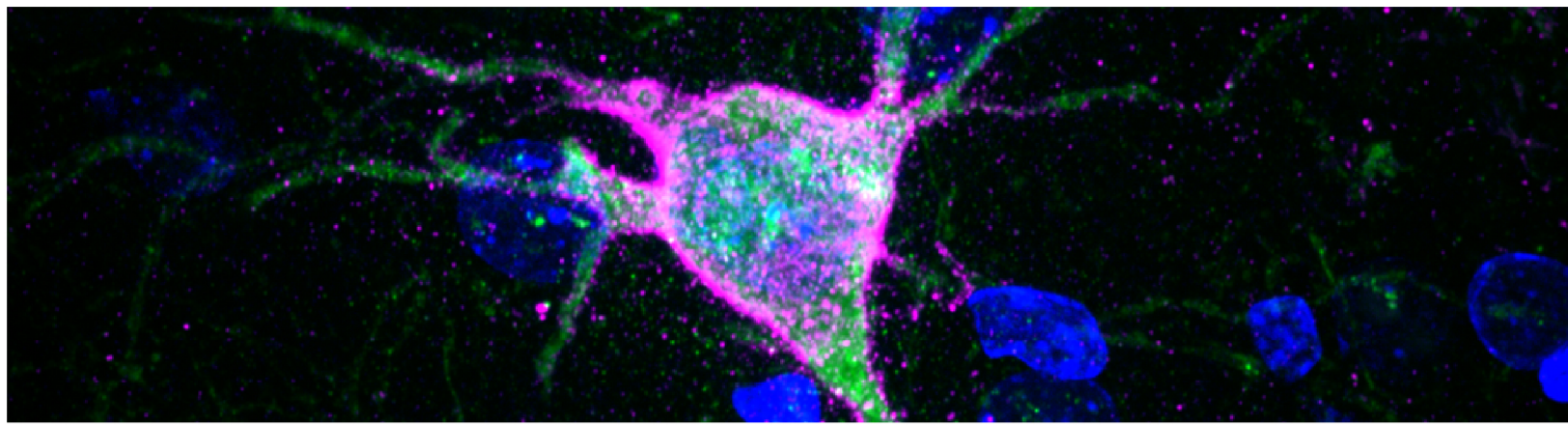

UNIVERSITY OF ALBERTA
FACULTY OF MEDICINE & DENTISTRY

17th Annual Department of Psychiatry Research Day

Abstract Book

Keynote Address: **Dr. Jane A. Foster**

Microbes and Mood: Microbiota-Host Interactions in Mood and Mental Health.

Wednesday, May 30, 2018
Bernard Snell Hall

UNIVERSITY OF ALBERTA

DEPARTMENT OF PSYCHIATRY
FACULTY OF MEDICINE AND DENTISTRY
OFFICE OF THE CHAIR

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May 30th, 2018

Welcome to the 17th Annual Research Day of the Department of Psychiatry at the University of Alberta

Going into its 17th anniversary, Psychiatry Research Day 2018 showcases and celebrates recent findings from our basic and translational research programs including developments in neurochemistry, genetics, imaging, neuropsychiatry, and psychotherapy. Many of these programs involve collaborative research with colleagues from other departments and institutions locally, nationally, and internationally. Over the years, the Department of Psychiatry has developed very strong MSc and PhD programs to complement our excellent residency program, with some of our residents enrolled in the MSc program. Our trainees represent our department exceedingly well by winning many national, provincial, university and faculty scholarships and awards and by disseminating their research at scientific conferences throughout the world.

Research Day this year has a focus on gut-brain interactions in mental health, as suggested by the graduate students. Our invited speakers cover a range of topics from this area and others, including a lived experienced presentation by Sharon Ryder Unger at the start of the day, Dr. Jane A. Foster providing the keynote presentation at part of Psychiatry Grand Rounds at lunch, and Dr. Allen Chan in the afternoon. Following last year's successful format, we will again have short presentations from our graduate students including Mohammad Alam, Chelsea Bedrejo, James Benoit, Jasmine Brown, Eric Chan Tai Kong, Catherine Cheng, Daniela Gomez, Michal Juhas, Jessica Luki, Manoj Malik, Tyler Marshall, Brad Necyk, John Paylor, Matt Reeson, Rejish Thomas and Eszter Wendlandt. Poster presentations from our trainees and collaborators will also be presented throughout the day. The top presentations by research trainees will be acknowledged with awards.

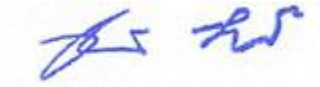
Our keynote speaker this year is Dr. Jane A. Foster, from McMaster University in Hamilton. Dr. Jane A. Foster is an Associate Professor of Psychiatry at McMaster University and past president of the Canadian College of Neuropsychopharmacology. Dr. Foster's fundamental work on gut-brain interactions is at the forefront of finding novel interventions in psychiatry, for example those targeting probiotics, antibiotics, and fecal microbiota transplants in the context of psychiatry. She has published more than 80 peer-reviewed papers, presented her work at over 40 local, national, and international venues, and has been highly active in outreach activities with the general public, including with TedTalks, webinars, public lectures and art exhibitions. Dr. Foster's keynote lecture entitled, "Microbes and Mood: Microbiota-host interactions in mood and mental health" will discuss her groundbreaking work in this area and is an ideal fit for the theme of this year's event, gut-brain interactions in mental health.

We are grateful to all our research trainees and their supervisors for their contribution to the vital research in our department. Special thanks to our organizing committee: Jessica Luki, Daniela Gomez, and John Wesley Paylor (our graduate student representatives); Tara Checknita (heart & soul of Research Day); and Dr. Esther Fujiwara for their tireless efforts in organizing this year's Research Day.

We would like to gratefully acknowledge funding from Lundbeck Canada and Janssen Pharmaceutical for this important venture. Lastly, we would like to thank our local Real Canadian Superstore, and Blush Lane Organic Market for providing prizes for out student speakers.

Thank you for joining us and celebrating our research accomplishments from the past year.

Best Wishes,



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

ACKNOWLEDGEMENTS

The Department of Psychiatry is grateful to the following for their financial support:

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17th Annual Psychiatry Research Day

Wednesday, May 30, 2018

Bernard Snell Hall

8:15 am – 9:00 am	**Coffee & Poster Set-up**
9:00 am – 9:15 am	**Opening Remarks** by Dr. Andrew Greenshaw Professor & Associate Chair-Research
9:15 am – 10:00 am	**Guest Speaker** – Sharon Unger "Healing Experience 101: *Honouring the past, respecting the future*"
10:00 am – 11:00 am	**5-Minute Thesis Talks** by Graduate Students *1. Daniela Gomez* *5. James Benoit* *2. Jessica Luki* *6. Jasmine Brown* *3. Mohammad Alam* *7. Catherine Cheng* *4. Chelsea Bedrejo* *8. Michal Juhas*
11:00 am – 12:00 pm	**Poster** Session & Lunch
12:00 pm – 1:00 pm	**Keynote Address - *Dr. Jane Foster*** "Microbes and Mood: Microbiota-Host Interactions in Mood and Mental Health."
1:00 pm – 1:10 pm	**Pfizer-University of Alberta, Psychiatry Resident Research Awards Presentation**
1:10 pm – 1:30 pm	**Refreshments**
1:30 pm – 2:30 pm	**5-Minute Thesis Talks** by Graduate Students *9. Eric Chan Tai Kong* *13. Wes Paylor* *10. Manoj Malik* *14. Matt Reeson* *11. Tyler Marshall* *15. Rejish Thomas* *12. Brad Necyk* *16. Eszter Wendlandt*
2:30 pm –3:15 pm	**Guest Speaker** - *Dr. Allen Chan* "Mesoscale functional neuroimaging: Insights into cortical dynamics and neuropsychiatric disorders in mouse models"
3:15 pm – 3:30 pm	**Refreshments**
3:30 pm - 4:00 pm	**Student Awards Presentation and Closing Remarks** by Dr. Esther Fujiwara, Graduate Program Director

5-Minute Thesis Talks by Psychiatry Graduate Students: AM

	Presenter	*Title*
		10:00 - 11:00
1	***Daniela Gomez***	Delay-discounting in patients with HIV-1 infection
2	***Jessica Luki***	Investigation of GABA and glutamate in perimenopausal depression
3	***Mohammad Alam***	APP metabolism in cultured astrocytes
4	***Chelsea Bedrejo***	ASK-MI: shared decision making in the treatment of anxiety and depression
5	***James Benoit***	Predicting treatment response to DVS using machine learning
6	***Jasmine Brown***	The standardization of diagnostic criteria for Fetal Alcohol Spectrum Disorder (FASD): Implications for research, clinical practice and population health
7	***Catherine Cheng***	The identification of potential brain and bloodneuroinflammatory biomarkers in multiple sclerosis
8	***Michal Juhas***	Regional homogeneity changes in Alcohol Use Disorder

5-Minute Thesis Talks by Psychiatry Graduate Students: PM

	Presenter	*Title*
		1:30 - 2:30
9	***Eric Chan Tai Kong***	eHealth for mental health: Optimizing information delivery between providers and patients in suicide assessment
10	***Manoj Malik***	Ante-mortem body fluid metabolites and their relationship with the severity of dementia in Alzheimer's disease: Systematic review and meta-analysis
11	***Tyler Marshall***	Mental health determinants for opioid use disorder (OUD) among adolescents transitioning to adulthood in Alberta: A case-control study
12	***Brad Necyk***	Telling Stories Otherwise
13	***Wesley Paylor***	Role of perineuronal nets in the structural and functional plasticity of CNS neurons
14	***Matt Reeson***	Improving outcome measures for child and adolescent mental health inpatient programs
15	***Rejish Thomas***	Rapid effectiveness of intravenous ketamine for ultraresistant depression in a clinical setting and evidence for baseline anhedonia as a clinical predictor of effectiveness
16	***Eszter Wendlandt***	Inhibitors of ischemia-induced CNS plasticity

POSTER PRESENTATIONS

11:00am - 12:00pm

Speaker Biographies

Sharon Ryder Unger is the Founder and President of Shinah House Foundation. Her traditional Blackfoot name is, Aakai'naimsskai'piiaakii. Sharon passionately advocates for First Nations right to their traditional healing model; supports cultural awareness for reconciliation and participates in ceremony for healing. She has served in the past as a National Board Director & Chair of the "Lived Experience" Executive Committee, for the Canadian Depression Research and Intervention Network (CDRIN). She continues to support the Alberta CDRIN Hub in their efforts to create and share knowledge that leads to more effective prevention, early diagnosis and treatment of depression and depression-linked illnesses. Sharon participates in Strategic Patient Oriented Research (SPOR) for the Province of Alberta and has participated in developing guidelines for Patient Partner Appreciation and in determining the top 11 priorities for depression research in Alberta. She speaks of her struggles with serious life experienced trauma; system perpetuated mental illness and pharmaceutical dependency.

Dr. Jane A. Foster is an Associate Professor of Psychiatry at McMaster University and past president of the Canadian College of Neuropsychopharmacology. Dr. Foster's fundamental work on gut-brain interactions is at the forefront of finding novel interventions in psychiatry, for example those targeting probiotics, antibiotics, and fecal microbiota transplants in the context of psychiatry. She has published more than 80 peer-reviewed papers, presented her work at over 40 local, national, and international venues, and has been highly active in outreach activities with the general public, including with TedTalks, webinars, public lectures and art exhibitions.

Dr. Allen Chan Dr. Allen Chan is an assistant professor in the Department of Psychiatry at the University of Alberta. He received his PhD in Physiology and the Collaborative Program in Neuroscience from the University of Toronto. Dr. Chan completed postdoctoral fellowship training at the Djavad Mowafaghian Centre for Brain Health at the University of British Columbia under the supervision of Dr. Yu Tian Wang and Dr. Tim Murphy where he gained expertise in neuroimaging and optogenetic techniques. Dr. Chan is interested in employing in vivo mesoscale functional imaging approaches to examine cortical dynamics and altered functional connectivity in mouse models of neuropsychiatric disease.

APP metabolism in cultured astrocytes

Mohammad Alam (Department of Psychiatry, University of Alberta); Glen Baker (Department of Psychiatry, University of Alberta); Satyabrata Kar (Department of Psychiatry, University of Alberta).

Alzheimer's disease (AD), the most common type of senile dementia, is characterized by the presence of intracellular neurofibrillary tangles, extracellular neuritic plaques, gliosis and the loss of neurons in selected regions of the brain. Structurally, neuritic plaques contain a compact deposit of β-amyloid (Aβ) peptides generated from amyloid precursor protein (APP) by successive cleavages mediated via β-secretase and the tetrameric γ-secretase complex. Accumulated evidence suggests that an over-production and/or a lack of degradation may increase Aβ levels which, in turn, contribute to the development of AD. Under normal condition, neurons are the major source of Aβ, while astrocytes play an important role in its clearance. Activated astrocytes associated with neuritic plaques in AD brains, however, have been shown to accumulate Aβ which correlates positively with the local tissue damage. Thus, using a variety of experimental approaches we are currently evaluating the level and expression of APP, its processing enzymes and Aβ peptides in primary cultured astrocytes. Subsequently, we will determine if activation of astrocytes by altering cholesterol levels can influence APP metabolism – which may provide the relevance of astrocytes in AD pathogenesis.

Presentation: Thesis Talk

New methods to study the function of limb associated somatosensory cortex in mice using two-photon calcium imaging of excitatory and inhibitory networks in vivo

Mischa V. Bandet (Neuroscience and Mental Health Institute and Neurochemical Research Unit, Department of Psychiatry, University of Alberta); Bin Dong (Neurochemical Research Unit, Department of Psychiatry, University of Alberta); Ian R. Winship (Neuroscience and Mental Health Institute and Neurochemical Research Unit, Department of Psychiatry, University of Alberta)

To distinguish between somatosensory modalities (pressure, vibration, etc.), the somatosensory cortex should process dissimilar stimuli with different patterns of activation. However, a population based study of neuronal encoding of complex stimuli has never been reported within the limb associated somatosensory cortex of rodents. Here we used in vivo two-photon Ca2+ imaging to measure somatosensory evoked activity of large neuronal networks (250+ neurons). We found that individual neurons within the somatosensory cortex are tuned to particular frequencies of mechanical limb stimulation or broadly tuned to multiple frequencies of stimulation, thereby forming a population code for sensory processing. For short stimulus presentations, stimulus frequency is not encoded by the overall strength of a population's response, but is instead primarily dependent on the particular subset of neurons activated and the relationship between the activity of these neurons. In contrast, longer stimulus durations result in greater overall population activity, and greater correlation within the population responses, despite continuing to show a degree of preferential activity within subsets of neurons within the population response. To examine tuning in parvalbumin-expressing (PV+) inhibitory interneurons and CaMKII-expressing glutamatergic neurons, adeno-associated viral vectors were used to express GcAMP6F in CaMKII and PV+ neurons (also co-expressing a red reporter protein). We show that PV+ cells are tuned to stimulus intensity, likely as a means to inhibit prolonged activity in excitatory networks. As PV+ cell dysfunction is thought to be a contributor to sensory abnormalities after stroke, future studies will investigate alterations in excitatory and inhibitory networks following cortical stroke.

Presentation: Poster

ASK-MI: shared decision making in the treatment of anxiety and depression

Chelsea Bedrejo (Department of Psychiatry, University of Alberta)

Since I am relatively new into the program I will just be sharing what my thesis plans are: I am working under Sunita Vohra and Karin Olson on the ASK-MI project which looks at the integration of Shared Decision Making in the care of patients suffering from anxiety disorder or depression. I will be doing a systematic review of SDM in this context. I will also be doing an economic evaluation of patient engagement and outcomes following the integration of SDM. I plan to do an comparison between patients who integrate SDM in their treatment and those who do not. Lastly, I will evaluate the spillover effects of anxiety disorder and depression on a patient's network and do a comparison between those who integrate SDM in their treatment and those who do not.

Presentation: Thesis Talk

Predicting treatment response to DVS using machine learning

James Benoit (Department of Psychiatry, University of Alberta)

Consistent diagnosis and treatment of major depressive disorder (MDD) continues to elude clinical efforts. The DSM-5 shows a "questionable" test-retest reliability for MDD diagnosis, while treatment failure rates are 40-60% in the clinic , and treatment response to any single antidepressant sits at approximately 50% in clinical trials. These are troubling statistics in the context of clinical outcomes, considering that early optimized treatment of depression improves functional recovery. We combined datasets from 9 stage III/IV desvenlafaxine (DVS) clinical trials carried out between 2003 and 2011, and used this single combined dataset to build a cross-validated model predicting MDD remission in patients undergoing DVS therapy. We defined remission by a previously used criteria of a week 8 HAM-D17 score <=7. Our study expands on Chekroud's data-driven approach to treatment prediction in three areas: it introduces a competing models approach to find the optimal model to predict patient response, uses data from global DVS clinical trials that span 21 countries and 5 continents, and validates the model on a dataset analogous to those found in a clinic.

Presentation: Thesis Talk

The standardization of diagnostic criteria for Fetal Alcohol Spectrum Disorder (FASD): implications for research, clinical practice and population health

Jasmine Brown (Department of Psychiatry, University of Alberta); Dr. Roger Bland (Department of Psychiatry, University of Alberta); Dr. Egon Jonsson (Department of Psychiatry, University of Alberta); Dr. Andrew J Greenshaw (Department of Psychiatry, University of Alberta)

Fetal Alcohol Spectrum Disorder (FASD) is a preventable disorder, marked by a range of physical and mental disabilities, which is caused by maternal alcohol consumption. Although recognized by the scientific and medical community as a clinical disorder, no internationally standardized diagnostic tool yet exists for FASD. This presentation seeks to provide a brief overview of the academic debate around early historical accounts of the awareness of alcohol as a prenatal teratogen, and analyze the discrepancies of existing diagnostic tools for FASD, as well as the repercussions these differences have on research, public health, and government policy.

Presentation: Thesis Talk

Title: eHealth for Mental Health: Assessment of mental illness using smartphone apps

Dr. Eric Chan Tai Kong (University of Alberta), Keanna Wallace (University of Alberta), Garima Aryal (University of Alberta), Leslie Roper (University of Alberta), Dr. Rohit J. Lodhi (University of Alberta), Dr. Richard A. Isenberg (American Foundation for Addiction Research), Dr. Bradley Green (University of Southern Mississippi), Dr. Andrius Baskys (Western University of Health Sciences), Dr. Patrick Carnes (American Foundation for Addiction Research), Dr. Katherine J. Aitchison (University of Alberta)

Smartphone adoption has been steadily increasing in recent years, with smartphone ownership in Canada reported as high as 76% in 2016. In recent surveys on the use of mobile phones in mental health, over 65% of respondents indicated interest in using a mobile application to monitor symptoms of mental health conditions. Unfortunately, there is a lack of scientific evidence available regarding mental health apps.

To assess the validity of data obtained using mobile apps and evaluate patients' preferences between app-based and computer based measures, we developed an application for administration of the Suicide Ideation and Behavior Assessment Tool (SIBAT), a newly developed assessment tool of suicidality. We have deployed the application and are currently in the process of collecting data from healthy controls using the app-based scale. The SIBAT is also being administered via the Qualtrics interface and study participants are also assessed using the Mini-International Neuropsychiatric Interview (MINI). Data from these three measures will be compared in order to assess the validity of the SIBAT, as well as the validity of mobile app-based assessment tools. In addition, data collected from surveys at the end of the study will be used to examine patient attitudes toward app-based assessment tools.

Presentation: Thesis Talk & Poster

The identification of potential brain and bloodneuroinflammatory biomarkers in multiple sclerosis

Catherine Cheng (Department of Psychiatry, University of Alberta), Dr. Chris Power (Departments of Medicine (Neurology), Medical Microbiology & Immunology, and Psychiatry; University of Alberta), and Dr. Glen B. Baker (Department of Psychiatry; Professor of Neuroscience, Faculty of Medicine & Dentistry, University of Alberta)

Multiple sclerosis (MS) is a neuroinflammatory disease of the central nervous system (CNS) characterized by leukocyte infiltration, demyelination, gliosis, and ensuing axonal injury. Relapsing-remitting MS (RRMS) is the most common disease phenotype. Though the pathogenesis remains unclear, it is believed that MS is initiated by a breakdown of immune tolerance to CNS antigens due to genetic or environmental factors. Clinically Isolated Syndrome (CIS) is a demyelinating event isolated in time that is compatible with the possible future development of MS. In patients with MS, comorbid psychiatric disorders, such as depressive disorders and anxiety disorders are common. There has been increasing evidence of the role of neuro-inflammation in both MS and neuropsychiatric conditions, suggesting that inflammatory changes may contribute to disease occurrence, interaction and progression.

Currently no established bloodmarkers for MS exist. Several cerebrospinal fluid (CSF) markers have been identified, but they do not correlate with disease onset, severity or prognosis. In this study, amino acid levels (including glutamate, glycine, D-serine, arginine and taurine) and neurosteroid levels (including pregnenalone, pregnanalone and DHEA) were measured in plasma, CSF and post-mortem brain samples from controls, CIS and RRMS patients in an attempt to identify trends with progression and severity of symptoms and potential neuro-inflammatory biomarkers of MS. Plasma was obtained from controls (n=17), CIS (n=32) and RRMS patients (n=34). CSF was obtained from controls (n=15), CIS (n=11) and RRMS patients (n=21). In addition, we analysed frontal white matter and cortex from controls (n=6) and MS (n=6) patients. Findings will be discussed. The identification of neuro-inflammatory biomarkers in MS is fundamental to the diagnosis, prognostication and treatment of this debilitating condition.

Presentation: Thesis Talk

Delay-discounting in patients with HIV-1 infection

Daniela Gomez (Department of Psychiatry, University of Alberta), Deanna Nielsen (Department of Science, University of Alberta), Christopher Power (Department of Neurology, University of Alberta), M. John Gill (Department of Medicine, University of Calgary), Noshin Koenig (Southern Alberta Clinic, Alberta Health Services), Esther Fujiwara (Department of Psychiatry, University of Alberta)

Delay-discounting measures the ability to delay immediate small rewards in favour of later but larger rewards. Problems with delay-discounting are well known in the context of substance- and other forms of addiction. Fronto-striatal brain regions subserve delay discounting and are particularly vulnerable to damage in HIV-infection. Few studies explored delay-discounting in HIV-positive populations. Outcomes were inconclusive regarding primary or addiction-related comorbidities as determinants of delay-discounting in HIV. We explored patient characteristics influencing delay-discounting in an HIV-infected cohort from the Southern Alberta Clinic in Calgary (n=138). Discounting rate, k-coefficient, was derived from a computerized delay-discounting task. A higher k is indicative of a higher delay-discounting. Pearson correlations identified the background, clinical, and cognitive variables associated with k, followed by linear regression analysis. Discounting rate was associated with demographic variables (age, place origin, education), psychiatric risk-factors (marijuana and cocaine use, depressive symptomatology, suicide risk history), toxoplasma seropositivity, dyslipidemia, duration of HIV-infection and executive functions. These variables were entered as predictors in linear regression analysis. Birth place exerted dominant influences on performance, we analysed North American (n=107) and non-North American (n=31) participants separately. In North Americans, delay-discounting was related to low executive functions as well as to suicide risk history and education. In non-North Americans, delay-discounting related to depressive symptomatology. In conclusion, behavioural impulsivity in HIV-infected participants was associated with a combination of substance use, psychiatric comorbidity, as well as executive function deficits indicative of frontal lobe damage. Identifying modifiable risk-factors of impulsivity in HIV may inform the development of treatment strategies.

Presentation: Thesis Talk & Poster

The Temporal and Spatial Expression of Endogenous Pleiotrophin (PTN)after Ischemic Stroke in Mice

Samantha Ho (Department of Neuroscience, University of Alberta), Patricia Kent (Neurochemical Research Unit, Department of Psychiatry, University of Alberta), Anna M. Wiersma (Neuroscience and Mental Health Institute, University of Alberta; Neurochemical Research Unit, Department of Psychiatry, University of Alberta), Ian R. Winship (Neuroscience and Mental Health Institute, University of Alberta; Neurochemical Research Unit, Department of Psychiatry, University of Alberta).

Stroke is a leading cause of disability as many stroke survivors suffer from cognitive and physical impairments resulted from the neurological insult. Fortunately following stroke, adaptive changes ("neuroplasticity") in the central nervous system (CNS) allow reorganization of functional circuits that can reduce functional impairments. Pleiotrophin (PTN) is an endogenous neuromodulator elevated during development and after neurological injuries to mediate neuronal growth and plastic changes in the CNS. Our previous studies showed that injection of exogenous PTN at 7 days after ischemic stroke augmented expression of the structural plasticity marker growth-associated protein 43 (GAP-43) in the contralesional spinal grey matter and improved motor recoveries in rats. However, the spatial and temporal profile of endogenous PTN expression after stroke is not well defined. Here, to investigate the temporal and spatial expressions of endogenous PTN in the CNS after injury, brain and spinal cord tissues of mice were extracted at 3, 7, 14, 28 days after photothrombotic stroke induction and analyzed with western blot to compare PTN and GAP-43 protein levels between time points and hemispheres. The preliminary results suggest that PTN expression gradually increases between 3-14 days after stroke in the ipsilesional cortex. In the cervical spinal cord, PTN expression was undetectably low at all time points. These observations may explain the established effectiveness of exogenous PTN injection into the spinal cord, as the PTN expression had not expressed maximally in the ipsilesional cortex at day 7 and is inherently low in the spinal cord. Understanding the endogenous expression of PTN after injury will help define the effective treatment window in the future.

Presentation: Poster

Prediction and Understanding of Resilience in Albertan Families: Longitudinal Study of Disaster Responses

Shui Jiang (Department of Medical Genetics, University of Alberta; Department of Psychiatry, University of Alberta), Diego Lapetina (Department of Medical Genetics, University of Alberta; Department of Psychiatry, University of Alberta), Xiuying Hu (Department of Medical Genetics, University of Alberta; Department of Psychiatry, University of Alberta), Beatriz Carvalho Henriques (Department of Medical Genetics, University of Alberta; Department of Psychiatry, University of Alberta), Kashif Mughal (Faculty of Nursing, University of Calgary), Mona Nematian (Department of Medical Genetics, University of Calgary), Gerlinde Metz (Department of Neuroscience, University of Lethbridge), Suzanne King (Department of Psychology, McGill University), Suzanne Tough (Departments of Pediatrics, University of Calgary; Departments Community Health Sciences, University of Calgary), Sheila McDonald (Departments Community Health Sciences, University of Calgary), Katherine Wynne-Edwards (Department of Comparative Biology and Experimental Medicine, University of Calgary), Donna Slater (Department of Physiology and Pharmacology, University of Calgary), Paul Arnold (Department of Medical Genetics, University of Calgary; Department of Psychiatry, University of Calgary), Hongyan Ren (Department of Medical Genetics, University of Alberta; Department of Psychiatry, University of Alberta), Dawn Kingston (Faculty of Nursing, University of Calgary)*, Igor Kovalchuk (Department of Biological Sciences, University of Lethbridge) *, Lynne Postovit (Department of Oncology, University of Alberta) *, and Katherine J. Aitchison (Department of Medical Genetics, University of Alberta; Department of Psychiatry, University of Alberta)* *joint senior authors

Adverse childhood experiences (ACE) have been reported to impact approximately 40% of the global population. Childhood adversity or trauma can have a lifelong impact on mental health (e.g., it has been associated with psychotic episodes during adolescence and adulthood. Natural disasters can be classified as a form of childhood adversity, which can alter health outcomes. ACE can affect individuals to a different extent. To date, studies observed that while some children might be more vulnerable to the effects of traumatic events, others might present a higher degree of "resilience". There is increasing interest in the genetic contributions to "resilience." The aim of PURLS study is to define clinical and biological factors that are related

to resilience in children and families. As an extension of the All Our Babies (AOB) pregnancy cohort, the PURLS study provides a unique opportunity to compare the data collected pre and post-an ACE event (the 2013 flood in the region of Calgary, Alberta). The project is investigating genomic and epigenomic associations with resilience in the PURLS study (sample size: 165 resilient + 119 non-resilient, total: 284 received), including through variable number tandem repeats (VNTRs), and single nucleotide polymorphisms (SNPs) on an array. In such a manner, the project aims to identify biological markers of children with different levels of resilience, thus contributing to the growing body of literature on resilience and informing appropriate interventions.

Presentation: Poster

Regional Homogeneity Changes in Alcohol Use Disorder

Michal Juhas (Department of Psychiatry, University of Alberta), Matthew Brown (Department of Psychiatry, University of Alberta), Marnie MacKay (Department of Psychiatry, University of Alberta), James Benoit (Department of Psychiatry, University of Alberta), Timothy Gillese (Alberta Health Services), Manoj Malik (Department of Psychiatry, University of Alberta) Ericson Dametto (Department of Psychiatry, University of Alberta), Allan Aubry (Alberta Health Services), Glenn Walmsley (Alberta Health Services), Blayne Blackburn (Alberta Health Services), Cindy King (Alberta Health Services), Liana Urichuk (Alberta Health Services), Mark Loowell (Alberta Health Services), Wolfgang Sommer (Department of Addictive Behaviour & Addiction Medicine, Central Institute of Mental Health, University of Heidelberg; Department of Psychopharmacology, Central Institute of Mental Health, University of Heidelberg); Serdard Dursun (Department of Psychiatry, University of Alberta), and Andrew Greenshaw (Department of Psychiatry, University of Alberta)

Alcohol use disorder is associated with widespread structural brain atrophy as well as impaired brain function during both task-based and resting state functional brain imaging studies. This study analyzed regional homogeneity changes in resting state functional magnetic resonance brain scans of recently detoxified chronic alcohol dependent patients (n=56) compared to matched healthy controls (n=50). The patients exhibited significantly decreased regional homogeneity in the basal ganglia. Longitudinal comparison of the patients' resting state brain activation in the first month of abstinence did not result in significant change in the regional homogeneity patterns after correction for multiple comparison. Our results might help to elucidate regional abnormalities which might underlie broader functional network changes in addiction. Limitations of our study include broad age-range, multi-site recruitment, and inclusion of only adult male participants.

Presentation: Thesis Talk

Alexithymia and Autistic Traits – shared and unique relationships with disordered eating

Yu Yuan Liu (Department of Psychiatry, University of Alberta), **Rahim Marani** (Department of Psychiatry, University of Alberta), Daniela Gomez (Department of Psychiatry, University of Alberta), Esther Fujiwara (Department of Psychiatry, University of Alberta)

Alexithymia (difficulties identifying and describing emotions, restricted imagination, externally-oriented thinking) is a personality trait well-known to precede or accompany eating disorders. Recently, autism in eating disorders has also been described, especially regarding social withdrawal aspects of autism. Much of this research relies on alexithymia/autism questionnaires. We ask here how alexithymia and autism traits may overlap and relate to symptoms of disordered eating, using questionnaire data from N=3069 undergraduate students. Assessed were demographic variables, self-reported body-mass-index, alexithymia (Toronto Alexithymia Scale, TAS), autism traits (Autism Quotient, AQ) and eating disorder symptoms (Eating Disorder Screen for Primary Care, EPS; Eating Disorder Examination, EDE-Q12). Initial analyses of the AQ revealed poor psychometric properties, remedied through a 28-item version (AQ28) with five factors: (1) social skills, (2) communication/mindreading, (3) restricted/repetitive behaviour, (4) imagination, (5) attention to detail. Low to moderate positive correlations between alexithymia (TAS) and the AQ28 factors were observed, especially 'social skills'. Hierarchical logistic regressions identified variables associated with disordered eating (EPS< 2 versus EPS> 1). Female sex, high BMI, AQ28 social skills and AQ28 restricted/repetitive behaviour predicted disordered eating. Including alexithymia eliminated influences of AQ28 social skills but retained effects of AQ28 restricted/repetitive behaviour. Similar outcomes were observed using hierarchical linear regressions on the EDE-Q12 in a subset of 952 participants. Social skills in the AQ28 overlap with alexithymia and did not uniquely explain disordered eating. However, restricted/repetitive autistic behaviour explained disordered eating over-and-above alexithymia. These relationships should be studied in clinical eating disorder populations.

Presentation: Poster

Investigation of GABA and Glutamate in Perimenopausal Depression

Jessica Luki (Department of Psychiatry, University of Alberta), Christopher Hanstock (Department of Biomedical Engineering, University of Alberta), Katherine Aitchison (Department of Psychiatry, University of Alberta), Tami Shandro (Menopause Clinic, Royal Alexandra Hospital), and Jean-Michel LeMelledo (Department of Psychiatry, University of Alberta)

Background: Perimenopause is a period prior to menopause where female hormones fluctuate. An increased risk of depressive symptomatology has been demonstrated in women during life events associated with fluctuations of female hormones. This is exemplified in disorders such as premenstrual dysphoric disorder (PMDD) and postpartum depression (PPD). Perimenopause is a period of greater risk for both first onset and recurrence of an episode of major depression. An imbalance between ϒ-aminobutyric acid (GABA) and glutamate is thought to be implicated in the pathophysiology of depression; we will measure these neurotransmitters in perimenopausal women to see what effect female hormones may play on them.

Design: We plan to study women of reproductive age and perimenopausal women. These groups will be further subdivided into healthy controls and women with major depressive disorder (MDD), for a total of four study groups. We will do in vivo magnetic resonance spectroscopy (MRS) to assess the concentrations of glutamate and GABA in the medial prefrontal cortex of the participants' brains. This data will be analyzed to see if there is a significant difference between each group.

Expected Results: We expect to see dysregulation in glutamate and GABA levels in the group of women with MDD, and for this dysregulation to be distinct from reproductive women when compared to perimenopausal women.

Work Significance: This research could lead to valuable information about the impact of female hormone fluctuations on neurotransmitters, as well as development of preventive approaches and future therapeutic strategies for perimenopausal depression.

Presentation: Thesis Talk & Poster

Eye preference in speeded emotion recognition: alexithymia and eating disorders

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Eating disorders (EDs) such as anorexia or bulimia affect up to one million Canadians. EDs are psychiatric conditions characterized by disordered eating, concerns over body weight and shape, and fear of weight gain. Social-emotional problems are common among EDs. Using eye-tracking, we recently observed that ED patients avoided looking at other people's faces, especially their eye-region. Facial/eye-avoidance only emerged when expressions contained a small proportion of anger or disgust and therefore were difficult to judge. However, other studies reported faces with clearly visible disgust expressions may trigger ED-related problems most. Thus, we test here if our previous attentional findings generalize to a task using only clear emotional expressions (incl. anger and disgust). We also examined the role of comorbid alexithymia. A total of 33 patients from the UA Hospital Eating Disorder Program, and 66 non-ED controls (33 HA, 33 LA) were recruited. The speeded 'odd-man-out' task required participants to identify one face in a set of three that showed a different emotional expression. Eye-movements were recorded throughout the task. Patients were equally accurate but significantly slower, and they looked less at the faces or their eyes compared to LA (but not HA) controls. Findings suggest an ED-specific, non-alexithymia-driven sensitivity to processing anger or disgust in others. Understanding and withstanding perceived anger or disgust/disapproval appears a valuable treatment target in EDs.

Presentation: Poster

Accelerated collateral failure in aged rats during ischemic stroke

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Background and purposes: Cerebral collateral circulation and age are critical factors in determining outcome from acute ischemic stroke. Cerebral collaterals are recruited in the hyper acute phase of ischemia and are significant determinants of tissue outcome and response to therapy. Aging could may rarefaction of cerebral collaterals and thereby accelerate ischemic injury in brain tissues. However, dynamic changes of cerebral pial collaterals after onset of the cerebral ischemia in different ages of rats has not been well studied.

Methods and Results: In this study, two imaging methods, LSCI (laser speckle contrast imaging) and TPLSM (two photon laser scanning microscopy) were combined to continuously monitor cerebral pial collaterals between the anterior cerebral artery (ACA) and the middle cerebral artery (MCA) in young (2 months) and aged (16 months) male Sprague Dawley rats during distal middle cerebral artery occlusion (dMCAo). LSCI showed that both elder and young rats cerebral collateral perfusion declined over time after stroke ("collateral failure"). However, this decline was accelerated in aged rats. TPLSM revealed that pial arterioles in aged rats constricted faster than young rats. Red blood cell velocity in pial arterioles and the overall flux of blood through vessels were significantly reduced at all time points in aged rats. Infarction measurement by Hemotoxylin-Eosin staining showed aged rats had greater ischemic damage than young rats.

Conclusions: Our findings show that cerebral pial collateral fail faster in aged rats than young rats. Collateral perfusion in young rats was sustained during ischemia whereas flow in aged rats rapidly stalled after stroke. These findings confirm that aging has detrimental effects on pial collaterals in rats in the hyper acute phase of stroke.

Presentation: Poster

Ante-mortem body fluid metabolites and their relationship with the severity of dementia in alzheimer's disease: systematic review and meta-analysis

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Alzheimer's disease (AD) is the commonest form of neurodegenerative dementia in the elderly. It proceeds through a transitional stage, known as Mild Cognitive Impairment (MCI), between normal ageing and full dementia. Subjects with MCI, however may or may not progress to AD. Contemporary diagnosis of AD is based on the clinical examinations and cognitive testing, but definitive diagnosis only possible following autopsy or, rarely, biopsy. In addition, the clinical diagnosis of MCI subject is challenging and associated with a high rate of false negative errors. Despite massive investment in the search for therapies for AD, recent clinical trials indicate a current lack of effective drug therapies for AD dementia. This may be due to excessive damage in to brain prior to clinical symptom onset, or to insufficient understanding with respect to diagnosis and disease progression. One of my research questions focuses on ante-mortem levels of body fluid (cerebrospinal fluid, blood, serum, plasma, urine, and etc) metabolites and their relationship to severity of Alzheimer's dementia. To address this question, I am examining existing literature from July 1, 1984 (time of establishment of current AD diagnosis criteria) to 2017 for using systematic review and meta-analysis procedures. Hopefully, this research synthesis provide useful additional knowledge contributing to improved diagnosis and prognosis, prediction of AD dementia from the early pre-symptomatic MCI stage, and may open new windows for future research.

Presentation: Thesis Talk

Mental health determinants for opioid use disorder (OUD) among adolescents transitioning to adulthood in Alberta: a case-control study

Tyler Marshall (Department of Psychiatry, University of Alberta), Karin Olson (Faculty of Nursing, University of Alberta), Dr. Adam Aba-Aji MD (Department of Psychiatry, University of Alberta), Sunita Vohra (Departments of Pediatrics and Psychiatry, University of Alberta).

Introduction: Alberta is a part of a major ongoing mental health and opioid overdose crisis. From 2004 to 2016, emergency department visits for anxiety disorders and opioid use disorders (OUD) for youth increased over 200% in Alberta. As of 2017, anxiety, depression and OUD are the most frequently diagnosed psychiatric disorders in Alberta. To our knowledge, there has never been a quantitative analytical study to determine the mental health determinants associated with development of OUD in adolescents and young adults, specifically in Alberta. Research Question: Among Albertans (age 15 – 25) diagnosed with OUD, which mental health diagnosis is the strongest predictor for receiving an OUD diagnosis? Design: A population-based case-control study will be conducted (Timeframe: 2007 – 2017).

Methods: Cases and controls will be identified based on diagnostic information acquired from Alberta Health databases (primary care, physician, and inpatient) using either ICD-10 CA or ICD-9 criteria. Cases must have been diagnosed with OUD. At least N = 160 controls (no OUD history) will be randomly selected and pooled from the three datasets (total; greater than N = 480). Diagnoses of anxiety disorders, depressive disorders, alcohol dependence, bipolar disorders, or other mood disorders between Jan 1, 2007 and March 31, 2017 will be identified retrospectively. Binomial logistic regression analysis will be used to analysis the data.

Significance:Results from this study will help to identify youth at risk for developing OUD, and to identify early intervention may help to prevent development of opioid use disorder and growing number of overdoses associated with it.

Presentation: Thesis Talk & Poster

Telling Stories Otherwise

Brad Necyk (Department of Psychiatry, University of Alberta)

"It matters what stories tell stories" — Donna Haraway

If we want new narratives and insights around illness and illness experience, then it matters what stories we use. Illness is not simply about curing or making better but is a species meaning-making event. It's something we all share, strung along a vast expanse of time, affecting the narration of our lives. Over the length of 2017-18, I am a visiting artist/researcher at the Centre for Addiction and Mental Health, conducting patient experience research. Through visual art and auto-ethnographic exploration, I am working on finding new ways to tell illness and recovery stories. The hope is to find an affective learning experience within the viewer of the artwork, leading to new understandings and embodied experiences of illness.

Presentation: Thesis Talk

Role of perineuronal nets in the structural and functional plasticity of CNS neurons

John W. Paylor (Department of Psychiatry, University of Alberta), Dr. John G. Howland (Department of Physiology, University of Saskatchewan), and Dr. Ian R. Winship (Department of Psychiatry, University of Alberta)

Perineuronal nets are components of the extracellular matrix which are crucial to the regulation of neural plasticity. They surround mature neurons of the central nervous system, including the cell body, proximal dendrites, and initial axon segment. These structures serve not only as physical supports to the connectivity of neurons but also help stabilize the mature functional properties of the neurons surround. These properties of perineuronal nets are of interest in a variety of nervous system diseases in which it has been shown that perineuronal nets are reduced (e.g. schizophrenia, Alzheimer's) but the exact contribution of their loss to those diseases are not known. Our proposed study will investigate the consequences of perineuronal net loss on cellular structure and function as well as on cognition. By injecting a perineuronal net degrading enzyme into the brain, we can regionally deplete the number of perineuronal nets. Using live imaging techniques we can then image the cells of that region and look for changes in their structural and functional properties in awake, behaving animals. These findings will contribute to the fundamental understanding of perineuronal net function, how they support the cells they surround, and how that affects cognitive performance. In doing so, we can better understand the significance of their loss in diseases like schizophrenia and consider therapeutic approaches to maintain their integrity.

Presentation: Thesis Talk & Poster

Improving outcome measures for child and adolescent mental health inpatient programs

Matt Reeson (Department of Psychiatry, University of Alberta), Dr. Andy Greenshaw (Department of Psychiatry, University of Alberta), and Dr. Margot Jackson (Department of Nursing, University of Alberta)

Around 30% of youth in Canada meet diagnostic criteria for a mental disorder; this often translates into familial stress, poorer educational performance, a propensity for self-harm and substance misuse, and a greater risk of developing adult mental illness. Unfortunately, only around 1 in 6 children and adolescents with a mental health disorder receives appropriate clinical treatment or intervention. Despite the growing need for effective youth mental health programs, there is a dearth of research regarding the efficacy of child and adolescent inpatient mental health services. This study is designed to evaluate the effectiveness of inpatient services to provide information that will inform comparative program analysis and contribute to evidence-based decision making for optimizing mental health outcomes. This study has three primary components: First, the current outcome measures used by the Youth Inpatient Program at the Glenrose Rehabilitation Clinic will be presented and assessed. Second, contemporary literature on youth mental health outcomes will be reviewed and summarized. Finally, qualitative analysis of focus groups carried out with clinicians, caregivers, and patients will be analyzed. Qualitative analysis will provide a comparison between outcome priorities for individual groups and actual outcome measures used in clinical practice in order to develop a universal balanced scorecard that takes into account all of these factors.

Presentation: Thesis Talk & Poster

Rapid effectiveness of intravenous ketamine for ultraresistant depression in a clinical setting and evidence for baseline anhedonia as a clinical predictor of effectiveness

Rejish K Thomas (Department of Psychiatry, University of Alberta), Glen Baker (Department of Psychiatry, University of Alberta), John Lind (Department of Psychiatry, University of Alberta), and Serdar Dursun (Department of Psychiatry, University of Alberta).

Background: Intravenous ketamine has been established as an efficacious and safe treatment, with transient effect, for treatment resistant depression. However, the effectiveness of intravenous ketamine in non-research settings and with ultraresistant depression patients remains understudied. Aims: This study aims to measure the response and remission rates in ultraresistant depression patients in a clinical setting by means of a retrospective, open label, database study. Secondarily, the study will attempt to support previous findings of clinical predictors of effectiveness with intravenous ketamine treatment. Methods: Fifty patients with ultraresistant depression were treated between May 2015 and December 2016, inclusive, in two community hospitals in Edmonton using six ketamine infusions of 0.5mg/kg over forty minutes over two to three weeks. Data were collected retrospectively from inpatient and outpatient charts. Statistical analysis to investigate clinical predictors of effectiveness included logistic regression analysis using a dependent variable of a 50% reduction in rating scale score at any point during treatment. Results: At baseline, the average treatment resistance was severe, with a MSM score of 12.1 out of 15, 90.0% were resistant to ECT, and the average BDI score was 34.2. The response rate was 44% and remission rate was 16%. As a single predictor, moderate or severe anhedonia at baseline predicted a 55% increased likelihood of response. Conclusion: In a clinical setting, intravenous ketamine showed effectiveness in a complex, severely treatment resistant, depressed population on multiple medication profiles concurrently. This study gave support to anhedonia as a clinical predictor of effectiveness.

Presentation: Thesis Talk

Inhibitors of Ischemia-Induced CNS Plasticity

Eszter Wendlandt (Department of Psychiatry, University of Alberta), and Ian Winship (Department of Psychiatry, University of Alberta)

Functional recovery after stroke is driven by the various mechanisms of central nervous system plasticity, including the structural rewiring of surviving neuronal circuits. Such processes, however, are limited in both their extent and timecourse by a host of endogenous signalling molecules - two main classes of which include the myelin-associated proteins and a major component of the extracellular matrix called the chondroitin sulfate proteoglycans (CSPGs). Though both classes are thought to be major contributors to limiting plasticity, their response to ischemic injury, as well as any potential interactions between them, are poorly characterized. In this project, we will investigate the native timecourse of CSPG deposition following stroke and attempt to manipulate it using an experimental compound called fluorosamine - a CSPGs biosynthesis inhibitor. Concurrent monitoring of a variety of structural and functional plasticity measures as well as behavioral recovery will help determine CSPGs' role in regulating stroke-induced reorganization. In particular, structural plasticity will be assessed by quantifying peri-infarct and contralesional spinal neuronal sprouting, while meso-scale monitoring of cortical remapping using Intrinsic Optical Signal imaging will be used to study the functional plasticity response. In addition, peri-infarct myelination changes will be monitored to help characterize both the endogenous myelin response to stroke and to help explicate the potential role CSPGs may play in regulating this response.

Presentation: Thesis Talk

Real brains in virtual environments: An investigation of attention in depth using a novel depth P3 task

Eden X. Redman (Department of Psychology, University of Alberta), Jonathan W. P. Kuziek (Department of Psychology, University of Alberta), Abdel R. Tayem (Department of Psychology, University of Alberta), Jeff Murray (IBM Research: Education & Cognitive Sciences), Jenna Reinen (IBM Research: Education & Cognitive Sciences), Aldis Sipolins (IBM Research: Education & Cognitive Sciences), Kyle E. Mathewson (Department of Psychology, University of Alberta)

Electroencephalography (EEG) research is typically conducted in a highly controlled laboratory setting. However, this often limits the generalizability of results to real-world situations. Contemporary research has shown that alternative means of stimulus presentation can yield results comparable to traditional EEG methods. Currently, we are exploring the use of virtual reality for presenting stimuli within an EEG study. This may serve to characterized brain states in novel or otherwise inaccessible research environments. In the present study we used an HTC Vive head mounted display (HMD) within a Faraday chamber to assess brain states during a novel depth-based P3. For this task, stationary participants responded to either near or far (size-matched) target orbs within a virtual environment. Standard orbs were presented 80% of the time and target orbs only 20%. Typical oddball task EEG waveforms such as the MMN and P3, negative and positive deflections respectively, were elicited following target orb presentation. Additionally, horizontal electrooculography (EOG), fitted to measure eye convergence and divergence, was shown to be related to orb depth. Further research will differentiate how neural activity is modulated by objects presented at varying depths. Additionally, it may also be possible to use informative cues to promote attention at specific depths. Current results suggest that virtual reality can serve as a valid means of stimulus presentation in novel or otherwise inaccessible environments for EEG experimentation.

Presentation: Poster