

Behavioural Neuroscience.com
 Canadian Spring Conference on Behaviour and Brain



Fernie, BC, February 23-25, 2017

Thursday, February 23th, 2017

6:00pm Social Night – Informal buffet with wine, beer, and soft drinks

Friday, February 24th, 2017

4:00pm Introductory Comments

4:10pm Epilepsy (Matthew Hill)

5:00pm Stress, Anxiety, and Addiction I (Matthew Hill)

5:30pm Break

5:40pm Keynote Speaker: Andrew Holmes – “Alleviating anxiety: Strategies past, present, and future”

6:40pm Dinner

7:30pm Parental Experiences (Tammy Ivanco)

8:05pm Sex Differences (Tammy Ivanco)

8:45pm Break

8:55pm Stroke (Richelle Mychasiuk)

9:25pm Plasticity and the Brain (Richelle Mychasiuk)

Saturday, February 25th, 2017

4:00pm Reaching (Jenni Karl)

4:45pm Memory (Jenni Karl)

5:25pm Break

5:35pm Keynote Speaker: Stefan Köhler – “Functional organization of recognition memory in the human medial temporal lobe”

6:35pm Dinner

7:25pm Stress, Anxiety, and Addiction II (David Euston)

7:55pm Vocalization and Auditory Processing (David Euston)

8:50pm Break

9:00pm Concussion (John Howland)

9:30pm Miscellaneous (John Howland)

10:05pm Wrap-up, Awards, and Social

SCIENTIFIC PROGRAM AND ABSTRACTS – FRIDAY, FEBRUARY 24TH, 2017

EPILEPSY

(Moderator Matthew Hill – 4:10 to 5:00pm)

Jordan S. Farrell (GS), Roberto Colangeli, Kwaku Addo-Osafo, Maria Morena, Matthew N. Hill, G. Campbell Teskey. Non-canonical COX-2 signaling mediates postictal hypoxia.

Department of Cell Biology and Anatomy, Faculty of Medicine, University of Calgary

Recent studies have implicated COX-2 in the metabolism of the endocannabinoid, 2-arachidonoylglycerol (2-AG). This novel pathway produces prostaglandin glycerol esters (PG-Gs). A biological setting in which the brain produces PG-Gs is unknown and their physiological effects remain elusive. Here we suggest that COX-2 oxygenation of 2-AG, and not the conventional substrate arachidonic acid, mediates hypoxia following seizures. We support this idea through the use of substrate-selective COX-2 inhibitors, manipulation of endocannabinoid enzyme systems, and measuring endocannabinoid levels before and after seizures. This research provides a key advance in our understanding of COX-2 signaling and identifies more targeted treatments for postictal hypoxia.

Dr. Wendie N. Marks, Nadine K. Zabder, Quentin Greba, Stuart M. Cain, Terrance P. Snutch, John G. Howland. The effects of T-type calcium channel blockade on fear conditioning and extinction behaviour in an animal model of absence epilepsy.

Department of Physiology, Faculty of Medicine, University of Saskatchewan

Genetic Absence Epilepsy Rats from Strasbourg (GAERS) are a rodent model of childhood absence epilepsy that also displays characteristics of psychiatric disorders. GAERS have a gain-of-function missense mutation in the gene encoding the Cav3.2 T-type calcium channel. We tested GAERS and Non-Epileptic Control rats on fear conditioning and extinction. The pan T-type calcium channel blocker, Z944, was administered prior to the fear acquisition and extinction phases. We demonstrated alterations in fear conditioning which are reversed by Z944 prior to the acquisition phase in GAERS. Therefore, altered T-type calcium channel activity may underlie certain cognitive deficits in the GAERS strain.

Alexandra K. Wall (GS), Jordan S. Farrell, G. Campbell Teskey. Seizure-induced brainstem hypoxia during fatal kainic acid seizures.

Department of Neuroscience, Faculty of Medicine, University of Calgary

Sudden Unexpected Death in Epilepsy (SUDEP) results from breathing failure during or following a seizure, but the mechanisms behind this are unknown. Our lab recently discovered a period of severe hypoxia during and following a seizure in the brain regions involved in the seizure, providing a novel hypothesis for the neurobiological mechanism underlying SUDEP. We administered high doses of

intra-hippocampal kainic acid to mice, resulting in death approximately 30 minutes post-infusion. Brainstem and hippocampal EEG and tissue oxygen levels, breathing, and heart rate were recorded. Brainstem breathing centers became severely hypoxic immediately prior to breathing cessation, suggesting seizure-induced brainstem hypoxia may be involved in SUDEP.

Dr. Roberto Colangeli, Maria Vella, Massimo Pierucci, Giuseppe Di Giovanni. The fatty acid amide hydrolase inhibitor URB597 shows anti-seizure effects and does not alter synaptic plasticity at the perforant path-dentate gyrus synapses.

Department of Cell Biology and Anatomy, Faculty of Medicine, University of Calgary

Antiepileptic drugs control seizures with little effects on comorbid psychiatric and neurological alterations, including memory impairments. Cannabis has been used for centuries for the treatment of several neurological disorders including epilepsy. However, exogenous cannabinoids have detrimental effects on memory. Endocannabinoids finely control neuronal excitability and several forms of synaptic plasticity in the brain. Here we show that the synthetic cannabinoid WIN55,212-2 and the endocannabinoid anandamide hydrolysis inhibitor URB597 have anti-seizure effects. However, WIN55,212-2, but not URB597, impaired hippocampal synaptic plasticity. Furthermore, URB597 restored seizure-induced alterations of plasticity, suggesting that URB597 might be a good candidate for the treatment of epilepsy.

Jennifer Bialecki (GS), Alexander W. Lohman, Nicholas L. Weiling, Jordan H.B. Robinson, Haley A. Vecchiarelli Matthew N. Hill, G. Campbell Teskey, Roger J. Thompson. Pannexin-1 knockout increases kindling rate via TRPV1 dependent mechanism.

Department of Cell Biology and Anatomy, Faculty of Medicine, University of Calgary

Panx1 is a large pore non-selective ion channel that passes molecules up to 1kDa with implications in stroke and epilepsy. To investigate a role for Panx1 expressed by glutamatergic neurons we compared seizure properties using the kindling model of epilepsy in wildtype and Panx1^{-/-} mice. Panx1^{-/-} mice reached a stage five seizure more quickly than control mice. Interestingly, the number of kindling sessions required to reach a stage five seizure was reversed by a TRPV1 antagonist, capsazepine, administered prior to kindling. This suggests that Panx1 knockout enhances TRPV1 receptor activation. We show using electrophysiology and fluorescent imaging that Panx1 is permeable to anandamide, a TRPV1 agonist. Thus, Panx1 blockers increase neuronal excitability via AEA accumulation and TRPV1 activation, which may account for the augmented effects of kindling in Panx1^{-/-} mice.

Marshal D Wolff (GS), Scantlebury MH, Teskey GC. The role of hippocampal oxygen levels in the development and expression of epilepsy.

Department of Neuroscience, Cumming School of Medicine, University of Calgary

We recently determined that following the cessation of brief seizures, a long-lasting severe hypoxic event occurs in the brain regions involved in the seizure. We reasoned that given this severe change in oxygen levels following an ictal event, there may also be changes in local oxygen levels following focal status epilepticus (SE); these changes in turn may account for the development of chronic

epilepsy in rodent models. I employed two animal models of epilepsy to induce a long-duration focal SE whilst recording hippocampal oxygen for 24 hours. This was followed by 6 weeks of 24/7 video-EEG monitoring in order to observe spontaneous recurrent seizures. We hypothesize that during the induction of epilepsy, there will be drastic changes in hippocampal oxygen levels.

STRESS, ANXIETY, AND ADDICTION I

(Moderator Matthew Hill – 5:00 to 5:30pm)

Dr. Maria Morena, Kira D. Leiti, Asim Rashid, Sheena A. Josselyn, Matthew Hill. Fatty acid amide hydrolase overexpression in the basolateral nucleus of the amygdala paradoxically decreases anxiety and reduces fear expression in rats.

Department of Cell Biology and Anatomy, Cumming School of Medicine, University of Calgary

Increased endocannabinoid anandamide (AEA) levels in the Basolateral Amygdala (BLA), by inhibition of its degrading enzyme fatty acid amide hydrolase (FAAH), reduce anxiety, neuroendocrine responses to stress and promote fear extinction. We examined if impairments in AEA signaling, by FAAH overexpression within the BLA, would produce the opposite effects. Unexpectedly, we found that the overexpression of FAAH induced consistent anxiolytic effects, a dramatic reduction in fear expression and promoted fear extinction. These surprising findings open the avenue to investigate new potential mechanisms by which AEA regulates emotional states and memory in the amygdala.

Alicia Zumbusch (GS), Tristan Hynes, Catherine Thomas, Una Mrdja, Ioana Petriman, Anna Samson, Emilie Cutts, Nelson Canul, Abdullah Azeem, Asfar Khan, & Vedran Lovic. Early-life adversity potentiates escalation of opioid drug self-administration under extended drug access conditions.

Department of Psychology, Faculty of Arts, University of Calgary

Early-life conditions profoundly affect adult behaviour, especially in the context of addiction. We investigated the effects of early-life stress on escalation of opiate self-administration. Adversity rats experienced several mild, variable stressors in adolescence while their non-adversity siblings were left undisturbed. As adults, all rats were implanted with jugular catheters and trained to self-administer remifentanyl under short drug access and subsequently under long drug access. Adversity and non-adversity rats did not differ in drug seeking or consumption during short access; however, during long access, adversity rats showed significant escalation of drug seeking behaviour and marginal escalation of drug consumption.

David J. Lau (UG), Martin A. Sticht, Keith A. Sharkey, Matthew N. Hill. Modulation of acute stress-induced anorexia by fatty acid amide hydrolase inhibition in rats.

Departments of Cell Biology and Anatomy and Psychiatry, Faculty of Medicine, University of Calgary

Acute stress causes a reduction in food intake, which is modulated by factors such as stressor intensity and motivation to feed. Although fatty-acid-amide-hydrolase (FAAH) inhibition attenuates stress effects through increases in the endocannabinoid, anandamide (AEA), it is unclear how AEA

regulates stress-induced anorexia. We assessed the effects of systemic and intracerebroventricular administration of a FAAH inhibitor following restraint stress (2hr) or homecage food restriction (2hr). Rats consumed less chow following stress, which was not altered by systemic FAAH inhibition. However, central FAAH inhibition attenuated the stress-induced decrease in feeding, yet reduced food intake in non-stressed control rats.

Acknowledgements: Canadian Institutes of Health Research (CIHR) and Alberta Innovates Health Solutions (AIHS) Summer Studentship.

Catherine S. Laskowski (GS), Christensen, D. R., Dorchak, D., Fisher, K. G., & Euston, D. R. Short term dopamine D3 agonist administration increases motivation but does not generate addiction in rats.

Department of Neuroscience, Faculty of Arts and Science, University of Lethbridge

Patients prescribed dopamine agonists for treatment of Parkinson's Disease have reported spontaneous emergence of gambling addiction. In this study, we investigated whether dopamine agonist administration exacerbates addiction symptomatology in rats after long term exposure to gambling-like schedules of reinforcement. The drug had a large effect on the willingness of animals to work for food; however, the drug had no significant effect on other behaviours related to addiction. Overall, our results indicate that short term dopamine agonist administration increases motivation to work for food reward, but does not result in a loss of control over behaviour.

Break (5:30 to 5:40pm)

KEYNOTE SPEAKER – Andrew Holmes (5:40 to 6:40pm)

Alleviating anxiety: Strategies past, present, and future

Laboratory of Behavioral and Genomic Neuroscience | National Institute on Alcohol Abuse and Alcoholism (NIAAA)

Trauma-related and anxiety disorders are the most prevalent group of psychiatric diseases, and there is growing medical need to improve on the effectiveness and the side effect profile of existing anti-anxiety drugs. Many years of preclinical pharmacological research has generated a huge amount of data and has led to numerous clinical trials – but this has led to very few translational success stories. There is therefore an urgent need to find a more productive dialog between preclinical models and clinical studies that is powered by an ever-developing appreciation of the shared neural circuits and genetic architecture that moderate anxiety-related behaviors across species. Innovative approaches will be discussed, using recent case studies, which have the potential to deliver a new generation of risk biomarkers and therapeutic strategies for trauma and anxiety disorders. For more info: <http://niaaa.nih.gov/research/niaaa-intramural-program/niaaa-laboratories/laboratory-behavioral-and-genomic-neuroscience>

Dinner (6:40 to 7:30pm)

PARENTAL EXPERIENCES

(Moderator Tammy Ivanco – 7:30 to 8:05pm)

Brittney R. Lins (GS), Jessica L. Hurtubise, Wendie N. Marks, Nadine K. Zabder, Gavin A. Scott, Quentin Greba, Wojciech Dawicki, Xiaobei Zhang, John R. Gordon, John G. Howland. Prospective analysis of maternal serum cytokine levels following polyI:C treatment and effects on offspring behaviour.

Department of Physiology, Faculty of Medicine, University of Saskatchewan

Infection during pregnancy is associated with increased risk of schizophrenia in the offspring. This may be mediated by components of the maternal immune response released in response to infection, particularly cytokines. Human prospective studies have demonstrated elevated maternal interleukin-8 (IL-8) is associated with developing schizophrenia while IL-6 has been implicated in mice. We used a prospective design in rats to determine the relationship between maternal cytokine levels (CXCL1, CXCL2, IL-6, TNF- α) and offspring behaviour abnormalities. IL-6 elevations were associated with heightened MK-801-induced locomotion and impaired sociability. Cognitive impairments were seen in CMOR, PD/RL, and Oddity Preference while OSST was facilitated.

Allison Dyck (GS), Dr. Tammy Ivanco. Treats are neat, unless you are male and exposed to VPA.

Department of Psychology, Faculty of Arts, University of Manitoba

Difficulties coupling perception and action may induce social deficits in Autism spectrum disorders (ASD). Prenatal Valproic Acid (VPA) exposure causes autism-like development in several mammals. The Montoya staircase tests rodents' ability to perceive goals and make goal-directed movements. We expected the staircase task to reveal perception to action deficits in the VPA exposed rats, specifically in males. VPA exposed males consistently took and ate significantly fewer pellets than other groups. In contrast, VPA exposed females took and ate more pellets than other groups. We propose the VPA-exposed males had trouble coupling perception and action, impeding their abilities in goal-directed movements.

Allonna Harker (GS), Serena Jenkins, Bryan Kolb, Robbin Gibb. Preconception paternal experience: Impact on offspring epigenome, neurodevelopment and behaviour.

Department of Neuroscience, Faculty of Arts and Science, University of Lethbridge

A plethora of studies have demonstrated the impact of the maternal prenatal environment on offspring development. Experiences such as prenatal stress, diet, teratogens and environmental factors have a significant and direct impact on the developmental and behavioural outcomes of unborn offspring. However, there has been limited investigation examining the indirect impact of preconception paternal experiences on the developing brain of offspring. The aim of this research is to advance the present

understanding concerning the influence of paternal experience during the preconception period on offspring neurodevelopment and behaviour. Remarkably, this preconception paternal influence can be observed throughout the lifespan of offspring.

Serena Jenkins (GS), Allonna Harker, Robbin Gibb. Maternal preconception stress: Effects on early development of brain and behaviour in offspring.

Department of Neuroscience, Faculty of Arts and Science, University of Lethbridge

Chronic prenatal stress impairs offspring development due to increased exposure to stress hormones in utero. Maternal stress prior to conception can also impact offspring development via indirect mechanisms such as heritable epigenetic modifications. The current study examines the effects of maternal preconception stress on the early development of offspring brain and behaviour. Methods mirror those used in a recent study on paternal preconception stress, allowing the direct comparison between parental experiences. Maternal care was unaffected by the stress paradigm. Results suggest that stress-offspring have accelerated sensorimotor development compared to control-offspring, which is accompanied by alterations in brain.

Jessica Hodson (UG), Nathan Bartlett, Dr. Peter Hurd. Paternal and maternal ages association with self-reported schizophrenia liability: A replication study.

Department of Psychology, Faculty of Science, University of Alberta

While there are considerable amounts of research to support the association between older paternal age and increased risk of schizophrenia in offspring, the effect of maternal age on schizophrenia remains relatively understudied. The objective of this study was to replicate the findings of an earlier investigation which reported younger maternal age is associated with increased cognitive-perceptual features of schizotypy in offspring. This study was unable to replicate the association between younger maternal age and increased cognitive-perceptual features of schizotypy; however, evidence for a maternal age effect will be discussed.

SEX DIFFERENCES

(Moderator Tammy Ivanco – 8:05 to 8:45pm)

Ben Brinkman (UG), Ayanda Ngwenya, Bryan Kolb, Andy Iwaniuk. Quantifying hippocampal neuronal morphology in a seasonally reproducing rodent, Richardson's ground squirrel.

Department of Neuroscience, Faculty of Arts and Science, University of Lethbridge

Many seasonally reproducing mammals undergo significant changes in brain region sizes throughout the year. Seasonal changes can then interact with sex differences such that large sex differences in the spring are absent in the fall. However, the extent to which seasonal changes in brain regions reflect neuronal morphology is poorly understood. Using virtual microscopy and Golgi staining, we are testing whether there are seasonal changes in the hippocampal neurons of Richardson's ground squirrels, a species with profound seasonal and sex differences in behaviour. Here, we present our preliminary data on sex differences in the non-breeding season.

Bianca G Cioceanu (UG), Hurd PL, Boliek CA & Cummine J. Habenular asymmetry: A DTI study.

Department of Psychology, Faculty of Science, University of Alberta

The habenula is a component of a highly conserved pathway belonging to the limbic system, connecting the forebrain with the ventral midbrain. The habenula is one of the most well-known asymmetrical structures in the brain, but remains relatively understudied in humans. Previous work in fish has demonstrated habenular asymmetry to be generally lateralized in one direction per species, but individual variation can show sex differences or correlations with behaviour. Here, I investigate habenular asymmetry in humans using diffuse tensor imaging (DTI). I find that individuals tend to be rightward biased in terms of habenular tract integrity. Evidence of sex differences will be discussed.

Dr. Peter L. Hurd, Nathan J. Brandwein. Female choice for alternative male morph in a cichlid fish.

Department of Psychology, Faculty of Science, University of Alberta

Males of the cichlid *Pelvicachromis pulcher* exist in one of four different morphs. The two most common morphs, "red" and "yellow" show differences in reproductive strategy. Both morphs will breed monogamously, red males show preference to harem holding, while yellows do not but may follow a "satellite male" strategy. We presented females with the choice of associating with either red or yellow males in a dichotomous mate choice task. We found a significant preference for yellow over red males. We discuss the probable influences of female choice relative to other selection pressures in maintaining this polymorphism.

Nathan T. Bartlett (GS), Massah, S., Crespi, B., Prefontaine, G., Hurd, P.L. Methylation of Cyp19a1 and sexually differentiated cognitive traits.

Department of Psychology, Faculty of Science, University of Alberta

While humans demonstrate sexually differentiated psychological traits, there is a vast amount of within- and between-sex variation. During prenatal neurodevelopment, estradiol, which is converted from testosterone via aromatase, serves to masculinize and defeminize the male brain. Consequently, the degree of expression of Cyp19a1, the aromatase producing gene, may influence the differentiation process. Cyp19a1 methylation levels were assessed to 1) determine a general sex difference for the epigenetic marker and 2) investigate the influence of the gene's productivity on sex typical cognitive phenotypes. A sex difference in overall methylation levels was found, but this did not extend to our psychological measures.

Lara A Coelho (GS), Jason Schacher, & Claudia LR Gonzalez. Perceptual hand dysmorphia.

Department of Kinesiology, Faculty of Arts and Science, University of Lethbridge

Women are more likely to suffer from body dysmorphia and eating disorders; this had led to the suggestion that body representation differs across the sexes. Here we tested this suggestion by comparing hand representation between the women and men. Previous research on hand

representation has demonstrated an overestimation of hand width, and an underestimation of finger length but these studies have included mostly female participants. Our results show that while females replicated the previously described distorted characteristics, males had accurate representation of hand width. Future work will investigate the developmental trajectory of this phenomenon.

Break (8:45 to 8:55pm)

STROKE

(Moderator Richelle Mychasiuk – 8:55 to 9:25pm)

Kristen Dietrich (UG), Colby A. Nadeau, BSc; Phyllis G. Paterson, PhD; Frederick Colbourne, PhD. Efficacy of N-acetylcysteine in the collagenase rat model of intracerebral hemorrhage.

Department of Psychology, Faculty of Science, University of Alberta

Excessive reactive oxygen species (ROS) overwhelm endogenous antioxidant systems causing prolonged secondary injury after intracerebral hemorrhage (ICH). We investigated the efficacy of the N-acetylcysteine (NAC) as a potential ICH therapy, hypothesizing that NAC would improve behaviour and lessen neural injury in rat by increasing endogenous antioxidant glutathione, thereby mitigating oxidative damage. Although NAC failed to improve behavioural recovery at multiple doses, it reduced lesion volume at lower doses. Negative results with the higher doses are likely due to peripheral side effects. Overall, NAC is not markedly beneficial after ICH, but further study is underway to further improve efficacy.

Jasmine Aziz (UG), Ana Klahr, Kelly Fagan, Roseleen John, Frederick Colbourne. The effect of cooling applied to the uninjured hemisphere on behavioural recovery in a rat model of stroke.

Department of Psychology, Faculty of Science, University of Alberta

Cooling the body to ~33°C mitigates brain injury after stroke. However, cooling may affect plasticity in the uninjured hemisphere and thereby influence compensation. We assessed how cooling just the uninjured hemisphere influences post-stroke recovery. Rats were given a stroke followed by cooling of the uninjured hemisphere (vs. controls). While reaching success with the contralateral-to-stroke forelimb was unaffected, early cooling diminished their tendency to use their unimpaired paw, potentially reducing learned non-use. Interestingly, in a follow-up experiment with healthy animals, cooling did not impair learning or plasticity. Overall, cooling is safe and may discourage maladaptive learning after stroke.

Eszter Wendlandt (GS), Dr. Ian Winship. Mapping the timecourse of myelin changes in stroke.

Department of Psychiatry, Faculty of Medicine and Dentistry, University of Alberta

Stroke induces demyelination, but its relationship with cortical network impairment and recovery is not well defined. We used a novel approach to *in vivo* myelin imaging in peri-infarct cortex (ScoRe microscopy) to monitor myelin changes for 6 weeks following stroke. Changes in myelin were compared to the timecourse of functional remapping of somatosensory limb representations disrupted by stroke. Demyelination both proximal and distal to the infarct was apparent as early as day 1 post-stroke, with significant recovery by 7 days in distal regions and by 14 days in proximal regions. This timecourse closely mirrored the timeline of functional remapping.

Junqiang Ma (GS), Ian Winship. Prevention of the collapse of pial collaterals by remote ischemic preconditioning during acute ischemic stroke.

Department of Psychiatry, Faculty of Medicine and Dentistry, University of Alberta

Remote ischemic preconditioning (RIPerC) is a therapeutic strategy inducing peripheral ischemia (typically in the limbs) during stroke that may exert a neuroprotective effect. Collateral circulation plays an important role in determining tissue survival after ischemic stroke. We investigated collateral flow using *in vivo* laser speckle contrast imaging (LSCI) and two photon laser scanning microscopy (TPLSM) during distal middle cerebral artery occlusion (MCAo) in rats. LSCI and TPLSM revealed that RIPerC augmented collateral flow and prevented progressive narrowing of pial arterioles post-MCAo. RIPerC also significantly reduced early ischemic damage. Thus, via prevention of collateral collapse, RIPerC is neuroprotective.

PLASTICITY AND THE BRAIN

(Moderator Richelle Mychasiuk – 9:25 to 10:05pm)

Ryaan El-Andari (UG), Ayanda Ngwenya, Tom Lisney, Doug “Sunshine” Wylie, Andy “Eeyore” Iwaniuk. Does optic tectum size reflect the number of retinal ganglion cells?

Department of Neuroscience, Faculty of Science, University of Lethbridge

In non-mammals, the optic tectum is the primary target of retinal ganglion cell projections. Here, we ask whether the size of the tectum reflects the number of retinal ganglion cells (RGCs), as predicted by the principle of proper mass. Tectum and tectal layer volumes were measured and compared with retinal topography maps. The absolute sizes of the tectum and its layers increased with the total number of RGCs. However, when we examined relative size of the tectum, parrots, owls and ducks differed from other birds. The different scaling relationships among bird groups likely reflect variations in visual abilities and behaviour.

Lauren Williams (GS), T. Salik, R. Stryjek, K. Modlinska, W. Pisula, S. M. Pellis, A. N. Iwaniuk. Domestication affects Purkinje cell size and foliation in the cerebellar cortex in laboratory rats (*Rattus norvegicus*)

Department of Neuroscience, Faculty of Arts and Science, University of Lethbridge

The lab rat is an important model organism in scientific research. Similar to other domesticated animals, lab rats have relatively smaller brains compared to wild rats. In addition, lab rats exhibit less

spontaneous motor behaviour and acrobatic play than their wild counterparts. Such variation in motor behaviour likely reflects underlying changes in regions that coordinate and regulate motor activity, such as the cerebellum. Here, we compared the cerebella of female wild-caught Norway and Long-Evans rats to assess the effect of domestication on cerebellar folding (foliation), cerebellar volume, the number of Purkinje cells, and Purkinje soma size.

John W. Paylor (GS), Brittney Lins, Quentin Greba, John Howland, Ian Winship. Perineuronal nets.

Department of Psychiatry, Faculty of Medicine and Dentistry, University of Alberta

Perineuronal nets are components of the extracellular matrix which are crucial to the regulation of neural plasticity. These structures are lost in the prefrontal cortex of patients suffering from schizophrenia and our group has recently replicated this in a prominent animal model of the disorder. Unfortunately, the significance of the loss of PNNs and the regulation of plasticity in schizophrenia is not well understood. Our current work investigates direct perineuronal net degradation in the prefrontal cortex of rodents. We have found that PNN degradation results in the manifestation of several schizophrenia-like symptoms and perturbs the local cellular environment.

Brandon E. Hauer (GS), Pagliardini, S., Dickson, C.T. Assessing the relative circuit contributions for hippocampal rhythmical activity.

Department of Neuroscience, Faculty of Medicine and Dentistry, University of Alberta

The hippocampus generates two large rhythms in a mutually exclusive fashion during sleep: theta and the slow oscillation. Profile analysis confirms that the major field and current fluctuations giving rise to these activities occur at the level of stratum lacunosum moleculare (SLM) of CA1. The major input to this region is from layer 3 of entorhinal cortex, although a prominent input also derives from the thalamic nucleus reuniens. We will determine the relative importance of these two inputs by direct optogenetic manipulation combined with single unit recordings. This study will address how these circuits both generate and coordinate hippocampal activity.

Sarah E. Thackray (GS), Sarah S. Bryden, Vedran Lovic, Richard H. Dyck. The role of synaptic zinc in striatal plasticity.

Department of Psychology, Faculty of Arts, University of Calgary

The striatum is a brain region that has important roles in movement, cognition, motivation, and reward. Several neurotransmitters/neuromodulators can modulate circuits within the striatum; one of these is synaptic zinc. The role of synaptic zinc in the striatum is currently unknown; however, it may play a role in plasticity. Drugs of abuse, like cocaine, act within the striatum and can alter striatal plasticity. To test whether zinc plays a role in cocaine-induced striatal plasticity, zinc transporter 3 (ZnT3) knockout mice, which lack synaptic zinc, were examined on locomotor activity and sensitization after cocaine administration and compared to wildtype mice.

Clare M. Song (UG), Doenni, Vienna M, Pittman, Quentin J. Microglia characterization in the P14 brain.

Department of Neuroscience, Faculty of Medicine, University of Calgary

In recent years, evidence has been brought forward showing altered amygdala related behaviour as well as altered receptors and signaling molecules in the amygdala in rodents that experienced early life inflammation. In order to identify the reason for the unique vulnerability of the amygdala we analyzed microglia density and number in amygdala and hippocampus, a structure that is significantly affected by earlier insults (e.g. P5) but largely unaffected by LPS on postnatal day (P) 14. Our preliminary data show that indeed differences exist between the structures that may explain the different vulnerabilities of hippocampus and amygdala to P14 LPS.

SCIENTIFIC PROGRAM AND ABSTRACTS – SATURDAY, FEBRUARY 25TH, 2017

REACHING

(Moderator Jenni Karl – 4:00 to 4:45pm)

Jessica Kuntz (GS), Ian Whishaw, Jamshid Faraji, Behroo Mirza Agha, Grelinde Metz, Majid Mohajerani. Dissociation of the reach and grasp in head-fixed mice: The evolutionary predecessor of the Dual Visuomotor Channel theory?

Department of Neuroscience, Faculty of Arts and Science, University of Lethbridge

When blindfolded the seamless act of prehension in humans dissociates into a Reach and a Grasp. The Reach extends the arm to the target and the Grasp shapes the hand for purchase. This finding supports the Dual Visuomotor Channel theory of reaching that the act consists of two movements. Here head-fixed mice reached for food and we asked whether, not able to locate the target by sniffing, they would adopt a touch-release-grasp strategy. That they did, suggests that rodent reaching is a composite movement proposing that the Dual Visuomotor organization of reaching is conserved.

Alexis M. Wilson (UG), Jenni M. Karl. The development onset of visually-guided prehension: It's at the tip of your finger.

Department of Psychology, Faculty of Arts, Thompson Rivers University

Multiple Motor Channel (MMC) Theory predicts that prehensile development requires learning to visually coordinate separate Reach and Grasp movements into a singular act. The Reach and Grasp of 12-month-old infants were compared to sighted and blindfolded adults. Infants resembled blindfolded adults in that they did not scale hand aperture to target size prior to target contact and they relied on initial contact with the underlying table to stabilize their Reach endpoint. Yet, after Reach stabilization, infants, like sighted adults, could accurately direct a grasping digit to make target contact; only then did infants shape and close the hand to grasp. The results support the MMC theory by providing evidence that visual guidance of the Reach begins to develop before that of the Grasp.

They also contrast with traditional neuromaturational theories of development by suggesting that visual guidance of the distal portion of the Reach developmentally precedes that of the proximal portion.

Dr. Melvyn A. Goodale, Juan Chen, Irene Sperandio. Proprioception calibrates object size constancy for grasping but not perception in limited viewing conditions.

Department of Psychology, Brain and Mind Institute, University of Western Ontario

Perceptual size constancy has been shown to depend on a range of distance cues, each of which is weighted differently in different viewing conditions. What is not known, however, is whether or not the same cues are used to calibrate size constancy for grasping. To address this question, participants were asked either to grasp or to manually estimate the size of spheres presented at different distances when different visual and proprioceptive cues were available. Our results suggest that proprioception can support size constancy for grasping when visual distance cues are severely limited, but not size constancy for perceptual judgements.

Behroo Mirza Agha (GS), Ian Wishaw, Majid Mohajerani. Inactivation of posterior parietal cortex in freely reaching mice affects reach efficacy.

Department of Neuroscience, Faculty of Arts and Science, University of Lethbridge

Freely moving mice reached for food pellets in a reaching chamber and received laser stimulation that activated parvalbumin interneurons of posterior parietal cortex. Neither the reach nor the grasp was inhibited by stimulation given before the grasp. The results suggest that posterior parietal cortex is involved in calibration of arm accuracy suggesting that posterior parietal cortex more generally has greater involvement in planning than in executing an action.

Daniela Aguilar (UG), Blinch, J., and Gonzalez, C. Is there a relationship between visuospatial and haptic processing?

Department of Kinesiology, Faculty of Arts and Science, University of Lethbridge

Right hemisphere dominance for visuospatial and haptic functions is well known, but is there a relationship between the two? In other words, do people with better visuospatial abilities also display enhanced haptic processing and vice versa? To assess visuospatial abilities, we employed the Shepard and Metzler mental rotation test, a visual search task, and a novel Lego-based test combining mental rotation and visual search. To assess haptic processing two object-recognition tasks were employed. Significant positive correlations were found between the two domains but only when the haptic task was executed with the left hand. We suggest that shared mechanisms in the right hemisphere support visuospatial and haptic processes.

Nicole van Rootselaar (GS), Fangfang Li, C.L.R. Gonzalez. Grasp it like you mean it: Action affects speech, but only when meaningful.

Department of Kinesiology, Faculty of Arts and Science, University of Lethbridge

Manipulating objects while telling a friend about your day are actions that are performed simultaneously without effort. Yet, research has shown that manual movements influence speech and vice-versa. The extent of this interaction is contentious as some researchers have observed a powerful effect of manual actions on speech whereas others observe minor changes. A possible reason for this discrepancy is that the studies required participants to execute different manual actions. We found that voice/speech was affected by the action but only when grasping was functionally relevant (i.e. grasp-to-place). The results are discussed in the context of the evolutionarily-based relationship between hand and mouth gestures.

MEMORY

(Moderator Jenni Karl – 4:45 to 5:25pm)

Dr. Irene P. Kan. Memory monitoring failure in confabulation.

Department of Psychology, Villanova University

Confabulation is a neurological syndrome characterized by the patients' propensity to confuse untrue memories with true memories, and this condition is sometimes referred to as “honest lying” because individuals who confabulate are often unaware of the inaccuracies of the retrieved information. Across two behavioural studies, we examined post-retrieval memory processes in confabulating patients who suffered from ruptured anterior communicating artery (ACoA) aneurysms. Compared to non-confabulating ACoA patients and healthy controls, we found that confabulating patients are differentially impaired in the controlled aspects of memory monitoring. We interpret our findings in the context of a dual-process model of post-retrieval monitoring.

Vanessa Moman (UG), Emily Cole, Megan Tchaderjian, and Dave G. Mumby. A new go/no-go procedure to assess object-recognition in rats.

Department of Psychology, Faculty of Arts and Science, Concordia University

Novelty-preference tests are commonly used to assess object-recognition in rats, but there are serious concerns about their internal validity. Alternatives exist, as a few delayed nonmatching-to-sample (DNMS) tasks were developed in the 1990s to assess object-recognition in rats. But conventional DNMS tasks are difficult to use, and subjects require many weeks of training. We developed a new go/no-go DNMS procedure that rats can master much quicker than previous DNMS tasks. The results from this new task confirm its utility as a test of object-recognition memory.

Emily Cole (GS), Ralph E. Mistlberger, Dave G. Mumby. Circadian time-place (or time-route) learning in rats with hippocampal lesions.

Department of Psychology, Faculty of Arts and Science, Concordia University

Circadian time-place learning (TPL) is the ability to remember both the place and time of day that a significant event occurred (e.g., food availability). To date, it is unclear which neuronal substrates are critical in this process, but one candidate structure is the hippocampus (HPC). We trained rats using a novel TPL procedure, and then we administered either HPC or SHAM lesions and re-tested the rats.

Rats with HPC lesions were initially impaired on the task, but re-attained high scores with continued testing. The results demonstrate that the HPC is not required for rats to find food in different locations using circadian phase as a discriminative cue.

Anastasia Greenberg (GS), Javad Karimi, Clayton Dickson, Majid Mohajerani. DYE-ing for stimulation: Sleep-like slow wave propagation patterns, as measured by voltage sensitive dye imaging under urethane anesthesia, are constrained by the application of rhythmic alternating electric fields.

Department of Psychology, Faculty of Science, University of Alberta

During slow-wave states, neocortical activity shows a robust large-amplitude slow oscillation (SO) which propagates as a traveling wave and has been implicated in memory consolidation. Our goal was to assess the modulation of this dynamic activity by the application of sinusoidal electrical fields in a mouse model using voltage-sensitive dye (VSD) imaging in a bilateral cortical window. Spontaneous SO propagation showed two major patterns: anterior-to-posterior and posterior-to-anterior directions. The application of field stimulation entrained the VSD signal at widespread cortical sites and biased SO propagation in the anterior-to-posterior direction. Our results suggest that electric fields could be used as a tool to modulate SO dynamics and thus, perhaps memory consolidation.

Justin Q. Lee (GS), Erin L. Zelinski, Robert J. McDonald, Robert J. Sutherland. Heterarchic reinstatement: A concept on hippocampal amnesia and long-term memory organization.

Department of Neuroscience, Faculty of Arts and Science, University of Lethbridge

Contemporary views of LTM organization suggest that HPC disruption produces amnesia for specific memory types. These accounts also imply that HPC disruption before or soon after a learning episode should have similar amnesic effects. However, recent evidence from HPC lesion and inactivation experiments illustrate that HPC disruption after a learning episode causes amnesia for a wider range of memories than if the same disruption occurs before learning. This finding supports that multiple circuits can acquire and retrieve similar information, it also suggests they do not do so independently. We develop an explanation for why anterograde and retrograde HPC effects differ.

Break (5:25 to 5:35pm)

KEYNOTE SPEAKER – Stefan Köhler (5:35 to 6:35pm)

Functional organization of recognition memory in the human medial temporal lobe

Brain and Mind Institute and Department of Psychology, Western University

It is well established that recognition of the prior occurrence of a stimulus can succeed in the absence of successful recollection of contextual detail about a specific past encounter, by way of a process

known as familiarity assessment or item-based recognition memory. The goal of my talk is to review neuropsychological research and neuroimaging studies that address its underlying neural mechanisms in the human medial temporal lobes (MTL). Our work has been guided by the general hypothesis that representations in extra-hippocampal structures that interface the MTL with the ventral visual pathway, including but not limited to perirhinal cortex, support item-based recognition memory. I will argue that the evidence reviewed supports models of MTL organization that emphasize the nature of stimulus representations, and their functional-behavioral relevance, rather than any sharp distinction between memory and perceptual processing.

Dinner (6:35 to 7:25pm)

STRESS, ANXIETY, AND ADDICTION II

(Moderator David Euston – 7:25 to 7:55pm)

Haley A Vecchiarelli (GS), Kaitlyn Tan, Maria Morena, Catherine Keenan, Winnie Ho, Martin Sticht, Kira Leitl, Keith A. Sharkey, Matthew N. Hill. Anxiety induced by peripheral inflammation is reversed by acute inhibition of fatty acid amide hydrolase.

Departments of Cell Biology and Anatomy and Psychiatry, Cumming School of Medicine, University of Calgary

There is a large degree of comorbidity between chronic inflammatory diseases and psychiatric diseases, but the neural mechanisms underlying this are not fully elucidated. The endocannabinoid system is an ideal target to investigate these interactions, as it is anti-anxiety and anti-inflammatory. We previously showed that the endocannabinoid system is altered in brain regions that regulate anxiety during colitis. Currently, we show that colitis increases anxiety, and this can be reversed by an acute, icv administration of an inhibitor of the enzyme that metabolizes anandamide, FAAH, prior to testing. Our work may provide insights into neural mechanisms of comorbid anxiety during inflammation.

Tristan Hynes (GS), Anna Samson, Alicia Zumbusch, Catherine Thomas, Angelique Orr, Una Mrdja, Bruce Ruzindana, & Vedran Lovic. The effects of early life adversity on compulsive opioid self-administration.

Department of Psychology, Faculty of Arts, University of Calgary

The etiology of drug-addiction, a compulsive and relapsing brain disorder, is poorly understood. Human survey studies have found an association between early life adversity (ELA) and addiction relevant phenomena. However, causal links between the two remain elusive. We investigated the effects of ELA (peri-adolescent mild stressors) on addiction relevant traits and compulsive opioid self-administration. We have found that ELA increases drug self-administration and that the propensity to attribute incentive value to reward cues is a significant predictor of compulsive drug-self administration. This is the first experimental study showing a psychological mediator between ELA and compulsive opioid self-administration.

Catherine Thomas (GS), Ioana Petriman, Una Mrdja, Tristan Hynes, Alicia Zumbusch, & Vedran Lovic. Drug sensitization leads to rapid incentive sensitization.

Department of Psychology, Faculty of Arts, University of Calgary

Drug cues can be attributed with incentive value, rendering them capable of potentiating drug craving and consumption. Exposure to cocaine leads to psychomotor sensitization; however, less is known about the development of incentive sensitization. We treated rats with escalating doses of cocaine or saline. Following an incubation period, rats experienced a single session during which a cue was paired with cocaine infusions. Rats then had an opportunity to make instrumental responses for the presentation of a cocaine cue. Sensitized rats made a significantly greater number of responses, showing that drug sensitization leads to rapid attribution of incentive value to a drug cue.

Brendan McAllister (GS), Richard Dyck. The effects of chronic social defeat stress on mice that lack zinc transporter-3.

Department of Psychology, Faculty of Arts, University of Calgary

Certain neurons release zinc ions in an activity-dependent fashion. Zinc transporter-3 (ZnT3) is the sole mechanism responsible for sequestering zinc into synaptic vesicles. ZnT3 knockout mice therefore lack synaptically-releasable zinc and, as a result, are deficient in some forms of experience-dependent plasticity. Here, we examined how ZnT3 knockout mice are affected by chronic social defeat stress. Regardless of genotype, stress resulted in social avoidance and increased anxiety-like behaviour. Relative to stressed wild type mice, stressed ZnT3 knockouts were less avoidant of a novel conspecific. Additionally, stress potentiated cued fear memory in ZnT3 knockouts but not in wild type mice.

VOCALIZATIONS AND AUDITORY PROCESSING

(Moderator David Euston – 7:55 to 8:50pm)

Candace Burke (GS), Theresa M. Kisko, David R. Euston, Sergio M. Pellis. Use of ultrasonic calls in regulating social interactions in rats: The danger of making a faux pas.

Department of Neuroscience, Faculty of Arts and Science, University of Lethbridge

The ultrasonic calls of rats are associated with emotional states, 22 kHz for negative and 50 kHz for positive affective states. Intact adult male rats were paired with either a devocalized or intact partner. All devocalized-vocal pairings escalated encounters to aggression, suggesting that intact pairs used vocal signals to attenuate such aggression. Detailed analysis of the vocalizations revealed that specific ultrasonic calls are used to mitigate the escalation into aggression. These findings indicate that rat ultrasonic vocalizations are not only emitted to express emotional state, but also strategically to influence the actions of a partner. Supported by NSERC and AIHS.

Dr. Stephen G. Lomber, Ameer J. McMillan, Andres Carrasco, and Paul Cornwell. A hierarchically organized sound discrimination pathway in auditory cortex.

Department of Physiology and Pharmacology, Schulich School of Medicine and Dentistry, University of Western Ontario

We tested the hypothesis that ventral, but not dorsal, areas of the cat's temporal lobe have greater specificity for complex acoustic stimuli. The animals concurrently learned to discriminate three sound classes: tones, narrow-band bursts, and conspecific vocalizations. After training, cooling loops were bilaterally placed over primary auditory cortex (A1), second auditory cortex (A2), temporal cortex (area T), and insular cortex (area IN). Bilateral deactivation of A1 resulted in discrimination deficits on all three stimulus classes. Bilateral deactivation of A2 caused deficits only for the narrow-band burst and conspecific vocalization classes. Bilateral deactivation of area T resulted in deficits restricted to the conspecific vocalizations. The results of this study indicate a "what" processing pathway in auditory cortex of the cat that arises in primary auditory areas and radiates down the temporal lobe.

Vera Lee (UG), Scott Stone, Matthew Tata. What's in a cocktail party? Testing the mechanisms of auditory spatial resolution in multi-talker scenes.

Department of Neuroscience, Faculty of Arts and Science, University of Lethbridge

Our ability to resolve and select single voices out of a complex auditory scene is a foundational problem in cognitive neuroscience and cognitive psychology. In discovering the computational mechanisms by which we resolve spatially distinct sounds, we find that binaural sound localization cues can lead to a front-back ambiguity. One theory holds that head movements are critical in resolving these ambiguities. We developed a simple listening task in which participants count the number of distinct voices they hear in a front-field complex auditory scene – with and without head rotations. We found that there was an increase in performance for those listeners using head rotations. We further tested the front-back ambiguities by using the same listening task with talkers in both front and back-fields. This task allowed us to further test mechanisms of auditory scene analysis that determine the resolution of spatial auditory attention.

Theresa M Kisko (GS), Braun MD, Redecker T, Bartz M, Pützer A, Hohmeyer C, Rietschel M, Witt SH, Schwarting RKW, Wöhr M. Sex-dependent effects of Cacna1c haploinsufficiency on social behaviour and 50-kHz ultrasonic vocalizations in rats.

Department of Experimental and Behavioural Psychology, Faculty of Psychology, Philipps University Marburg

A recently implicated gene in affective disorders is CACNA1C. To study its role in social behaviour, we investigated juvenile play and concomitant emission of 50-kHz ultrasonic vocalizations (USV) in wildtype (+/+) and heterozygous (+/-) Cacna1c rats. Our results show that female Cacna1c+/- rats engaged in more rough-and-tumble play than Cacna1c+/+ littermates, displaying strongly enhanced levels of pinning. In males, rough-and-tumble play did not differ between genotypes, yet the emission of prosocial 50-kHz USV during juvenile play was clearly lower in Cacna1c+/- compared to Cacna1c+/+ rats. This indicates that Cacna1c is implicated in social development and communication relevant to affective disorders.

Niti Patel (UG), Michael Kyweriga, Majid Mohajerani. Tinnitus impairs performance on gap inhibition of the acoustic startle reflex.

Department of Neuroscience, Faculty of Arts and Science, University of Lethbridge

To gain a better understanding of tinnitus, there is a need to observe how the brain changes from its normal state to its disordered state. In addition to the auditory cortex, other cortical areas may also be affected. To investigate this, we plan to image their brains. We have induced tinnitus in mice using traumatically loud noise. To assess the degree of tinnitus, we have used a behaviour test, Gap Inhibition of the Acoustic Startle Response (GIASR). We found that tinnitus-induced mice are unable to detect a gap in background noise. Knowing this, we can image their brains.

Rachel Stark (GS), Allonna Harker, Toshi Uyesugi, Ana Carvalho, Fangfang Li & Robbin Gibb. Paternal fluoxetine changes the natural development of ultrasonic vocalizations.

Department of Neuroscience, Faculty of Arts and Science, University of Lethbridge

Neonatal rodents begin vocalizing after birth and have been shown to stimulate maternal behaviours such as retrieval, lactation, and grooming. Ultrasonic vocalizations (USVs) follow a strict developmental profile that can give insight into neurodevelopment, thus, is an effective tool to assess perturbations. This experiment will assess the USV development of offspring whose fathers were treated with fluoxetine during the preconception period. Fluoxetine is a selective serotonin re-uptake inhibitor used to treat depression in the clinical population. Prenatal and perinatal exposure to fluoxetine has been shown to create deficits in play behaviour and memory throughout the lifespan in rodent models.

Dr. Ning Cheng, Maryam Khanbabaei, Jessica Naidu, Kartikeya Murari and Jong M. Rho. Ketogenic diet improves vocal communication in a mouse model of autism.

Department of Pediatrics, Faculty of Medicine, University of Calgary

Language delays and deficits is a defining feature of autism spectrum disorder (ASD). Currently, only co-morbid manifestations of the disorder can be alleviated, but not the core symptoms. Here, we tested whether the ketogenic diet (KD) could improve vocal communication of the BTBR mouse model of ASD. We found that the KD improved both the volume and structure of ultrasonic vocalizations in juvenile as well as adult BTBR mice, compared with BTBR mice fed with standard diet. These data suggest that the KD could have therapeutic benefit for language impairment in ASD.

Break (8:50 to 9:00pm)

CONCUSSION

(Moderator John Howland – 9:00 to 9:30pm)

Dr. Glenn Yamakawa, Richelle Mychasiuk. Circadian rhythms in adolescent traumatic brain injury.

Department of Psychology, Faculty of Arts, University of Calgary

One of the most common complaints following mild traumatic brain injury such as concussion are sleep disruptions. In order to develop interventions to deal with post-concussion sleep problems, they first must be characterized. We measured circadian locomotor activity and body temperature rhythms in adolescent male and female rats through telemetry probes implanted in the intraperitoneal cavity. We then subjected them to repeated mild traumatic brain injuries followed by a brief exposure to constant dark. The animals were sacrificed and the brains processed for immunohistochemical markers of damage. Circadian disruption was not apparent in response to traumatic brain injuries, however differences did appear to emerge under constant dark conditions.

Sabrina Salberg (UG), Katrina Yu, Richelle Mychasiuk. Investigating the preclinical effects of resveratrol, prebiotic fiber, and omega-3 fatty acids as a nutritional supplement treatment for concussion using the Sprague Dawley rat model.

Department of Psychology, Faculty of Arts, University of Calgary

Following mild traumatic brain injury, there is ambiguity in prognosis for those who go on to suffer from post-concussive syndrome (PCS). We hypothesize that supplementation of a regular diet with resveratrol, prebiotic fiber, and omega-3 fatty acids, will prevent PCS. This study assigned Sprague Dawley rats to one of four experimental conditions (Supplement + Concussion; Supplement + Sham Injury; Placebo + Concussion; Placebo + Sham Injury). A complete behavioural test battery designed to examine PCS was then administered. Results showed that the supplement prevented injury-related deficits in half of the measures where TBI-induced deficits were found in control animals.

Connor Lengkeek (UG), Simon Spanswick, Richelle Mychasiuk. Effects of caffeine pre-exposure on recovery from traumatic brain injury during development.

Department of Psychology, Faculty of Arts, University of Calgary

Mild Traumatic Brain Injury (mTBI), an injury resulting from strong and sudden forces of acceleration to the brain, is an increasing risk to the population. Despite its prevalence and severity, few treatments exist and little is known about its interactions with comorbidities or pharmaceuticals. Caffeine is the most commonly used psychoactive drug in North America, and in many cases, is used by the same groups that are at risk for mTBI. This study investigated the relationship of adolescent pre-exposure to caffeine and recovery from mTBI. Behavioural and post-mortem tissue analysis were conducted using rats as an animal model. Differences in caffeine exposure contribute to the heterogeneity found in Post Concussion Syndrome.

Erik Fraunberger (GS), Timothy Shutt, Michael Esser. Chronic alterations in mitochondrial form and function following pediatric mild traumatic brain injury in rats.

Department of Neuroscience, Faculty of Medicine, University of Calgary

In the present study, we used a modified weight drop model of pediatric mTBI at P30. Behavioural assessments were conducted between P31 and P50 followed by sacrifice for mitochondrial preparation. While rats displayed motor deficits and affect changes, there were no measurable alterations in short term memory or depressive-like behaviour. However, mitochondrial respiration and the expression of key regulators of mitochondrial dynamics were altered in a sex-dependent manner following mTBI at three weeks post-injury. In summary, our work suggests mTBI in the developing brain has the potential to produce changes in mitochondrial form and function without broad changes in behaviour.

MISCELLANEOUS

(Moderator John Howland – 9:30 to 10:05pm)

Axita Shienh (UG), Claire Scavuzzo, Clayton Dickson. Fuel availability and brain state: Examining the effects of lactate administration on forebrain states in the urethane anesthesia model of sleep.

Department of Psychology, Faculty of Science, University of Alberta

The role of metabolism in neural function has been typically considered in terms of dwindling resources. We have adopted a different approach by considering how augmenting metabolic resources might influence neural function. Previously, we have found that increases in blood oxygen content to neural tissue promotes slow wave states in both natural sleep and urethane anesthesia. Here we show that administering lactate either systemically or intracranially evokes an increase in slow-wave states under urethane. This suggests that a bias towards oxidative metabolism promotes states that may function to save energy for future operations.

Vienna M. Doenni (GS), Quentin Pittman. Risky decision making as consequence of early-life inflammation.

Department of Neuroscience, Faculty of Medicine, University of Calgary

Early-life inflammation has been connected to a variety of behavioural abnormalities such as altered anxiety as well as autism- and schizophrenia-like symptoms. Previously, we were able to show that amygdala dependent behaviours (social behaviour and fear) are affected by P14 inflammation. Therefore we investigated whether risk assessment, another amygdala mediated behaviour, is altered in consequence to P14 LPS. In a novel object exploration task P14 LPS increases the time animals investigate the novel object. Further, preliminary data suggests that P14 LPS alters the likelihood of sampling a novel item (sweetened water) and alcohol consumption in a 2 bottle choice paradigm.

Scott Stone (GS), Claudia Gonzalez, Matthew Tata. Seeing through sound: A Novel Visuo-to-Auditory Augmented Reality Device.

Department of Neuroscience, Faculty of Arts and Science, University of Lethbridge

Many visual events are temporally coupled with an auditory event, such as a car making noise as it passes by. However, some visual events have no auditory component, like interacting with a computer monitor. Using neuromorphic camera technology, we created augmented auditory reality software to convert those visual events into spatial audio events. Here we demonstrate this software which allows blind individuals to perceive purely visual events as spatially-relevant audio. Two studies were conducted to assess the usefulness of such a device in sighted and blind individuals. Preliminary results suggest a potentially useful device for blind individuals.

Anna Kovalchuk (GS), Yaroslav Ilnytsky, Svitlana Shpyleva, Amanda Katz, David Sidransky, Olga Kovalchuk and Bryan Kolb. Tumor brain and chemo brain: The brain after chemotherapy.

Department of Neuroscience, Faculty of Arts and Science, University of Lethbridge

Central nervous system complications happen after cancer treatment. This condition is known as chemo brain and affects over half of cancer survivors. Recent studies report that cognitive impairments manifest before chemotherapy and are broader than chemo brain alone, thus implicating the tumor. The molecular mechanisms of chemo brain are under-investigated, and those of tumor brain have not been looked at all. We analyzed the molecular and epigenetic changes in the brains of tumor-bearing mice post chemotherapy treatment. Our data show that tumor presence alone impacts molecular and epigenetic processes in PFC tissues. Chemotherapy further exacerbates these tumor-caused effects.

Katrina Zmavc (UG), Tammy Ivanco. Is IL-1 β ; a traveler to the brain?

Department of Psychology, Faculty of Science, University of Manitoba

The ability of exogenous IL-1 β ; to cross the blood-brain barrier to facilitate an immune effect on the brain is debated. Due to the connection between immune proteins and neural response and function in the literature and our lab, we expected IL-1 β ; to be increased in animals given peripheral injections of the cytokine. We examined the hippocampus following IL-1 β ; treatment, mimicking another lab study. Our findings illustrate exogenous IL-1 β ; results in increased IL-1 β ; protein in hippocampus. We suggest differences in neural responses are due to the direct influence of IL-1 β ; on brain physiology after peripheral administration.