BOOK OF ABSTRACTS

42nd Annual Scientific Meeting
PLENARY ABSTRACTS

Pain and the Developing Nervous System – It All Starts Here

Maria Fitzgerald

Department of Neuroscience, Physiology & Pharmacology, University College London, United Kingdom

This presentation will focus upon our understanding of how pain is processed in the developing spinal cord and brain. The neurobiological, mechanistic approach provides (i) predictive and testable theories of early life pain from age-appropriate animal models using new technologies and (ii) a scientific framework for better measurement & treatment of pain in infants and children. Pain is learned in infancy – and so discoveries in this area are relevant to us all. Newborn mammals display robust responses to noxious or tissue-damaging stimulation. These nociceptive or “pain” responses arise from neural activity at different levels of the central nervous system. Protective reflex movements and physiological reactions mediated by spinal cord and brainstem circuits are essential for the preservation of life and well-being but should not be equated with pain awareness. The unique sensation of pain and its unpleasant, threatening quality requires activity in the cortical and subcortical regions of the brain. Here I will present our recent research on the maturation of pain processing in the young mammalian brain, drawing on data from human infants and laboratory rodent pups, and highlighting fundamental differences from pain processing in the adult. I will further show new evidence that early life pain alters adult brain functional connectivity, both within and between cortical areas involved in sensory and affective dimensions of pain. This data provides direct evidence that the cortical pathways underlying adult pain experience are shaped by events in infancy. Such discoveries are relevant to us all.

Learning Objectives: At the end of this session, participants will be able to:

- discuss recent advances in our knowledge of the developing nociceptive system;
- identify how a developmental neuroscience approach to pain behaviour and pain perception can help young people with pain; and
- explain how pain circuits in the adult brain are altered by early life pain experience.
Treatment of Neuropathic Pain: Led and Misled by Clinical Trials

Nanna Brix Finnerup

Danish Pain Research Center, Department of Clinical Medicine, Aarhus University, Denmark

Neuropathic pain is a complex disabling neurological disorder caused by, for example, stroke, spinal cord injury, neuropathy and nerve injury, and is a growing global challenge. In this presentation, I will give an overview of the treatment options for neuropathic pain. I will present the NeuPSIG (Neuropathic Pain Special Interest Group of IASP) recommendations for the pharmacological treatment of neuropathic pain and new drug trials. Surprisingly few new treatments have been introduced and proven effective and safe for neuropathic pain over the past 120 year, and the drugs available have not been developed through bottom-up translational approaches but rather through empirical clinical observations. Main barriers for the failure to introduce new analgesics may include complexity and diversity of underlying pathophysiological mechanisms, poor animal-to-human translatability, heterogeneity of clinical pain phenotypes and mechanisms, and complexity of clinical trials with high placebo responses and low assay sensitivity. There is some evidence from clinical trials that patient profiling might be informative for deciding on certain treatments and I will discuss the advances in phenotype and mechanism-based treatment trials.

Learning objectives: At the end of the session, the participant will be able to:

- Describe evidence-based pharmacological treatments of neuropathic pain;
- Evaluate limitations of clinical trials; and
- Exemplify phenotype-based treatment trials.
Imaging Pain Processing in the Brain and Spinal Cord of the Awake, Behaving Mouse

Allan Basbaum

Department of Anatomy, University California San Francisco, San Francisco, California, USA

Prior to the development of very rapidly acting general anesthetics, distinct stages of general anesthesia were readily recognized. For example, using ether, patients initially are unresponsive to normally pain-provoking stimuli. This Stage 1 is followed by an amnesic state and only after that is unconsciousness provoked. These interesting properties suggested to our laboratory that by monitoring the activity of different general anesthetics it might be possible to identify populations of neurons that are critical to the experience of pain. To this end we have used calcium imaging in the mouse to study the effects of isoflurane and nitrous oxide on the activity of neurons in the anterior cingulate cortex, a region generally associated with the affective component of the pain experience. It is of particular interest that nitrous oxide, in contrast to isoflurane has analgesic properties. In this presentation we will demonstrate unexpected differential effects of these two anesthetics on the activity of ACC neurons. In contrast to cortical studies of pain processing, spinal cord analyses have relied on recordings in anesthetized or semi-intact preparations. The ability to image activity of the same population of spinal cord neurons, long-term, in an awake preparation, we predict will provide important insights into mechanisms that underlie the transition from acute to chronic pain. Success in the endeavor required that optical imaging be sustained after laminectomy, a hurdle that we only recently overcame.

Learning Objectives: At the end of this session, participants will be able to:

- illustrate the advantages offered by calcium imaging to monitor CNS circuitry in behaving animals;
- describe the difference in cortical regulation provoked by different volatile general anesthetics and how this relates to their analgesic action; and
- illustrate the possibilities offered by imaging
Paradigmatic Shifts in Health Research and the Problem of Pain in People with Dementia

Thomas Hadjistavropoulos

Department of Psychology and Centre on Aging and Health, University of Regina, Regina, Saskatchewan, Canada

Over the last 30 years there have been significant changes in the manner in which health research is conducted. Paradigmatic shifts increasingly have emphasized the importance of interdisciplinarity, knowledge translation, knowledge mobilisation, and partnerships with stakeholders. These paradigmatic shifts have moved us from fragmented unidisciplinary approaches to more integrated knowledge acquisition with a greater focus on application. Using a program of research on pain in dementia as an example, I will illustrate ways in which tackling complex, real world problems can lead traditionally-trained clinical health scientists to areas of scholarly inquiry that were previously foreign to them. Effectively addressing the problem of pain in dementia requires a combination of basic and clinical science, public policy, knowledge translation, cost investigations, implementation science, engineering, computer science and patient/caregiver partners.

Learning objectives: At the end of the session, the participant will be able to:

- summarize recent shifts in stakeholder/knowledge user expectations that have changed the way in which health research is conducted; and
- describe recent developments in pain assessment in dementia, associated challenges with implementation of research findings, and researcher adaptations to a new research environment that benefits from knowledge user input, implementation science methodologies and interdisciplinarity.
Igniting the Spark: How People with Lived Experience Have Transformed My Career

Katie Birnie

Department of Anesthesiology, Perioperative and Pain Medicine, and Department of Community Health Sciences, University of Calgary, Calgary, Alberta, Canada

Learning objectives: At the end of the session, the participant will be able to:
- demonstrate how people with lived experience have shaped and expanded my early career in pain research, care, and policy;
- illustrate historical and current examples of how people with lived experience have been critical to advancing pediatric pain research, care, and policy; and
- understand how partnership with people with lived experience contributes to more equitable pediatric pain management.
**SYMPOSIA**

**Sexual dimorphism in the neuroimmune response to pain**

Nader Ghasemlou¹, Bradley Kerr², Vivianne Tawfik³

¹ Queen's University, Anesthesiology, Biomedical & Molecular Sciences, Kingston, Ontario, Canada
² University of Alberta, Anesthesiology and Pain Medicine, Edmonton, Alberta, Canada
³ Stanford University, Anesthesiology, Perioperative & Pain Medicine, Stanford, California, United States

**Symposium Chair:** Nader Ghasemlou, PhD, Queen's University, Anesthesiology, Biomedical & Molecular Sciences, Kingston, Ontario, Canada, nader.ghasemlou@queensu.ca @ghasemloulab

**Symposium Abstract:**

Females are disproportionately affected by chronic pain compared to males, with a higher prevalence of pain conditions including arthritis, migraine and fibromyalgia, among others. Seminal work from various laboratories has shown that differing inflammatory responses underlie some of the sexual dimorphism observed in the regulation of pain. While it is now clear that interactions between the nervous and immune systems are critical mediators of both acute and chronic pain responses, the underlying molecular and cellular mechanisms controlling these differences remain poorly understood. We will present evidence from our respective laboratories showing how sexually dimorphic responses in neuroimmunity help control pain using models of multiple sclerosis (Dr. Bradley Kerr), complex regional pain syndrome (Dr. Vivianne Tawfik), and in the baseline control of nociception (Dr. Nader Ghasemlou).

**Speaker 1:** Nader Ghasemlou, PhD, Queen's University, Anesthesiology, Biomedical & Molecular Sciences, Kingston, Ontario, Canada, nader.ghasemlou@queensu.ca @ghasemloulab

**Speaker 1 Abstract Title:** Circadian rhythms control somatosensory function in male mice

**Speaker 1 Abstract:** Circadian (24-hour) biological rhythms are controlled by the suprachiasmatic nucleus and entrained by external cues such as light, temperature, and feeding cycles. However, most mammalian cells also express circadian genes (also called Clock genes), such as the master controller Bmal1, which act as transcription factors to regulate the rhythmic transcription of other clock-controlled genes. These regulated genes comprise 5-50% of all genes depending on the cell and organ. Evidence now suggests that peripheral sensory neurons, as well as most immune cells, express these circadian transcription factors. Recent data from our laboratory now shows that baseline thermal, but not mechanical, thresholds in naive mice fluctuate in a rhythmic pattern, in a sex-specific manner. Male but not female mice exhibit an attenuated thermal response during the dark (resting) phase relative to the light (active) phase. Acute nociception induced by capsaicin, but not mustard oil, follows a similar trajectory. Working to better understand the molecular mechanisms underlying this response, we will present evidence that these functional outcomes are controlled by the circadian master gene.
Bmal1. Furthermore, our results suggest that opioid receptors are key players in this response. Our work provides new understanding of how somatosensory function and nociception may be under control of circadian rhythms and the molecular mechanisms underlying this response.

**Speaker 2:** Bradley Kerr, PhD, University of Alberta, Anesthesiology and Pain Medicine, Edmonton, Alberta, Canada, bjkerr@ualberta.ca @BradleyKerr20

**Speaker 2 Abstract Title:** How does the PNS inform the CNS about pain in multiple sclerosis?

**Speaker 2 Abstract:** Multiple Sclerosis is a disease that is associated with significant demyelination of axonal tracts in the central nervous system (CNS). Demyelinating plaques in the CNS underlie the pathological signs of weakness and paralysis that are most commonly associated with the disease. However, a significant proportion of patients with MS also develop sensory disturbances including pain in the distal limbs and/or a form of facial pain called trigeminal neuralgia. In this talk I will present recent data from my laboratory implicating the peripheral nervous system, specifically the sensory neurons that reside outside of the CNS in structures called the dorsal root ganglia (DRG) and trigeminal ganglia (TG) that innervate the distal limbs and face respectively, as key drivers of pain in the MS disease state. I will discuss recent insights into maladaptive changes that occur in the DRG and TG even in the absence of overt demyelination. I will discuss how the plasticity of the sensory neurons in the peripheral nervous system affects pain sensitivity in a specific mouse model used to study MS. Sex differences in these responses will also be discussed.

**Speaker 3:** Vivianne Tawfik, MD, PhD, Stanford University, Anesthesiology, Perioperative & Pain Medicine, Stanford, California, United States, vivianne@stanford.edu, @TawfikLab

**Speaker 3 Abstract Title:** Location-, time- and sex-specific contributions of myeloid-lineage cells to pain chronification

**Speaker 3 Abstract:** Activated myeloid-lineage cells, macrophages peripherally and microglia centrally, contribute to the acute-to-chronic pain transition, however, the details on the timing and possible sex-specificity of such involvement remains a matter of debate. For example, there is evidence that CNS microglia may contribute to chronic pain only in males. In this talk I will discuss data from my laboratory using complementary pharmacologic and transgenic approaches in mice to more specifically manipulate myeloid-lineage cells using a model of the pain condition, complex regional pain syndrome. I will discuss a novel spatiotemporal transgenic mouse line, Cx3CR1-Cre ERT2 -eYFP;TLR4 fl/fl (TLR4 cKO) that we used to specifically knock out toll-like receptor 4 (TLR4), only in microglia and no other myeloid-lineage cells. Using this transgenic mouse, we find that early TLR4 cKO results in profound improvement in chronic, but not acute, allodynia in males, with a significant but less robust effect in females. In contrast, late TLR4 cKO results in partial improvement in allodynia in both sexes, suggesting that downstream cellular or molecular TLR4-independent events may have already been triggered. I will further discuss new data using a transgenic mouse that allows for microglia-specific depletion, Cx3CR1-Cre ERT2 -eYFP;iDTR lox-STOP-lox (microglia cKO). We performed microglial depletion at multiple time points after peripheral injury and see the most striking decrease in mechanical allodynia in males and females when depletion is performed.
several weeks after injury. Overall, we find that microglia themselves contribute to the chronic pain transition in both sexes, however, microglial TLR4 contributes more heavily to the transition in males.

**Learning Objective 1:** Describe how nociception is differentially affected by circadian rhythms in a sex-specific manner

**Learning Objective 2:** Describe the peripheral pathways that lead to central MS pain in male and female mice

**Learning Objective 3:** Describe how peripheral and central myeloid lineage cells contribute to chronic pain in a sexually dimorphic manner
The impact of another's pain: Psychological, physiological, and neural sequelae of observing pain in loved ones.

Rebecca Pillai Riddell¹, Shaylea Badovinac², Tine Vervoort³, Marina López-Solá⁴

¹ York University, Department of Psychology, Toronto, Ontario, Canada
² York University, Department of Psychology, Toronto, Ontario, Canada
³ Ghent University, Ghent, Belgium
⁴ University of Barcelona, Barcelona, Spain

Symposium Chair: Rebecca Pillai Riddell, PhD, York University, Department of Psychology, Toronto, Ontario, Canada, rpr@yorku.ca @drbeccapr

Symposium Abstract:
Observing the pain of others brings about a cascade of biological and psychological changes in the self (Goubert et al., 2005, 2021; Hadjistavropoulos et al., 2011). For caregivers and loved ones of individuals in pain, the ability to adaptively manage these reactions is closely related to the ability to provide appropriate pain assessment and pain management behaviours. This three-part symposium examines the psychological, physiological, and neural responses of individuals observing their loved ones as they undergo a range of painful experiences, across the lifespan. The workshop will be introduced with a personal reflection by session chair, Rebecca Pillai Riddell, a pain scientist with lived experience in supporting a spouse with chronic pain. In the first talk, focused on the toddler period, Shaylea Badovinac will present biobehavioural research on mechanisms subsuming how physiological arousal relates to parents’ concurrent psychological distress and use of sub-optimal soothing behaviours. In the second talk, focused on parents of school-aged children, clinical psychologist Tine Vervoort will explore how experimentally manipulating parents’ attention to children’s pain impacts parents’ physiological arousal, emotional distress, and pain control behaviour during their child’s participation in a painful task. In the third talk, neuroscientist Marina López-Solà will discuss adults’ functional brain activity in reaction to watching their romantic partner receive painful heat stimulation and how this varies as a function of partners’ interpersonal closeness.

Speaker 1: Shaylea Badovinac, MA, York University, Department of Psychology, Toronto, Ontario, Canada, sdbadov@yorku.ca

Speaker 1 Abstract Title: Parents’ physiological responses during toddler vaccinations: Associations with parents' psychological and behavioural responses.

Speaker 1 Abstract: Current theory and research support a central role for parental caregivers in the management of young children’s acute pain-related distress. Parents’ observable responses to their children’s pain are hypothesized to reflect a complex interplay of biological and psychological factors, however, few studies have investigated the impact of infants’ pain-related distress on parents’ physiological and psychological reactivity. A better understanding of the biological and psychological context for parents’ pain management behaviours may inform strategies for identifying and supporting parents whose own distress is impeding on their ability to respond appropriately to their infants’ pain. The aim of this presentation is to characterize
parents’ cardiac responses to toddlers’ acute procedural pain and explore associations with parents’ concurrent behavioural and psychological responses. Data are drawn from a cohort of parent-infant dyads followed longitudinally across routine vaccinations over the second year of life. First, individual variability in caregivers’ cardiac responses within and across time points will be discussed in relation to infant and caregiver characteristics. Next, associations among caregivers’ cardiac responses and their concurrent psychological distress and use of sub-optimal soothing behaviours in reaction to children’s pain-related distress will be presented. To conclude, findings will be interpreted in the context of current theories and existing research pertaining to parents’ physiological and psychological experiences of their child’s pain. Directions for future research and implications for pain management will also be discussed in view of the present findings.

Speaker 2: Tine Vervoort, PhD, Ghent University, Ghent, Belgium, Tine.Vervoort@UGent.be, @tinevervoort13

Speaker 2 Abstract Title: Parental emotional responses when facing their child in pain: the role of attention and perspective-taking

Speaker 2 Abstract: Research has shown that observers are likely to experience emotional distress when faced with another in pain, often prompting or motivating protective behaviour aimed at controlling the sufferers’ pain. Ironically, pain control behaviors (e.g., restricting the sufferers’ painful activities) can in some situations contribute to sufferers’ pain and disability. These dynamics are particularly critical in highly dependent relationships, such as that between parent and child. In this presentation, Dr. Vervoort will provide evidence showing observers’ ability to regulate pain-related distress is key to understanding links to motivational and behavioural outcomes and that observers’ attention to pain and perspective taking may comprise key components of both successful emotion regulation and goal-directed behaviour. Dr. Vervoort will discuss lab-based findings on the role of parental emotion regulation via attention deployment to child pain and perspective taking in understanding links to motivational and behavioural outcomes. Furthermore, she will also discuss how integrating research on emotional, motivational, and interpersonal dimensions of pain (including other-oriented and self-oriented goals) may propel forward theoretical and clinical intervention development. Current evidence will be critically reviewed with discussion of future empirical and clinical directions.

Speaker 3: Marina López-Solà, PhD, University of Barcelona, Barcelona, Spain, mlopezsola@ub.edu, @mlopezsola82

Speaker 3 Abstract Title: Neural underpinnings of observing loved ones’ pain: The Vicarious Pain Signature in romantic partners

Speaker 3 Abstract: Pain is a phenomenon consisting of biological, psychological, and social aspects. While it has long been known that the interpersonal context impacts an individual’s experience and expression of pain, only recently has the experience of those witnessing a loved one’s acute pain accrued attention. Previous literature suggests that observing the pain of strangers activates neural mechanisms that are distinct from those implicated in processing somatic pain. An understanding of how the painful experiences of familiar and significant others are processed at the neural level may help explain individual differences in caregiving reactions
in a pain context. In this presentation, Dr. López-Solà will present functional neuroimaging data that characterize the neural correlates of empathy for a loved one’s acute pain. Findings are drawn from a series of laboratory-based studies that exposed healthy adults and their romantic partners to painful heat stimulation and recorded their neural responses. Dr. López-Solà will show how observing the pain of a loved one brings about a pattern of whole-brain activation, coined the Vicarious Pain Signature (VPS), which is distinct from neural patterns reflecting one’s first-person experience of pain. She will also discuss how the magnitude of VPS responding relates to relationship factors such as interpersonal closeness. Findings will be discussed in the context of the broader literature on empathic responding to the pain of strangers to illustrate how interpersonal connections shape empathic responding on a neural level. The presentation will conclude with a discussion of opportunities for future research and potential implications for pain management.

Learning Objective 1: To examine associations between parents' physiological arousal and parents' soothing behaviours during toddler immunizations.

Learning Objective 2: To explore interrelationships between parents' attention to child pain, physiological and emotional reactivity, and pain-related caregiving behaviours in an experimental context.

Learning Objective 3: To discuss the neural networks involved in adults observing their romantic partners' pain during an experimental paradigm.
Supporting people with chronic pain via multidisciplinary online pain management programs

Jennifer Stinson¹, Brigitte Sabourin², Patricia Poulin³

¹ University of Toronto, Faculty of Nursing, Toronto, Ontario, Canada
² University of Manitoba, Department of Clinical Health Psychology, Winnipeg, Manitoba, Canada
³ University of Ottawa, Department of Anesthesiology & Pain Medicine, Ottawa, Ontario, Canada

Symposium Chair: Brigitte Sabourin, B.A., M.B.A., PhD, University of Manitoba, Department of Clinical Health Psychology, Winnipeg, Manitoba, Canada, bsabourin@hsc.mb.ca

Symposium Abstract:
With the increasing demands on clinical pain specialists and ever-growing waitlists in pain clinics across Canada, there is a need to find innovative ways for patients to access support in managing their pain and mental health. The internet has provided many people with access to information and treatment applications in several different areas of health, and with the COVID-19 global pandemic, there has never been a greater need to deliver care virtually. There is growing interest in online, self-directed pain management programs by both governing structures and patient populations, with the goal to deliver timely interventions to people that is both evidence-based, accessible, and easy to understand. Various options for internet-based multidisciplinary pain management are currently being created and tested in Canada for both adult and pediatric populations. The Power Over Pain portal aims to provide Canadians with rapid access to bilingual empirically-based, stepped care resources for the management of pain, mental health, and substance use across the lifespan. One of the proposed programs in this portal is the Internet-based Multidisciplinary Acceptance and Commitment Therapy (IMPACT) program for adults living with chronic pain. Results from the just completed feasibility study will be presented. Additionally, a novel online pain program for pediatric pain patients designed to meet the unique needs of this population will be described. Timely and widely accessible interventions targeting the biological and psychological implications of living with chronic pain conditions can significantly ease suffering in many individuals living with chronic pain.

Speaker 1: Jennifer Stinson, RN-EC, PhD, University of Toronto, Faculty of Nursing, Toronto, Ontario, Canada, jennifer.stinson@sickkids.ca

Speaker 1 Abstract Title: Development and Implementation of the Power Over Pain Portal for Youth with Chronic Pain

Speaker 1 Abstract: Dr. Stinson will discuss the creation, evaluation, and implementation of a stepped-care virtual solution [Power Over Pain (PoP) Portal] to improve equitable, timely access to evidence-based care for youth living with chronic pain (CP). PoP Portal is an online platform that includes self-assessment tools and a suite of evidenced virtual education (pain neuroscience) and cognitive behavioural therapy-based pain interventions that are applied adaptively based on participant preferences/needs. With support from CIHR, over the past 12 months, our team has:
(1) surveyed all Canadian pediatric CP clinic directors (N=13/13) and healthcare providers who treat pediatric CP across the continuum of care (N=151) to understand barriers to pain care during the pandemic; (2) completed a mixed method study to explore pandemic impacts on pain experience and mental health among youth with CP (N=303), their siblings (N=244), and parents (N=233); (3) published a rapid scoping review of virtual care best practices for pediatric CP; 4) published an evidence gap map of available virtual care solutions across the stepped care continuum for youth with CP and (5) tested the usability to ensure ease of use and accessibility. This foundational work was synthesized to inform the co-design of the PoP Portal in partnership with a pan-Canadian youth CP advisory group. The PoP Portal was built using the infrastructure of the Wellness Together Canada program, created by Health Canada. The next phase of this research is to gather information on implementation and clinical impact of the PoP Portal in a diverse sample of youth with CP.

**Speaker 2:** Brigitte Sabourin, B.A., M.B.A., PhD, University of Manitoba, Department of Clinical Health Psychology, Winnipeg, Manitoba, Canada, bsabourin@hsc.mb.ca

**Speaker 2 Abstract Title:** Feasibility Study: Improving access to pain interventions for adult patients with chronic pain through the IMPACT (Internet-based Multidisciplinary Acceptance and Commitment Therapy) Program

**Speaker 2 Abstract:** Background/Aim Accessing pain clinic services can be challenging, with long waitlists delaying patients from receiving any form of pain management treatment. We sought to create and evaluate the Internet-based Multidisciplinary Pain Acceptance and Commitment Therapy (IMPACT) Program to address this gap in pain services. Methods With patient partners’ input, we developed a multi-disciplinary, online, self-directed pain management program based on Acceptance and Commitment Therapy. The IMPACT program content contains multi-media and interactive components, including videos, audio recordings, and reflective questions. Some program videos consist of patient partners reflecting on their experiences with program themes (e.g., acceptance, values, committed action). The program also includes additional units related to exercise, medications, sleep, and communication and relationships. We conducted a feasibility study with people waiting for treatment at a tertiary pain management centre in Winnipeg, Canada. Participants completed baseline measures before accessing the program, and follow-ups immediately after completing the program and at 6-months post-completion. They provided feedback on the content throughout the program. Results Seventy-one people consented to participate, and 63 completed program enrollments. Average age of enrolled participants was 55 years (range 23-83); 76% identified as female. Seventeen participants have completed the full program and 27 participants have completed follow-up measures. Between 75% and 100% of participants recommended the various units they completed. Further outcome data and program feedback will be presented. Conclusion Based on study results, the IMPACT program shows promise in supporting individuals with chronic pain, including those who may not have timely access to pain specialist services.

**Speaker 3:** Patricia Poulin, PhD, University of Ottawa, Department of Anesthesiology & Pain Medicine, Ottawa, Ontario, Canada, ppoulin@toh.ca

**Speaker 3 Abstract Title:** Adaptation of Stepped Care 2.0 for Chronic Pain - Foundation of the Power over Pain Portal for Youths and Adults
Speaker 3 Abstract: Chronic pain is one of many fields of practice struggling with long wait-times. Endorsed by the Mental Health Commission of Canada, Stepped care 2.0 is a resiliency-based approach, grounded in recovery principles, which providers access to a variety of interventions tailored to a person’s needs, preferences, and readiness for change. Over time and based on continuous outcome monitoring, the intensity of care can be stepped up or down. Stepped Care 2.0 curates interventions spanning the continuum of care and can include education, self-directed online treatment modules, peer support, group therapy, individual treatment, and specialist care. The Power Over Pain portal is informed by Stepped Care 2.0 and connected to Wellness Together Canada. It aims to provide youths and adults living in Canada with rapid access to a variety of interventions for chronic pain and associated mental health or substance use needs. This presentation will highlight programs available through the adult stream of Power over Pain, integration with provincial and national resources, plans for on-going evaluation, further development and implementation within community, primary, and tertiary care environments. We will also describe the development of the Power Over Pain collective, its role and opportunities for engagement. Together, the Power Over Pain collective and portal constitutes a key element of a rapid learning health system of for chronic pain in Canada.

Learning Objective 1: Explain the Power over Pain portal's objectives and identify some of the planned activities in meeting these objectives

Learning Objective 2: Compare the programs contained in the Power over Pain portal in terms of targeted patient populations and other considerations in providing helpful recommendations for chronic pain patients who might benefit from the portal.

Learning Objective 3: Describe the preliminary empirical evidence supporting two of the Power over Pain portal's programs.
Comprehensive Integrated Pain Program-Rehabilitation Pain Service
An Innovative Approach for Precision Medicine

Dinesh Kumbhare¹, Samah Hassan², Wenqing He³, Ryan Koh⁴

¹ Toronto Rehabilitation Institute, Toronto, Ontario, Canada
² Toronto Rehabilitation Institute, Toronto, Ontario, Canada
³ Department of Statistical and Actuarial Sciences, University of Western Ontario, London, Ontario, Canada
⁴ Toronto Rehabilitation Institute, Toronto, Ontario, Canada

Symposium Chair: Dinesh Kumbhare, MD, PhD, Toronto Rehabilitation Institute, Toronto, Ontario, Canada, dinesh.kumbhare@uhn.ca

Symposium Abstract:
Chronic pain is a public health concern affecting 21% of the Canadian population. Although there have been notable advances in pain medicine in recent decades, patient-reported outcomes remain disappointingly poor. Chronic pain is a subjective multifactorial condition, modulated by a myriad of biological, psychosocial, and environmental factors. As a result, there is tremendous inter-patient variability in the clinical presentation even within a single pain diagnosis, leading to marked heterogeneity in treatment response. Inter-patient variability has led to calls for individualized treatment approaches (i.e., precision medicine) to improve patients’ reported outcomes. The concept of precision medicine is based empirically on identifying patients’ distinguishing characteristics (i.e., phenotypic profiles of patients). These profiles allow a better understanding of patients’ pain experience, predict treatment responses and hence facilitate personalized treatment approaches. However, to implement precision medicine, physicians need to conduct a comprehensive pain assessment, collect, and analyze a diverse array of clinical data to identify these phenotypic profiles of patients. This process is extremely difficult, if not impossible, to accomplish in clinical settings especially in real-time. It also imposes a high cognitive load for physicians. The presenters in this symposium will address the challenges physicians face to implement precision medicine and share innovative methods that can potentially facilitate the process of identifying phenotypic profiles of patients in clinical settings.

Speaker 1: Samah Hassan, MD, MSc., PhD, Toronto Rehabilitation Institute, Toronto, Ontario, Canada, Samah.Hassam@uhn.ca

Speaker 1 Abstract Title: Comprehensive Pain Assessment

Speaker 1 Abstract: Chronic pain (CP) is one of the most challenging health problems facing the health care industry today. It affects 21% of the adult population in Canada. Chronic pain is a multifactorial condition. Multiple biological, psychological, and social factors modulate patients’ pain experience causing tremendous inter-patient variability in clinical presentations and marked heterogeneity in treatment response. Inter-patient variability has led to calls to implement precision medicine to improve patient outcomes. Precision medicine, however, requires comprehensive pain assessment to identify patients’ distinguishing characteristics (i.e., phenotypic profiles of patients). These profiles allow a better understanding of patients’ pain experience.
experience and hence facilitate personalized treatment approaches. Until now, pain assessment has relied mainly on a list of self-reported questionnaires to capture the experience of pain. While these measures are convenient and represent the gold-standard approach to assess patient-reported symptoms, questionnaires may not be sufficient to capture all modulating factors that may affect the patients’ pain experience. As a result, treatment planning is often associated with poor outcomes. Therefore, physicians need to adopt a biopsychosocial model for pain assessment in all their patients, which might be challenging to apply in clinical practice. This session will briefly discuss the challenges of adopting a comprehensive pain assessment and explain how to conduct a comprehensive pain assessment to capture all potential modulating factors that may affect patients’ pain experience.

Speaker 2: Wenqing He, PhD, Department of Statistical and Actuarial Sciences, University of Western Ontario, London, Ontario, Canada, whe@stats.uwo.ca

Speaker 2 Abstract Title: Development of a New Pain Database

Speaker 2 Abstract: Chronic pain (CP) is a multidimensional condition with biological, psychological, and social factors, interact together to modulate each patient’s unique pain experience. As a result, patients with CP often present with significant inter-patient variability even within the single pain diagnosis, leading to marked heterogeneity in treatment response. To unravel patient variability, we need to identify patient characteristics (phenotypes) that can stratify patients into groups or clusters with similar profiles. Through these identified profiles, physicians can reach a more consistent specific diagnosis and consequently plan for more personalized treatment. Databases have now become a potential tool for physicians as well as researchers to collect and restore patient characteristics, assessment results, and patient-reported outcomes after treatment. These data can then be used to identify patient phenotypes and evaluate responses to treatments. The quality of databases, however, depends mainly on the type of variables collected. So far, decisions to include variables mainly rely on the physicians’ and researchers’ interests for specific data, the burden placed on the patients, and the time/costs associated with the data collection process. Although these factors are important to consider, constructing a database should also follow a biopsychosocial model that can reflect the nature of CP. Through this model, the database can guarantee high-quality data collection of CP to guide decision-making and treatment planning. This session will briefly discuss the development of a new database that facilitates collecting a diverse array of clinical data that reflects the multidimensional nature of CP using valid and reliable tools.

Speaker 3: Ryan Koh, PhD, Toronto Rehabilitation Institute, Toronto, Ontario, Canada, ryan.koh@uhn.ca

Speaker 3 Abstract Title: Application of Machine Learning Techniques in Precision Pain Medicine

Speaker 3 Abstract: Precision medicine is based on algorithms that consider all modulating factors that impact patients’ pain experience to permit the establishment of personalized treatment strategies. To implement precision medicine, physicians need to process a diverse array of clinical information and weigh the influence of any potential modulating factors to
identify patients’ distinguished characteristics to reach a diagnosis. Although logical and important, the process required to implement precision medicine imposes a high cognitive load for physicians since they are required to appreciate the complex interactions between a very large number of factors in real-time while they are assessing their patients. Machine learning is a method of data analysis that can be used to better understand the structure of data and fit this data into models that can be better understood and utilized by physicians. Applications of machine learning can include assessing data and identifying patient profiles or patterns, creating a clinical decision support system by understanding which variables or groups of variables are most important, predicting patient’s responses to treatments or simply aiding the physician in reaching a clinical diagnosis. This session will describe different machine learning techniques and their potential uses in the processing and analysis of the collected data to recognize patterns of specific chronic pain types to guide the implementation of precision medicine in the clinical setting.

**Learning Objective 1:** Explain how to conduct a comprehensive pain assessment to capture all potential modulating factors that may affect patients' pain experience

**Learning Objective 2:** Describe the development of a new database that facilitates collecting a diverse array of clinical data that reflects the multidimensional nature of chronic pain using valid and reliable tools

**Learning Objective 3:** Describe the integration of machine learning techniques in the processing and analysis of the collected data to recognize patterns of specific chronic pain types to guide safe and effective treatment
Chronic Pain in Canada – The Trajectory of Pain as a National Health Priority and Health Canada’s Response to the Canadian Pain Task Force’s Action Plan

Fiona Campbell¹, Maria Hudspith², Linda Wilhelm³, Jean-Francois Leroux⁴, Jennifer Novak⁴

¹ University of Toronto, Toronto, Ontario, Canada
² Pain BC, Vancouver, British Columbia, Canada
³ Canadian Arthritis Patient Alliance, Midland, Kings County, New Brunswick, Canada
⁴ Health Canada, Ottawa, Ontario, Canada

Symposium Chair: Fiona Campbell, MD, University of Toronto, Toronto, Ontario, Canada, fiona.campbell@sickkids.ca

Symposium Abstract:
In September 2018, the Minister of Health directed Health Canada to establish a Canadian Pain Task Force to help the Government of Canada better understand and address the needs of Canadians who live with chronic pain. Between March 2019 and May 2021, the Task Force reviewed the literature and conducted national consultations, which led to the publications of three reports that provided an overview of the gaps, challenges and opportunities towards an improved approach to the prevention and management of chronic pain in Canada. The Task Force’s final report entitled Action Plan for Pain in Canada and released in May 2021, provides a series of recommendations towards specific and targeted actions to prevent pain, improve health outcomes for people living with chronic pain, and to address its impacts on families, communities and society. This session will involve members of the Canadian Pain Task Force and a representative from Health Canada to present the trajectory of the Task Force and provide a deeper dive into the recommendations included in the Task Force’s final report. The session also intends to provide an update on Health Canada’s response and discuss future actions supporting the implementation of the Task Force’s Action Plan.

Learning Objective 1: At the end of the session, participants will be able to communicate the work of the Canadian Pain Task Force and its proposed Action Plan

Learning Objective 2: At the end of the session, participants will be able to identify the evidence and the process that led to the Task Force’s proposed Action Plan

Learning Objective 3: At the end of the session, participants will be able to communicate how Health Canada intends to move forward on the implementation of the Task Force’s Action Plan
Biopsychosocial drivers and consequences of musculoskeletal pain with reflection from a patient's perspective.

Laura Stone\textsuperscript{1}, Massieh Moayedi\textsuperscript{2}, Richard Hovey\textsuperscript{3}

\textsuperscript{1} University of Minnesota, Anesthesiology, Minneapolis, Minnesota, United States
\textsuperscript{2} University of Toronto, Faculty of Dentistry, Toronto, Ontario, Canada
\textsuperscript{3} McGill University, Faculty of Dentistry, Montreal, Quebec, Canada

Symposium Chair: Laura Stone, PhD, University of Minnesota, Anesthesiology, Minneapolis, Minnesota, United States, stone@umn.edu, laurasstone

Symposium Abstract:
The biopsychosocial model of chronic pain suggests that psychological and social factors must be considered in addition to biological factors to understand an individuals’ pain experience. It follows that these factors should also be considered to develop the most effective treatment plans. In this symposia, Dr. Stone will begin with a brief summary of the current biological understanding of musculoskeletal pain with a focus on fresh insights from human and animal studies on the role of epigenetic drivers in chronic low back pain. Since epigenetic modifications are potentially reversible, the therapeutic implications will be emphasized. Dr. Massieh Moayedi will present an overview of the psychological factors that contribute to chronic pain and will present new data on the interaction between pain and cognition, and how these could potentially be leveraged as novel therapeutic targets. Dr. Richard Hovey will focus on social factors contributing to increased suffering and will share his innovative model for a community social support network that return the patient to a person.

Speaker 1: Laura Stone, PhD, University of Minnesota, Anesthesiology, Minneapolis, Minnesota, United States, stone@umn.edu, @laurasstone

Speaker 1 Abstract Title: Biological drivers and consequences of musculoskeletal pain

Speaker 1 Abstract: Dr. Stone will present new insights into the biological drivers of chronic back pain with emphasis on the role of epigenetics. Since epigenetic modifications are potentially reversible, the potential therapeutic implications will be emphasized. Data from animal models demonstrating the disease-modifying effects of physical activity will be highlighted. At the end of the presentation, attendees will have an increased understanding of chronic LBP pathology, the role of epigenetics in LBP and the benefits of harnessing lifestyle change to reduce the global burden of back pain.

Speaker 2: Massieh Moayedi, PhD, University of Toronto, Faculty of Dentistry, Toronto, Ontario, Canada, m.moayedi@utoronto.ca

Speaker 2 Abstract Title: Psychological drivers and consequences of musculoskeletal pain

Speaker 2 Abstract: Pain is the largest health-related burden on society, and interferes with cognitive processes, resulting in forgetfulness, an inability to focus, and difficulties in abstract
thinking, problem solving and decision-making. A fundamental gap in our understanding of pain is the mechanism of this interference, which would serve as a therapeutic target for pain. Prevailing models of this interference rely on distraction or salience competition, but these do not adequately fit behavioural data. Our imaging studies in chronic pain reveal a potentially different mechanism for this interaction. Specifically, the frontal polar cortex has abnormal structure and function in chronic pain. The frontal pole is implicated in cognitive branching – the ability to select a task based on its perceived value while tracking the perceived value of a competing task. Based on these findings, we propose that pain competition is not distraction or salience based, but is value-based. We show novel behavioural data supporting this concept: painful stimuli, but not iso-salient, unpleasant somatosensory stimuli, adversely affect task performance on low-value task, but not a high value task. In sum, we provide evidence for a value-based model of pain-cognition interactions in the human brain.

Speaker 3: Richard Hovey, PhD, McGill University, Faculty of Dentistry, Montreal, Quebec, Canada, richard.hovey@mcgill.ca

Speaker 3 Abstract Title: Social drivers and consequences of musculoskeletal pain with reflection from a patient's perspective.

Speaker 3 Abstract: Dr. Hovey has defined expertise in bridging gaps between theory and practice in areas such as patient centered care and communication in healthcare. His research approach utilizes philosophical hermeneutics in strengthening our understanding of the experiences of vulnerable and underserved populations, like those living with chronic pain and illness, cancer, disability, or the effects of medically induced trauma. He also brings the perspective as a person who has lived in chronic pain for 10 years.

Learning Objective 1: Integrate new knowledge on the molecular drivers of low back pain.

Learning Objective 2: Explain how pain competes for resources, and novel potential therapeutic targets for pain management.

Learning Objective 3: Describe the lived experience of pain from the perspective of a patient consultant.
Improving Chronic Pain Care with a Single-Entry System: Discussing the development and implementation of central referral and triage in a tertiary care setting

Rachael Bosma¹, Tania Di Renna², Celeste Corkery³, Laura Pus⁴

¹ Women's College Hospital, Toronto Academic Pain Medicine Institute (TAPMI), Toronto, Ontario, Canada
² Women's College Hospital, Toronto Academic Pain Medicine Institute (TAPMI), Toronto, Ontario, Canada
³ Women's College Hospital, Toronto Academic Pain Medicine Institute (TAPMI), Toronto, Ontario, Canada
⁴ Women's College Hospital, Toronto Academic Pain Medicine Institute (TAPMI), Toronto, Ontario, Canada

Symposium Chair: Rachael Bosma, PhD, Women's College Hospital, Toronto Academic Pain Medicine Institute (TAPMI), Toronto, Ontario, Canada, Rachael.Bosma@wchospital.ca

Symposium Abstract:
Single-entry models consisting of a centralized referral and triage system have shown to improve wait times, reduce duplicate referrals and prevent cancelled appointments, in tertiary clinical settings. The Toronto Academic Pain Medicine Institute (TAPMI) is a comprehensive, interdisciplinary, tertiary pain program in Toronto. It is the only provincially funded program in Ontario to successfully implement a single-entry system for chronic pain care. TAPMI operates as a hub and spoke model, with common referral and triage across 5 academic pain centres. The central referral system has streamlined care across these sites, improved patient flow and enhanced the patient journey to access care. In addition, the centralized system processes roughly 6000 referrals a year, allowing TAPMI to collect and analyze patient demographic data, pain diagnoses and referring provider characteristics on an ongoing basis. This enables TAPMI to develop and improve its programming to better meet patient and referring provider needs.

This symposium will (1) discuss the successful implementation of a central referral and triage model in chronic pain care, (2) outline the clinical and research benefits of the central intake system (i.e., development of appropriate interdisciplinary programming based on patient pain needs and experiences), and (3) discuss how the centralized system aligns with a broader Learning Health Systems perspective -- an innovative and continuous improvement approach that uses cyclical, technical and social methods to improve systems with every patient treated. This interdisciplinary panel discussion will embed patient stories throughout to show the positive impact of TAPMI’s centralized model on patient care.

Speaker 1: Tania Di Renna, MD, FRCPC, Women's College Hospital, Toronto Academic Pain Medicine Institute (TAPMI), Toronto, Ontario, Canada, tania.direnna@wchospital.ca

Speaker 1 Abstract Title: The Successful Implementation of a Single-Entry Model to Enhance Chronic Pain Care: The TAPMI Example
**Speaker 1 Abstract:** The important role of central triage in reducing wait times and improving patient access to timely care is well documented in the literature. The implementation of a single-entry model is consistently associated with a decrease in the time between patient referral and first assessment by a specialist physician or allied health professional. Duplicate referrals, which increase wait times and reduce efficiency of patient flow, have also shown to reduce after the implementation of a single-entry model. Similar success has been seen with the centralized referral and triage system at the Toronto Academic Pain Medicine Institute (TAPMI). TAPMI is a partnership of 5 pain clinics serving as an interdisciplinary hub for chronic pain care in Toronto, Ontario. The development of this centralized system has enabled a clearer pathway for patients, increased communication between pain specialists in the area, and enhanced the sharing of pain programs and resources across the sites. The goals of this talk are to (1) describe the development and implementation of the central intake and triaging system at TAPMI, and (2) discuss the benefits of this approach for patient access to resources and pain care. We will also identify how the centralized system has allowed TAPMI to collect and analyse patient specific data, which is used to improve service delivery (patient stories will be shared to demonstrate this). Lastly, we will answer questions from the audience on how other sites may replicate the single-entry model to enhance chronic pain care.

**Speaker 2: Celeste Corkery, BSc (Physiotherapy), Women's College Hospital, Toronto Academic Pain Medicine Institute (TAPMI), Toronto, Ontario, Canada, celeste.corkery@wchospital.ca**

**Speaker 2 Abstract Title:** The Clinical Benefits of Central Referral: Program Development Guided by Patient Needs

**Speaker 2 Abstract:** The development of a centralized referral and triage system for chronic pain across five partner sites revealed the absence of services for patients suffering from pelvic pain. From 2017 to 2019, no publicly funded chronic pain programs accepting pelvic pain referrals existed in GTA, and the needs of these patients were unmet. In response to high volumes of referrals for this underserviced population, TAPMI developed an interdisciplinary Pelvic Pain Program. A four-month needs assessment during which new patients referred for CPP met with a pelvic physical therapist and a psychologist, served as the foundation for the development of a nonmedical component of this program. An innovative 8-week holistic Pelvic Pain Group co-facilitated by a pelvic physical therapist and a psychologist emerged from the common themes identified in the needs assessment. Based on the commonly described theme of isolation and stigma, a group-format offered patients the opportunity to connect with others living similar experiences. The voices of those suffering from pelvic pain are at the foundation of this group intervention, and as such, feedback from each iteration of the group is diligently collected, and the content and delivery method continues to evolve and be informed by patient needs. The objectives of this talk are to 1) demonstrate the benefits of the central referral system in the development of the Pelvic Pain Group; 2) describe the needs assessment and 3) describe the development and outline the components of a therapeutic Pelvic Pain group designed to meet the needs of this underserviced population.

**Speaker 3: Laura Pus, MBA, Women's College Hospital, Toronto Academic Pain Medicine Institute (TAPMI), Toronto, Ontario, Canada, laura.pus@wchospital.ca**
Speaker 3 Abstract Title: Central Referral and Beyond: Bridging clinical, research and health system approaches to improve chronic pain care for the future

Speaker 3 Abstract: Central referral and triage at TAPMI has proven to be a valuable system that aligns itself well with a Learning Health System (LHS) approach. A LHS is an innovative and continuous improvement approach that utilizes a diverse range of methods to improve systems with every patient that is seen. LHS is the combination of a health and research system that is grounded in patient needs and perspectives, is driven by timely data and evidence, is supported by appropriate infrastructure, and is developed for rapid learning and improvement. The aim of a LHS is to facilitate and support continuous cycles of study, feedback, and practice change. This approach is ideal in the context of chronic pain, as a LHS is built on evidence-based, patient-centred care, with the goal to capture new knowledge as an important by-product of the delivery experience. Building on the discussion thus far of TAPMI’s centralized system, this session will speak to the relevance of LHS in the context of chronic pain. More specifically, we will discuss the learning health cycle of a LHS, key enablers of a LHS, and key opportunities of a LHS in chronic pain care. We will also engage the audience in a discussion on how equity fits into this approach, and how LHS may be adopted in the future to improve patient outcomes through its iterative process of data collection, analysis, and action.

Learning Objective 1: To discuss the successful implementation of a central referral and triage model in chronic pain care

Learning Objective 2: To identify the clinical and research benefits of the central intake system

Learning Objective 3: To discuss how a centralized system aligns with a broader Learning Health Systems perspective and the value of this approach for chronic pain care.
The untold story: Family experiences of chronic pain

Laurie Proulx¹, Maria Pavlova², Katie Birnie³

¹ Canadian Arthritis Patient Alliance, Ottawa, Ontario, Canada
² University of Calgary, Department of Psychology, Calgary, Alberta, Canada
³ University of Calgary, Department of Anesthesiology, Perioperative and Pain Medicine, Calgary, Alberta, Canada

Symposium Chair: Katie Birnie, PhD, University of Calgary, Department of Anesthesiology, Perioperative and Pain Medicine, Calgary, Alberta, Canada, kathryn.birnie@ucalgary.ca
@katebirnie

Symposium Abstract:
Chronic pain clusters in families and ripples through generations. Parent global mental and physical health contributes to youth pain outcomes through biopsychosocial mechanisms (e.g., genetic risks, parent cognitions about pain, social learning). Children of parents with chronic pain are at risk of poorer physical and psychological outcomes. Further, up to 50% of youth with chronic pain have a parent with chronic pain. Living and parenting with chronic pain results in significant levels of parenting stress, anxiety, and depression. Yet, research on family experiences of chronic pain, as well as ways to support both parents and children in an integrated way, is lacking. In the proposed symposium, our patient partner, Ms. Proulx, will share her lived experience of parenting with chronic pain, as well as results of a national survey on the key challenges of and recommendations to provide better support for parents living with chronic pain. Ms. Pavlova will present new findings on how parents and children discuss past experiences of past chronic pain flare-ups and how those verbal exchanges influence child outcomes (i.e., children’s pain memories). Dr. Birnie will present new data on the development and feasibility testing of a novel virtual group-based acceptance and commitment therapy (ACT) intervention for parents living with chronic pain. The panel includes a group of clinical researchers and a patient partner applying a developmentally-informed lens to the family model of chronic pain and discussing novel ways to support parents and children living with chronic pain.

Speaker 1: Laurie Proulx, Canadian Arthritis Patient Alliance, Ottawa, Ontario, Canada, laurieproulx@bell.net, @ProulxLaurie

Speaker 1 Abstract Title: The pain experiences of women+ during pregnancy & parenting: Unmet patient needs

Speaker 1 Abstract: People living with rheumatic and psoriatic diseases experience significant pain that affects their participation in various aspects of life, such as pregnancy and parenting. Inflammatory arthritis and psoriasis are each estimated to impact roughly one million people in Canada. The onset and diagnosis of these diseases commonly affects people in the prime of their lives and these individuals are often left with a variety of reproductive and sexual health-related concerns and challenges in addressing pain and other symptoms of these conditions. To better understand the needs of this population, the Canadian Arthritis Patient Alliance (CAPA), the
Canadian Association of Psoriasis Patients (CAPP), the Canadian Psoriasis Network (CPN) and the Canadian Spondylitis Association (CSA) launched a survey to understand the experiences and insights about sexual and reproductive health and other key aspects of their lives, including managing chronic pain. Key challenges will be presented such as communication challenges with health care providers relating to pain management, dealing with fatigue and flares, how limitations affect their child(ren), and tips for accepting how their chronic condition affects their role as a parent. The presentation will identify work completed to date by patient organizations and identify key recommendations to provide better support to women+ in their role as parents such as evidence-based patient resources and access to person-centred interdisciplinary care and support.

**Speaker 2:** Maria Pavlova, MSc, University of Calgary, Department of Psychology, Calgary, Alberta, Canada, mpavlova@ucalgary.ca @mariapavlova

**Speaker 2 Abstract Title:** Parent-child reminiscing and children’s pain memories in the context of pediatric chronic pain

**Speaker 2 Abstract:** Pediatric chronic pain is a prevalent, disabling, and costly condition that occurs in, impacts, and is affected by a broader social context (e.g., family, parents). Biased (i.e., exaggerated compared to the initial report) pain memories are another factor that has been posited to contribute to the onset and maintenance of chronic pain. However, the role, origin, and prognostic value of pain memories in the context of pediatric primary pain disorders are unclear. The existing studies on memory in the context of pediatric chronic pain utilized methods from acute pain memory research (i.e., repeated use of single-item pain scales) and focused on the accuracy of and biases in pain recall with mixed results. Parent-child reminiscing offers a unique framework to examine how memory for chronic pain is recalled, constructed, and reconstructed. Parent-child reminiscing also provides a snapshot of parent-child verbal interactions that have been argued to play a powerful role in children’s pain outcomes. Yet, most of the existing research focuses on immediate, and often experimental, pain experiences. Reminiscing provides an idiographic representation of memory for salient past pain experiences, and how these memories are communicated within the parent-child dyad. Ms. Pavlova will present the results of the first study examining parent-child reminiscing about past pain flare-ups, as well as its associations with children’s pain memories. Ms. Pavlova will also discuss new potential avenues in parent-led pediatric chronic pain interventions to improve long-term outcomes.

**Speaker 3:** Katie Birnie, PhD, University of Calgary, Department of Anesthesiology, Perioperative and Pain Medicine, Calgary, Alberta, Canada, kathryn.birnie@ucalgary.ca @katebirnie

**Speaker 3 Abstract Title:** Evidence for treating pain in the family: Piloting a virtual ACT intervention for parents with chronic pain in the context of pediatric pain care

**Speaker 3 Abstract:** Chronic pain runs in families. Intergenerational research has revealed that children of parents with chronic pain are at greater risk for pain, emotional, behavioural, and family problems. Although an estimated 50% of children with chronic pain having a parent with chronic pain, engagement of parents in pediatric pain interventions primarily focuses on parents’
responses and neglects to address parents’ own pain and mental health. This is problematic given
the impact of parent chronic pain and mental health issues on parent behaviours and child pain
outcomes. Long waitlists and poor access to care are barriers to addressing parent and child
chronic pain concurrently across pediatric and adult health systems. This talk will present the
protocol and preliminary testing of a virtual group-based Acceptance and Commitment Therapy
(ACT) for parents with chronic pain who have a child with chronic pain. The group comprised
four 90-minute weekly sessions over Zoom. Sessions 1-3 were modelled after other brief ACT
interventions for adults with chronic pain. Session 4 focused on parenting with chronic pain. The
parent group occurred alongside a five 90-minute weekly virtual group-based psychological
intervention for children 10-17 years old with headaches and/or chronic abdominal pain. Six
parent-child dyads participated. Parents reported mixed chronic pain with concurrent mental
health concerns (e.g., anxiety, depression, PTSD). Pre- and post-group surveys and interviews
assessed feasibility and preliminary effectiveness. Implications will be shared to inform design
of concurrent parent and child interventions addressing chronic pain as an intergenerational
health issue.

Learning Objective 1: Provide a patient partner perspective on parenting and living with
chronic pain.

Learning Objective 2: Characterize parent-child reminiscing about past pain flare-ups and
examine the influence of parent-child reminiscing on pediatric pain outcomes.

Learning Objective 3: Explore how parent chronic pain and concurrent mental health concerns
can be feasibly and acceptably addressed in the context of pediatric pain care.
New approaches to modelling clinically relevant aspects of pain using neuroimaging in healthy subjects

Tim Salomons¹, Lizbeth Ayoub², David Seminowicz³

¹ Queen's University, Kingston, Ontario, Canada
² University of Toronto, Toronto, Ontario, Canada
³ University of Maryland, Baltimore, Maryland, United States

Symposium Chair: Tim Salomons, Ph.D., Queen's University, Psychology, Kingston, Ontario, Canada, tim.salomons@queensu.ca @head_like_egg

Symposium Abstract:
Much of what we know about brain activity related to pain comes from studies using experimental pain in healthy subjects. Understanding pain mechanisms will thus depend on using appropriate models for the research question. In this symposium we describe how different aspects of the pain experience can be modeled and how they reflect neural processes as assessed through brain imaging (primarily functional MRI). Seminowicz will describe the use of prolonged pain models and the neuroimaging of descending pain modulatory and cognitive circuitry in these states. This work involved the use of three different prolonged pain models and brain recordings using EEG, fMRI and simultaneous EEG-fMRI. Ayoub will show work demonstrating the neural correlates of tonic orofacial pain using an ecologically valid model: the placement of an orthodontic separator between teeth. Activation of trigeminal nociceptive and descending modulatory circuits prior to stimulation were correlated with future pain ratings in healthy adults. Salomons will describe how habituation or sensitisation to repeated pain stimuli over an hour is stable across sessions, and how neural responses in both pain-evoked and resting state functional connectivity designs can predict this stable pattern of response. Overall, we will see how various circuits can be informative for predicting pain sensitivity and modulation. Following their presentations, the speakers will hold a panel discussion, integrating their work and taking audience questions. The topics discussed will include potential clinical applications of the findings and so on.

Speaker 1: David Seminowicz, Ph.D., University of Maryland, Baltimore, Maryland, United States, Dseminowicz@umaryland.edu,

Speaker 1 Abstract Title: Multimodal examination of prolonged pain

Speaker 1 Abstract: We have employed prolonged pain models in healthy individuals to capture the ongoing representations of the chronic pain experience. These include an oral capsaicin model that replicated some aspects of burning mouth syndrome, topical application of the capsaicin to the skin that recapitulates symptoms of peripheral neuropathic pain, and intramuscular NGF injections that causes use-dependent pain lasting for days. An EEG-based metric, peak alpha frequency, can reliably predict individual pain sensitivity across these models. With fMRI, we showed that descending pain modulatory circuits including PAG, amygdala, and parabrachial nuclei, are engaged during prolonged pain and predict pain sensitivity. Our EEG-fMRI work indicates that cognitive networks are related to fluctuations in peak alpha frequency...
during ongoing pain. The talk will conclude with potential translation back to chronic pain conditions.

**Speaker 2:** Lizbeth Ayoub, B.Sc, University of Toronto, Toronto, Ontario, Canada, lizbeth.ayoub@utoronto.ca

**Speaker 2 Abstract Title:** A laboratory-based model for examining tonic orofacial pain

**Speaker 2 Abstract:** Laboratory-based acute experimental pain studies have limited ecological validity. Here, we propose a common orthodontic procedure—the insertion of an elastomeric separator between teeth—as an ecologically valid model of tonic orofacial pain. In twenty-six healthy adults, we investigated whether pre-stimulus nociceptive and pain modulatory brain circuits were related to pain elicited by the separator. We found that pre-existing functional connectivity of key nodes within the trigeminal nociceptive and descending pain modulatory pathways were significantly correlated to subsequent peak pain ratings. This model allowed us to capture the neural correlates of individual differences to an ecologically valid pain model.

**Speaker 3:** Tim Salomons, Ph.D., Queen's University, Kingston, Ontario, Canada, tim.salomons@queensu.ca @head_like_egg

**Speaker 3 Abstract Title:** Examining neural correlates of individual differences in habituation or sensitization to repeated experimental pain

**Speaker 3 Abstract:** In many neuroimaging designs, habituation or sensitization to repeated stimulation is treated as unwanted experimental noise and steps are taken to reduce this source of error variance (e.g. changing the site of stimulation). As part of a broader program of research aimed at understanding individual differences in vulnerability and resilience to chronic pain, we examined whether these patterns of habituation or sensitization were stable within individuals and, if so, what patterns of neural response were associated with these trait-like responses. In 68 healthy participants, we found that patterns of habituation or sensitization were stable across three sessions and that these responses were associated with activation of the hippocampus, striatum and other key regions during a separate session. Implications of these findings for better understanding individual differences in pain response will be discussed.

**Learning Objective 1:** Appraise current approaches to examining individual differences in pain response

**Learning Objective 2:** Demonstrate how new models might help us examine these individual differences

**Learning Objective 3:** Identify patterns of neural response associated with individual differences in pain response
Large-scale publicly available datasets provide novel insights into pathophysiology of chronic pain - focus on the UK BioBank.

Etienne Vachon-Presseau¹, Andrey Bortsov², Luda Diatchenko³

¹ McGill University, Montreal, Quebec, Canada
² University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, United States
³ McGill University, Montreal, Quebec, Canada

Symposium Chair: Luda Diatchenko, MD PhD, McGill University, Montreal, Quebec, Canada, luda.diatchenko@mcgill.ca

Symposium Abstract:
There was substantial progress lately in the development of integrated publicly available datasets of substantial sample size. One of such dataset is the UK BioBank. This large cohort of approximately 500,000 individuals (40 to 69 years at the time of recruitment) from several regions of the United Kingdom was designed to study the role of genomics in phenotypes and disease. The collected data include a rich variety of phenotypic and health-related information. Follow-up information is available, as well as linked health and medical records. All 500k study participants have genomic data. Large-scale phenotype-genotype studies including multiple pain manifestations provide new insights into plausible etiologic pathways to pain conditions. In this session, we will cover these applications using the latest methods and findings to demonstrate their practical importance and relevance to novel mechanism-based therapeutic approaches.

Speaker 1: Etienne Vachon-Presseau, PhD, McGill University, Montreal, Quebec, Canada, etienne.vachon-presseau@mcgill.ca

Speaker 1 Abstract Title: Revisiting the biopsychosocial framework for chronic pain using large scale datasets.

Speaker 1 Abstract: Chronic pain conditions are highly prevalent, heterogeneous, and commonly overlapping with other pain conditions. The accessibility to larger cohorts of patients provides unprecedented opportunities to test and modernize the biopsychosocial framework, especially from the lens of a spectrum, where pain is studied from single site to overlapping conditions. Here, we leveraged the UK Biobank dataset that enrolled about 500,000 individuals (45-75 y.o.) and curated a series of 99 features assessing physical, psychological, demographic, and sociological factors and computed a risk score capable of predicting the number of coexisting pain sites in cross-sectional data as well as the spreading of chronic pain in longitudinal data. In contrast to current theories emphasizing the heterogeneity between pain conditions, our models revealed a largely common etiology for different single site chronic pain locations and overlapping pain conditions, except for age, sex, white ethnicity, and body mass index that depended on the condition of the pain. We then showed that the derived risk factors for overlapping chronic pain conditions were associated with pain related polygenic risk scores, inflammatory blood markers, and neuroimaging-based markers for chronic pain.
Speaker 2: Andrey Bortsov, MD/PhD, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, United States, andrey.bortsov@duke.edu,

Speaker 2 Abstract Title: Genome-wide analysis identifies significant contribution of brain-expressed genes in chronic but not acute back pain

Speaker 2 Abstract: Back pain is the leading cause of disability worldwide. Although most back pain cases are acute, 20% of acute pain patients experience chronic back pain symptoms. It is unclear whether acute and chronic pain have similar or distinct underlying genetic mechanisms. In this study we investigated the differences in genetic architecture between acute and chronic back pain, using the UK Biobank cohort for discovery and the Nord-Trøndelag Health Study (HUNT) cohort for replication. Our results indicate that genetic contribution to chronic back pain is greater than to acute back pain, and much of the heritability of chronic back pain can be traced to genes predominantly expressed in the CNS. At the pathway level, we found the enrichment for genes in the spinal cord ventral commissure morphogenesis pathway in both cohorts. We also mapped the genetic component of chronic but not acute pain states to genes differentially expressed in the brain in mouse pain models. In summary, chronic back pain is more heritable than acute back pain and is driven mostly by genes expressed in the central nervous system.

Speaker 3: Luda Diatchenko, MD PhD, McGill University, Montreal, Quebec, Canada, luda.diatchenko@mcgill.ca

Speaker 3 Abstract Title: Genome-wide analysis identifies distinct pathophysiology for chronic overlapping pain conditions via impaired axonogenesis in the brain

Speaker 3 Abstract: Chronic pain is often present at more than one anatomical location, leading to chronic overlapping pain conditions (COPC). Whether COPC represents a distinct pathophysiology from the occurrence of pain at only one site is unknown. Using genome-wide approaches, we compared genetic determinants of chronic single-site vs. multi-site pain in the UK Biobank. We found that different genetic signals underlie chronic single-site and multi-site pain with much stronger genetic contributions for the latter. Among 23 loci associated with multi-site pain, 9 loci replicated in the HUNT cohort, with the DCC netrin-1 receptor (DCC) as the top gene. Functional genomics identified axonogenesis in brain tissues as the major contributing pathway to chronic multi-site pain. Finally, multimodal structural brain imaging analysis showed that DCC is most strongly expressed in subcortical limbic regions and is associated with alterations in the uncinate fasciculus microstructure, suggesting that DCC-dependent axonogenesis may contribute to COPC via cortico-limbic circuits.

Learning Objective 1: At the end of this symposium participants should be able to describe the advantages of large publicly available datasets for studying pain phenotypes and beyond

Learning Objective 2: At the end of this symposium participants should be able to explain the advantages of deriving predictive models for chronic pain in very large datasets.

Learning Objective 3: At the end of this symposium participants should be able to describe the variety and use of omics data publicly available to the pain researchers
New Insights in Pain Management of the Preterm Infant

Ruth E. Grunau¹, Manon Ranger², Mia McLean³, Marsha Campbell-Yeo⁴

¹ University of British Columbia, Paediatrics, Vancouver, British Columbia, Canada
² University of British Columbia, School of Nursing, Vancouver, British Columbia, Canada
³ University of British Columbia, Paediatrics, Vancouver, British Columbia, Canada
⁴ Dalhousie University & IWK Health, School of Nursing; Depart. Paediatrics, Psychology and Neuroscience, Halifax, Nova Scotia, Canada

Symposium Chair: Ruth E. Grunau, Ph.D., University of British Columbia, Paediatrics, Vancouver, British Columbia, Canada, rgrunau@bcchr.ca

Symposium Abstract:
Early exposure to frequent invasive procedures is related to short and long-term alterations in brain development, cognition and behaviour in children born very preterm. Sweet tasting solutions, such as sucrose or glucose, are currently considered the gold standard treatment for routinely performed minor procedural pain in both full-term and prematurely born neonates. Despite evidence of the effectiveness in reducing behavioural pain response, concerns have been raised regarding the possibility of adverse effects following repeated exposure on the developing brain of neonates born 2-4 months early. In this symposium, supported by recent pre-clinical and clinical findings, as well as parent perspectives, we will explore current evidence and perspectives as to best practices for infant pain management in the neonatal intensive care unit (NICU).

Dr. Sylvie Lambert, co-chair, will share her lived experience as a parent of extreme preterm twins hospitalized in the NICU. Dr. Manon Ranger will discuss the neuroinflammatory response patterns to early pain and/or sucrose in neonatal mice. Utilising observational data from three tertiary NICUs, Dr. Mia McLean will discuss relationships between early analgesia and sucrose exposure, neonatal brain, and cognitive and behavioural outcomes in children born very preterm. Dr. Marsha Campbell-Yeo will present randomized control trial evidence of biobehavioural and evoked brain activity responses to noxious stimuli in preterm neonates, which highlights the importance of including parents as active contributors to treatment for infant pain relief. Interactive discussion will focus on integrating current evidence with parent perspectives to inform strategies for parent engagement in infant pain management.

Speaker 1: Manon Ranger, Ph.D., University of British Columbia, School of Nursing, Vancouver, British Columbia, Canada, manon.ranger@ubc.ca @DrManonRanger

Speaker 1 Abstract Title: Pain and sucrose induced neuroinflammation in neonatal mice as a mechanism explaining adverse effects on brain and memory

Speaker 1 Abstract: Effective pain management in the neonatal intensive care unit (NICU) is crucial to help mitigate the known short/long-term negative consequences of early pain exposure in very preterm infants. Exposure to pain adversely affects neurodevelopment. Oral sucrose is administered routinely to reduce pain of minor procedures in the NICU and is recommended as standard care in international guidelines. The use of repeated oral sucrose to avert that pain may also adversely impact the developing brain. The mechanisms by which pain, and possibly
sucrose, produce negative short- and long-term effects on brain structure and function remain unclear. We have established a neonatal mouse model that closely captures critical aspects of what preterm infants may experience in the NICU (e.g., skin-breaking procedures, oral sucrose treatments). Using this paradigm, we were the first to show that exposure to early pain and/or sucrose has profound long-term structural effects on the brain and memory. Inflammation triggered by repeated negative stimuli, such as pain, increases inflammatory cytokines, which in turn modify brain function. Early-life exposure to repeated sucrose, alone or in combination with pain, might also lead to an inflammatory response and immune alterations. In this symposium, we will present our most recent findings on whether early repeated exposure to pain, sucrose, or pain and sucrose affects pro- and anti-inflammatory cytokine levels and induces brain microgliosis in neonatal mice. Our results will add evidence supporting the current clinical concerns for the use of sucrose as a standard pain management practice in the very preterm population.

**Speaker 2:** Mia McLean, Ph.D., University of British Columbia, Paediatrics, Vancouver, British Columbia, Canada, Mia.McLean@bcchr.ca

**Speaker 2 Abstract Title:** Cross-site Comparisons of Neonatal Brain Health, Cognitive and Behavioural Outcomes Following Exposure to Early Analgesics in Children Born Very Preterm

**Speaker 2 Abstract:** A major challenge in the care of preterm neonates is to find ways to reduce the prevalence and severity of neurodevelopmental problems thus optimizing wellbeing. Early exposure to neonatal pain (frequent invasive procedures) is related to short- and long-term alterations in brain development, neurodevelopment and behavior in very preterm children. The use of analgesic and sedative practice to treat procedural pain varies considerably across hospitals within Canada. Moreover, it is unclear whether medications regularly used for analgesia and sedation in the neonatal intensive care unit (NICU) may have some unanticipated harmful effects. Moreover, although oral sucrose reduces behavioral responses to neonatal pain, effects of repeated use on the developing immature brain and neurodevelopment is unknown. In a multi-site cohort study across three tertiary NICUs we are examining whether: 1) relative exposure to morphine analgesia and sucrose, independent of procedural pain exposure and clinical confounders, are related to cognitive and behavioral outcomes at ages 18 and 33 months; and 2) cumulative sucrose exposure is related to neonatal brain health (as measured by the Hurst exponent). Our findings will provide evidence supporting safe analgesic practices for the treatment of pain in neonates born very preterm, considering brain development and neurodevelopmental outcomes. Ultimately, our work will help improve clinical care of neonatal pain and ensure children born very preterm thrive.

**Speaker 3:** Marsha Campbell-Yeo, Ph.D., NNP-BC, Dalhousie University & IWK Health, School of Nursing; Depart. Paediatrics, Psychology and Neuroscience, Halifax, Nova Scotia, Canada, Marsha.Campbell-Yeo@Dal.ca @DrMCampbellYeo

**Speaker 3 Abstract Title:** The influence of skin-to-skin contact on Cortical Activity during Painful procedures in preterm infants in the neonatal intensive care unit (iCAP mini)-Preliminary results
**Speaker 3 Abstract:** Despite level one evidence on the effectiveness of maternal or parent-led interventions, specifically breastfeeding or skin-to-skin contact (SSC), to reduce biobehavioural pain responses associated with repeated procedural pain, practice uptake in neonatal care remains underutilized. One reason cited for this lack of uptake relates to a dearth of study regarding pain assessment beyond biobehavioural response such as brain-based measures. Most notably, there is a lack of understanding of the effect of these interventions on a) noxious pain-related responses in the neonatal brain, (b) the efficacy of SSC when compared to sucrose on noxious pain-related brain activity, and (c) the relationship between noxious evoked brain activity and biobehavioural responses to noxious stimuli in preterm neonates. Preliminary data from our randomized control trial aimed to characterize the effect of skin-to-skin contact compared to 24% oral sucrose on noxious evoked activity in the preterm neonate brain undergoing a clinically required heel lance will be discussed. Potential differentiation between bio-behavioural pain response and noxious evoked pain response elicited by clinical heel lance and frequency of adverse events between interventions will be presented. Challenges and complexities in the electroencephalographic measurement of neonatal pain and maternal acceptability will also discussed.

**Learning Objective 1:** Describe most recent evidence on short-term effects of early repetitive pain and/or sucrose exposure on neuroinflammatory markers and cell morphology in a mouse model.

**Learning Objective 2:** Describe effects of early analgesics and pain exposure on neonatal brain and child cognition and behaviour in children born very preterm.

**Learning Objective 3:** Describe current evidence comparing administration of oral sucrose and parent-led pain-relieving interventions to better recognize biobehavioural and evoked brain responses to neonatal procedural pain and inform uptake of parent-led interventions.
\textbf{Epiregulin and EGFR interactions as critical contributors to pain processes and a new therapeutic pain target}

Loren Martin\textsuperscript{1}, Gregory Neely\textsuperscript{2}, Luda Diatchenko\textsuperscript{3}

\textsuperscript{1} University of Toronto, Toronto, Ontario, Canada
\textsuperscript{2} University of Sydney, Sydney, Australia
\textsuperscript{3} McGill University, Montreal, Quebec, Canada

\textbf{Symposium Chair:} Luda Diatchenko, MD PhD, McGill University, Montreal, Quebec, Canada, luda.diatchenko@mcgill.ca

\textbf{Symposium Abstract:}
The search for new chronic pain treatments continues to be a priority in the pain field due to the fact that many current therapeutic options carry the risks of addiction and/or other undesirable side effects. Recently, the crucial role in pain of a protein known as epidermal growth factor (EGFR) and its ligand epiregulin (EREG) has been discovered through human genetic association studies. Importantly, the contribution of this pathway to pain states is conserved in both mice and fruit flies. EGFR blockers, routinely used in the treatment of lung cancer to inhibit tumor growth, is demonstrated to be potent analgesics (comparable to morphine) in mouse models of inflammatory and chronic pain. Repurposing existing drugs to treat diseases other than those they were designed for can be advantageous, because the toxicity of these compounds is well characterized, making their subsequent development for new indications relatively quick and inexpensive. Furthermore, developing drugs targeting these pathways through modulation of EREG activity is providing a new avenue for a non-opioid therapy for chronic pain.

\textbf{Speaker 1:} Loren Martin, PhD, University of Toronto, Toronto, Ontario, Canada, lj.martin@utoronto.ca

\textbf{Speaker 1 Abstract Title:} Uncovering a role for the EGFR and epiregulin as novel pain targets

\textbf{Speaker 1 Abstract:} The EGFR belongs to the well-studied ErbB family of receptor tyrosine kinases. EGFR is activated by numerous endogenous ligands that promote cellular growth, proliferation, and tissue regeneration. In this talk, I will give a brief overview of this system and efforts we have made towards uncovering a role for EGFR and its natural ligand, epiregulin (EREG), in pain processing. We have shown that inhibition of EGFR with clinically available compounds strongly reduces nocifensive behavior in mouse models of inflammatory and chronic pain. EREG-mediated activation of EGFR enhanced nociception through a mechanism involving the PI3K/AKT/mTOR pathway, while EREG neutralizing antibodies reduce established chronic pain in mice. Moreover, EREG neutralizing antibodies may have a less severe side effect profile than EGFR antagonists providing a novel and advantageous therapeutic target for the treatment of persistent pain conditions.

\textbf{Speaker 2:} Gregory Neely, PhD, University of Sydney, Sydney, Australia, greg.neely@sydney.edu.au,
Speaker 2 Abstract Title: High throughput functional validation of conserved pain genes

Speaker 2 Abstract: A basic understanding of the core genes and systems that control nociception/pain can help us develop new strategies to treat pain disease. However, these are systems level processes that can be difficult to model in vitro. Since the primordial genetic architecture of our nociception system first evolved over 500 million years ago, high throughput genetic screening in insects can help us identify new conserved pain genes and pathways. By combining human genetics data with high throughput functional screening in fruit flies, we have identified or validated multiple new conserved pain genes. Here we will discuss these efforts, and how they helped confirm EGFR/ EREG as a core pathway controlling pain perception from insects through to humans.

Speaker 3: Luda Diatchenko, MD PhD, McGill University, Montreal, Quebec, Canada, luda.diatchenko@mcgill.ca

Speaker 3 Abstract Title: The dichotomous role of epiregulin in pain states

Speaker 3 Abstract: We systematically screened single-nucleotide polymorphisms (SNPs) in all gene loci belonging to EGFR-family receptors (namely, EGFR, ERBB2, ERBB3 and ERBB4) and their ligands (namely, AREG, BTC, EGF, EPGN, EREG, HBEGF, MUC4, NRG1, NRG2, NRG3, NRG4 and TGFA) for their association with reported clinical pain. We tested an association with self-reported pain intensity in patients with chronic facial pain who participated in the Orofacial Pain: Prospective Evaluation and Risk Assessment (OPPERA) cohort. We found that only epiregulin (ERE)G was associated with pain. The strongest effect was observed for a minor allele at rs6836436 in EREG, which was associated with lower chronic pain intensity. However, the same allele was associated with higher facial pain intensity among cases with recent onset of facial pain. Similar trends were observed in an independent cohort of UK Biobank (UKB) where the minor allele at rs6836436 was associated with a higher number of acute pain sites but a lower number of chronic pain sites. Expression quantitative trait loci analyses established rs6836436 as a loss-of-function variant of EREG. Lastly, the dichotomous role of EREG for pain phenotypes was tested using mouse models of chronic and acute pain sensitivity.

Learning Objective 1: Upon completion of this session, attendees will be able to analyze the potential of EGFR and EREG as novel non-opioid pain therapeutics

Learning Objective 2: Upon completion of this session, attendees will be able to describe the functional validation of human genetics data using fruit flies as a powerful approach for identifying critical pain genes and pathways like EGFR/ EREG.

Learning Objective 3: Upon completion of this session, attendees will be able to explain the analgesic role of EREG during the early stages of pain, and, an opposite-pronociceptive role in establishing chronic pain.
Critical Social Science Approaches to Chronic Pain and Marginalization

Perri Tutelman¹, Therese Lane², Laura Connoy³, Lise Dassieu⁴, Bruce Wallace⁵

¹ PhD Candidate, Dalhousie University, Halifax, NS, Canada
² Person with lived experience of chronic pain, Toronto, Canada
³ Western University, London, Ontario, Canada
⁴ Centre de recherche du Centre hospitalier de l'Université de Montréal (University of Montreal Hospital Research Centre), Montreal, Quebec, Canada
⁵ University of Victoria, Victoria, British Columbia, Canada

Symposium Chair: Fiona Webster, PhD, Western University, London, Ontario, Canada, fiona.webster@uwo.ca @FionaWebster1; Theres Lane

Symposium Abstract:
The social sciences have long drawn attention to the role of social and public institutions in shaping people’s experience of health. Yet to date these approaches have been less well incorporated into chronic pain research. Studies in the area of chronic pain have historically been dominated by biomedical and clinical approaches that sometimes construct pain in dualistic and reductionist ways, thereby tending to problematize people living with pain, rather than attending to the complex and often violent historical, social, political, and economic conditions impacting their lives. To be sure, there is growing recognition of the association between pain and systemic and structural marginalization, including experiences of trauma and violence, yet more research is urgently needed. The Canadian Pain Task Force Report recently called for greater attention to this issue and several Canadian studies indicate that people with chronic pain are much more likely to struggle with poverty; such disparities are rooted in the social determinants of health—poverty, living and working conditions, and social exclusion. We argue that research in the area of chronic pain requires much more critical attention to how processes of marginalization shape experiences of chronic pain. This panel will, therefore, call attention to how critical social science approaches can be engaged to assist with efforts to critically interrogate not only chronic pain, but also the intersection of chronic pain with marginalization. In doing so, the focus on the individual can be transcended in favour of a focus on social systems.

Speaker 1: Laura Connoy, PhD, Western University, London, Ontario, Canada, lconnoy@uwo.ca @LauraConnoy

Speaker 1 Abstract Title: A critical sociology of chronic pain

Speaker 1 Abstract: Despite calls for inter disciplinarity in research, sociological approaches remain less utilized in chronic pain research. Reasons for this are multi-faceted. In this session, I reflect on the contributions of sociology to the study of chronic pain, with an emphasis on those studies adopting a critical lens. Scholars are beginning to call attention to the links between chronic pain and systemic and structural violence and inequity, and it is here that critical sociology can provide important insight by stressing the social as it pertains to chronic pain. Sociological research has the potential to contribute understandings of institutions, such as the capitalist system, late modernity, and neoliberal imperialism and also offers tools that allow for
the exploration of relationships between race, gender, and class. This has the potential to uncover deeper understandings of chronic pain, for the individual as well as society. Upon review of existing sociological analyses of chronic pain, and drawing on findings from a critical ethnography of chronic pain and marginalization (COPE II) I share some of the important critical contributions emerging from this work and note future research directions as a means to further the advancement of a critical sociology of chronic pain subfield and promote interdisciplinary work in this area.

**Speaker 2: Lise Dassieu, PhD, Centre de recherche du Centre hospitalier de l'Université de Montréal (University of Montreal Hospital Research Centre), Montreal, Quebec, Canada, lise.dassieu@umontreal.ca @LiseDassieu**

**Speaker 2 Abstract Title:** Painful lives: investigating the social experience of chronic pain

**Speaker 2 Abstract:** This presentation draws on the results of three recent qualitative research studies that utilized a sociological approach to pain experiences: (1) a study of the chronic pain experience and management among marginalized people who use drugs; (2) an analysis of the opioid overdose epidemic impacts on the social relationships of people living with chronic pain; and (3) an investigation of the systemic inequities affecting people with chronic pain during the COVID-19 pandemic. This body of research converges to highlight the multiple and intertwined forms of stigma, prejudices, and discrimination associated with the daily social experience of chronic pain. This work also highlights the constant energy deployed by people with chronic pain in attempting to counter social stigma. Chronic pain is far more than an individual biomedical and psychological health condition, and social science approaches underscore the importance of addressing these issues collectively. Both healthcare and welfare policies need to engage in fostering the inclusiveness of people with chronic pain in society, especially those experiencing stigma, marginalization, and systemic barriers. In research, clinical practices, and decision-making, interdisciplinary approaches integrating social sciences as a core component are essential to creating safe and equitable conditions for all individuals living with chronic pain.

**Speaker 3: Bruce Wallace, PhD, University of Victoria, Victoria, British Columbia, Canada, barclay@uvic.ca**

**Speaker 3 Abstract Title:** Chronic pain in persons who are marginalized by social conditions

**Speaker 3 Abstract:** For people who experience social inequities and structural violence, pain and related care are inexorably linked to experiences of injustice and stigma. I present the analysis of a social science field study, conducted in partnership with a team of researchers and community agencies, whose purpose was to examine in greater depth the experiences of pain, discrimination and stigma across diverse marginalized groups. Themes on the relationship of pain and marginalization that emerged from the study will be discussed in the presentation and will include: social locations and identities; experiences of violence; trauma and related mental health issues; experiences of discrimination, stigma and dismissal; experiences of inadequate and ineffective health care; and, the impacts of these intersecting experiences. The paper will conclude with remarks on equity-oriented responses to chronic pain that would recognize pain not only as a biomedical issue but also one of social justice.
Learning Objective 1: Differentiate between critical social science and biomedical approaches to chronic pain and discuss how these approaches can be integrated through interdisciplinarity.

Learning Objective 2: Offer suggestions for how future approaches to chronic pain research can incorporate social science approaches to explore or include marginalization.

Learning Objective 3: Provide examples of social science approaches to chronic pain and marginalization by sharing results of several studies.
Medical Cannabis and Cannabinoids for Chronic Pain: Current evidence and knowledge gaps

Fiona Campbell¹, Jason Busse², Hance Clarke³, John Brown⁴

¹ University of Toronto, Anesthesiology and Pain Medicine, Toronto, Ontario, Canada
² McMaster University, Anesthesia, Hamilton, Ontario, Canada
³ University of Toronto, Anesthesiology and Pain Medicine, Toronto, Ontario, Canada
⁴ Chronic Pain Centre of Excellence for Canadian Veterans, Dorchester, Ontario, Canada

Symposium Chair: Fiona Campbell, MD, University of Toronto, Anesthesiology and Pain Medicine, Toronto, Ontario, Canada, fiona.campbell@sickkids.ca @DrFCampbell

Symposium Abstract:
Medical cannabis is commonly and increasingly used by Canadians for chronic pain; however, this therapeutic option was made available in 2001 on compassionate grounds as opposed to empirical evidence showing that the benefits exceed the harms. Further, recreational cannabis was legalized in Canada in 2018. Several recent guidance documents have been published to help optimize evidence-based practice; however, they have inconsistent and conflicting recommendations. This symposium will discuss and reconcile contrasting recommendations for medical cannabis and chronic pain. Evidence informing the benefits and harms of medical cannabis for chronic pain is limited but increasingly available; however, the generalizability of findings is dependent on whether enrolled patients and products administered reflect real world practice. We will explore this issue and highlight areas for improvement. Finally, evidence alone is not sufficient for clinical decision-making. Patients’ values and preferences are critical to ensure that treatment decisions are accountable to an individual’s context. A patient partner will discuss their involvement in the development of a clinical practice guideline on cannabis for chronic pain.

Speaker 1: Jason Busse, DC, PhD, McMaster University, Anesthesia, Hamilton, Ontario, Canada, bussejw@mcmaster.ca @JasonWBusse

Speaker 1 Abstract Title: Reconciling Contrasting Recommendations for Medical Cannabis and Chronic Pain

Speaker 1 Abstract: Medical cannabis is increasingly used to manage chronic pain and, as of March 2020, Health Canada reported 329,000 Canadians with authorization to access medical cannabis. Education on medical cannabis is largely absent in healthcare training programs in Canada, and clinical practice guidelines are important to help inform evidence-based use of cannabis. In March 2021, NICE updated their guideline that made a strong recommendation against use of cannabis to manage chronic pain based on ineffectiveness. Also in March 2021, the International Association for the Study of Pain released a position statement that also strongly recommended against use of cannabis for chronic pain based on low-quality evidence. In September 2021, a guideline was published in the British Medical Journal that found moderate-to-high certainty evidence supporting a weak recommendation in favour of medical cannabis for chronic pain. This presentation will reconcile these contrasting recommendations.
Specifically, with a focus on exploring the impact of risk of bias on effect estimates, optimizing presentation of treatment effects to convey benefits and harms in a manner that is most helpful to patients and clinicians, and exploring the critical role of patients’ values and preferences in interpreting the importance of treatment effects and the trade-off between benefits and harms.

**Speaker 2:** Hance Clarke, MD, PhD, University of Toronto, Anesthesiology and Pain Medicine, Toronto, Ontario, Canada, hance.clarke@utoronto.ca @Drhaclarke

**Speaker 2 Abstract Title:** Using Real World Evidence and Basic Science to Inform the Impact of Medical Cannabis on Chronic Pain

**Speaker 2 Abstract:** Despite cannabis sales of over 2.6 billion in Canada in 2020, most patients (i.e., 2.7 million of 3.1 million that report using cannabis for a health-related condition) continue to self-medicate with cannabis products intended for recreational sales channels. Only recently has Health Canada enabled Canadian scientists to begin researching the products being consumed by patients in randomized controlled trials. This presentation will update a national real-world evidence project underway and provide early data from the human and basic science studies related to osteoarthritis being completed at the Centre for Cannabinoid Therapeutics (UHN). Pre-clinical study results in our mouse model of osteoarthritis will be presented. THC signals through numerous cannabinoid receptors, including CB1/2 are expressed on joint cells. Our preliminary data suggest that oral delivery methods are superior to intra-articular delivery methods in the mouse model for reducing pain and reducing joint degeneration. Data will also be presented from a cohort of 56 human subjects that were using cannabis to treat chronic pain within the Transitional Pain at the Toronto General Hospital. 70% of the products used by this cohort were considered THC dominant (daily dose: 1.7±1.3 grams of product). The majority of patients (96%) reported effective pain management and 76% self-reported a decrease in other analgesic medication usage. Between 83-93% of patients reported symptomatic improvements in nausea, appetite, sleep, anxiety, and depression with medical cannabis use. Compared to males, female patients had numerically higher blood concentrations of CBD, CBDA, Δ9-THC, 11-OH-THC but lower concentrations of Δ9-THCA and THC-COOH.

**Speaker 3:** John Brown, Diploma in Police Science, Chronic Pain Centre of Excellence for Canadian Veterans, Dorchester, Ontario, Canada, john.c.brown@me.com

**Speaker 3 Abstract Title:** The Role of Patient Partners in the Development of Guidance Regarding Medical Cannabis for Chronic Pain

**Speaker 3 Abstract:** As a Canadian Veteran with lived experience with chronic pain, I have context that is largely unavailable to most researchers and clinicians. This includes my engagement in multiple treatments, including opioids and medical cannabis. I recently participated in the development of a clinical practice guideline on medical cannabis for chronic pain, in which I was a full panel member and co-author. This involved some training to optimize my participation in the process, selecting outcomes of primary interest for evidence syntheses, ranking the relative importance of harms, and helping to establish if effect estimates were imprecise (i.e., did they include both effects that were important and unimportant). The oversight committee engaged 3 patient partners to support the guideline, that were selected in part to
represent a variety of experiences. Myself for my positive experience with using medical cannabis, another who had not used cannabis, and another who had tried cannabis but discontinued due to lack of benefit. Each of these perspectives were considered by the panel, as well as a formal review of studies exploring values and preferences of people living with chronic pain towards medical cannabis, when making their recommendation. I will describe my experience with this process to highlight the feasibility and importance of including patient partners with lived experience in the development of clinical practice guidelines that will affect their care.

Learning Objective 1: Criticize contrasting guidance recommendations regarding medical cannabis for chronic pain

Learning Objective 2: Demonstrate the importance of generating scientific data that reflects practical use of cannabis for chronic pain

Learning Objective 3: Discuss the critical role that patient partners have in the development of guidance for medical cannabis and chronic pain
"I feel more confident now and more empowered to give myself more love": Developing self-management skills and empowering chronic pelvic pain patients

Rachael Bosma¹, Tania Di Renna², Wendy Carter³, Emeralda Burke⁴

¹ Women's College Hospital, Toronto Academic Pain Medicine Institute (TAPMI), Toronto, Ontario, Canada
² Women's College Hospital, Toronto Academic Pain Medicine Institute (TAPMI), Toronto, Ontario, Canada
³ Women's College Hospital, Toronto Academic Pain Medicine Institute (TAPMI), Toronto, Ontario, Canada
⁴ Women's College Hospital, Toronto Academic Pain Medicine Institute (TAPMI), Toronto, Ontario, Canada

Symposium Chair: Rachael Bosma, PhD, Women's College Hospital, Toronto Academic Pain Medicine Institute (TAPMI), Toronto, Ontario, Canada, Rachael.Bosma@wchospital.ca

Symposium Abstract:
Chronic pelvic pain (CPP) is pelvic pain that persists longer than 6 months and is a common, debilitating condition affecting women. CPP occurs in 20% of women of reproductive age and has been recognized as a globally neglected reproductive health morbidity. It accounts for substantial personal suffering and has a direct impact on patient's marital, social, and professional life. Given the physical, psychological, and social components that contribute to CPP, therapeutic strategies should target both gynecological/biological and psychosocial factors. More specifically, biopsychosocial therapeutic approaches that are based in the educational framework of disease self-management equip patients with the knowledge, resources, and tools to self-manage CPP. Considering that there are very few CPP management programs in Canada and the lengthy wait times for patients, it is important to equip patients with these self-management tools.

This symposium will discuss (1) CPP and CPP management from a biopsychosocial perspective and (2) describe an online Pelvic Empowered Management Program (developed by TAPMI) consisting of 6 self-directed modules designed to enhance the self-management of CPP patients who are currently on the waitlist for care at an interdisciplinary chronic pain clinic. We will also consider the experiences, impacts, and outcomes of patients who have completed the Pelvic Empowered Management Program. Using audio/video excerpts as well as poignant quotes from our Pelvic Empowered feasibility study, patient stories will be woven in this discussion and described in detail by a patient with lived experience of CPP.

Speaker 1: Tania Di Renna, BSc, MD, FRCPC, Women's College Hospital, Toronto Academic Pain Medicine Institute (TAPMI), Toronto, Ontario, Canada, tania.direnna@wchospital.ca

Speaker 1 Abstract Title: The effectiveness of a biopsychosocial self-management approach to chronic pelvic pain
Speaker 1 Abstract: Factors contributing to CPP include gynecological, musculoskeletal, visceral, vaginal/vulvar, psychosocial, and central nervous system sensitization. However, up to half of the affected women have no obvious pathology. In addition to their pelvic pain symptoms, women with CPP are at an increased risk for depression, are more likely to have a history of physical and sexual abuse, and subsequently have a higher incidence of posttraumatic stress disorder. These patients often develop negative coping strategies. Management of this patient population is challenging and there are few established treatments. Although CPP may not be curable, it can be managed so patients attain normal or near-normal levels of functions. Providing patients with self-management educational resources is increasingly recognized as a critical strategy for improving self-efficacy and functional outcomes. Self-management reflects the ability to confidently function despite symptoms, including managing medication(s), adapting to physical limitations, and coping with the psychological and emotional challenges associated with one's disease. Evidence shows self-management support through education can often help patients manage their symptoms more effectively.

This talk will discuss CPP and the importance of educational self-management resources. Throughout the presentation we will address the following questions: 1) Are we providing adequate information and resources to CPP patients? 2) Are we enhancing CPP patients’ ability to self-manage? Through this presentation we will encourage audience participation to facilitate an interdisciplinary discussion on CPP and self-management strategies from a biopsychosocial perspective.

Speaker 2: Wendy Carter, C.Psych, Women’s College Hospital, Toronto Academic Pain Medicine Institute (TAPMI), Toronto, Ontario, Canada, wendy.carter@wchospital.ca

Speaker 2 Abstract Title: An interdisciplinary and holistic approach to chronic pelvic pain management

Speaker 2 Abstract: Treatment for chronic pelvic pain has evolved in the last years to include more modalities as well as more disciplines. As we come to better understand the complexities of chronic pain, especially in the context of pelvic pain, we are in a better position to effectively treat and manage this common condition. There are certain predictive factors involved in chronic pelvic pain such as a history of trauma and life circumstances. Experiencing pelvic pain often comes hand in hand with feelings of isolation and stigma. An interdisciplinary team can provide a holistic approach to care and address some of these layers. An interdisciplinary team is vital in providing the necessary biopsychosocial approach to guide women in developing the self-management skills and tools to live a fulfilled life, despite their pain.

Comprehensive treatment can include one on one treatment as well as group interventions. Topics covered consist of: 1) assessing and addressing any pelvic floor muscle tension and/or weakness by incorporating release techniques and specific exercises, 2) providing education and mindful types of movement in order to increase physical awareness 3) making recommendations on nutrition, and promoting an anti-inflammatory diet, 4) managing emotions and strengthening resilience while cultivating self-compassion, 5) addressing sex and intimacy as well as fertility.
In this session, we will speak to the pelvic pain group for chronic pelvic pain through Toronto Academic Pain Medicine Institute (TAPMI) at Women’s College Hospital.

**Speaker 3:** Rose Robbins, PhD., C. Psych., Psychologist, The Ottawa Hospital Pain Clinic, Ottawa, Ontario, Canada, rorobbins@toh.ca

**Speaker 3 Abstract Title:** A Stepped-care approach to interprofessional pelvic pain management: The Ottawa Hospital Pain Clinic Perspective

**Speaker 3 Abstract:** Access to specialized interprofessional care for chronic pelvic pain remains limited in Canada. Currently many women who live with pelvic pain are treated in general pain clinics either because they have a primary diagnosis of pelvic pain or experience pelvic pain as a comorbidity to another painful condition. Although women with pelvic pain do often benefit from general pain self-management, they have unique needs that are not always addressed effectively in such programs. Their needs are also heterogeneous and require various levels of care.

The Ottawa Hospital Pain Clinic uses a stepped-care approach that has allowed increased access to interprofessional care while reducing wait-times and tailoring treatment to the unique needs of patients. A specific pelvic pain stream was recently created that leverages the existing resources of the clinic to better serve women with pelvic pain. After participating in an intake assessment with an interprofessional team member, patients are given access to several treatment options within two months of their physician referral to the team. These services range from one-time educational workshops to trauma-informed individual therapy. An 8-week interprofessional group treatment facilitated by psychology, physiotherapy, and occupational therapy is also available. In this presentation, we will provide an overview of the pelvic pain stream at The Ottawa Hospital Pain Clinic, including the interprofessional pelvic pain group program and preliminary data on the program’s success in meeting the unique needs of pelvic pain patients.

**Speaker 4:** Emeralda Burke, BSc, Women's College Hospital, Toronto Academic Pain Medicine Institute (TAPMI), Toronto, Ontario, Canada, emeralda.burke@wchospital.ca

**Speaker 4 Abstract Title:** Empowered Management: The power of lived experience in chronic pelvic pain management and research

**Speaker 4 Abstract:** Living with CPP results in isolation, loneliness and embarrassment due to the challenges associated with this disease, including inability to sit for long periods, difficulty voiding and sexual dysfunction. This leads to mental health struggles and breakdown of relationships as the stigma around talking about such intimate things results in people trying to cope by themselves. However, CPP is present in 10-20% of reproductive-aged women, therefore there needs to be more awareness, education and open discussion about the real-life impact of CPP so that those suffering can understand they are not alone, gain support from their peers and learn to manage their pain. While a general education program is a great foundation, TAPMI saw the potential in creating a targeted educational tool which enables patients to become empowered, feel less alone and understand ways to manage this relentless pain. Our pelvic pain physicians, pelvic physiotherapist, psychologist and several patients living with CPP
collaborated to build six self-directed online modules that consisted of educational resources, videos and exercises, called the Pelvic Empowered Program.

In this talk, we will provide an overview of the program, the modules, topics covered, and interactive exercises provided to patients. Findings from a study examining the feasibility of this program will be presented and patient experiences with the modules will be described. We want attendees to leave this presentation with an understanding of the impact of the program and the empowerment patients felt in managing their pain from a biopsychosocial lens after completing the program.

**Learning Objective 1:** To discuss chronic pelvic pain from a biopsychosocial perspective and its impact on patient health and quality of life.

**Learning Objective 2:** To discuss interdisciplinary and self-management approaches to chronic pelvic pain management.

**Learning Objective 3:** To describe the experiences, impacts, and outcomes of patients who have completed the Pelvic Empowered Management Program.
Shift the Narrative: Strengths-based and Culturally Safe Considerations for Better Pain Care and Policy Related to Indigenous Peoples

Margot Latimer¹, John Sylliboy², Courtney Pennell³, Katie Gloade⁴

¹ Dalhousie University, Faculty of Health, Halifax, Nova Scotia, Canada
² McGill University, Education, Halifax, Nova Scotia, Canada
³ IWK Health, Nursing, Halifax, Nova Scotia, Canada
⁴ Dalhousie University, Health, Halifax, Nova Scotia, Canada

Symposium Chair: Margot Latimer, PhD, Nursing, Dalhousie University, Faculty of Health, Halifax, Nova Scotia, Canada, mlatimer@dal.ca @MargotALatimer

Symposium Abstract:
Indigenous Peoples have knowledge, beliefs, and cultural traditions that keep them healthy. Settler colonial practices cemented by government policies have disrupted Indigenous Peoples’ ability to maintain health and this has left an undeniable, intergenerational, and tragic impact on Indigenous Peoples’ health and well-being. Ongoing oppressive policies and a lack of willingness to uphold treaty and inherent rights have meant that Indigenous peoples have not received equitable, community-informed, and culturally safe care. The Health Council of Canada’s landmark document “Empathy Dignity and Respect: Creating Cultural Safety for Indigenous People in Urban Health Care” (2012) clearly identifies significant gaps in healthcare experiences that need to be remedied. There are many real scenarios involving Indigenous People presenting with pain yet are not being treated, or with conditions such as cancer that are ending with tragic results. Research indicates Indigenous peoples feel fearful, disrespected, dismissed, racialized and are reluctant to seek care in the healthcare system. This is especially problematic considering the high rates of multiple, co-existing chronic pain conditions experienced by Indigenous peoples in Canada. Health clinicians perceive Indigenous Peoples health from a deficit based-rather than a strength-based perspective. Shifting the narrative and focusing on strengths will shift our awareness, understanding, and inform our actions to advocate for the creation of safer health spaces for Indigenous Peoples. The symposia bring together the knowledge, experience, and wisdom of three Mi’kmaq people who have worked with Indigenous Peoples in the areas of 2SLGBTQQIA+, education, mental health and trauma and cultural safety in clinical care.

Speaker 1: John Sylliboy, M.A, McGill University, Education, Halifax, Nova Scotia, Canada, johnsylliboy@gmail.com @SylliboyJohnR

Speaker 1 Abstract Title: A Bundle of Knowledge for 2S Healthcare

Speaker 1 Abstract: Inequities in healthcare also affect the Two-Spirit community. According to a recent survey, Two-Spirit people face an intersection between racism and homophobia, misogyny and transphobia (Wabanaki Two-Spirit Alliance, Sylliboy, 2021). The currently available research demonstrating the intergenerational effects of Indian Residential Schools (IRS) provides support for the enduring negative consequences of these experiences and the role
of historical trauma in contributing to present day disparities in well-being. The intersecting and compounded minoritized identities of Two-Spirit people means that they face barriers in healthcare. The varying dimensions of minority stressors faced by Two-Spirit people leads to higher rates of anxiety, depression, PTSD, suicide [ideation], and violent victimization than their straight and/or cisgender peers. There is also evidence this group suffers from more pain conditions due to feeling unsafe and not seeking care in the system. Additionally, the mental health and wellbeing of Two-Spirit people is generally underreported in Canada. Researchers report that significant portions of health care professionals can hold biased and inaccurate beliefs about the causes of health and social inequities and this directly impacts healthcare interactions in the area of pain assessment and treatment. The Wabanaki Two-Spirit Alliance (W2SA) is developing community-led responses to address urgent concerns in this area and are also responding to the MMIWG2S+ Calls for Justice. This presentation will share key, evidence-based promising practices that will enhance the ways health providers can support ways to create safe spaces for the Two-Spirit community in the health care system.

**Speaker 2:** Courtney Pennell, BScN, IWK Health, Nursing, Halifax, Nova Scotia, Canada, courtney.pennell@iwk.nshealth.ca @courtneyPenne13

**Speaker 2 Abstract Title:** Mobilizing Indigenous Knowledge about Pain to Create Safer Healthcare Settings for Indigenous People

**Speaker 2 Abstract:** The landmark documents such as the UNDRIP (2007) and TRC Calls to Action (2015), the Canadian Pain Task Force Report (2021) and National Inquiry into Missing and Murdered Indigenous Women and Girls and 2SLGBTQQIA+ reports have identified important information related to culturally safe care in health-care settings. The UNDRIP, first introduced in 2007, is the most comprehensive international instrument outlining the inherent rights of Indigenous peoples to access traditional medicines, maintain their health practices and to be actively involved in developing and determining health outcomes, and designing health programming. There is an urgency to develop knowledge sharing and learning opportunities for health systems, organizations and clinicians to apply this knowledge into practice. Indigenous peoples are in the best position to guide health providers and administrators regarding the path to wellness for Indigenous people and communities. Essential elements of equity-oriented health care for Indigenous Peoples involve partnerships with Indigenous communities, action at all three levels, attention to local and global histories, and attention to potential harmful impacts of different strategies. This presentation will be led by an Indigenous Health Consultant and Registered Nurse who will engage learners to be aware of the ways to create culturally safe, equitable healthcare settings considering system, organization and clinician’s role in terms of pain care. A case study will be presented to provide learners an opportunity to put themselves in a real clinical situation and how these elements fit together.

**Speaker 3:** Katie Gloade, M.Ed, CCC, PhD(c), Dalhousie University, Health, Halifax, Nova Scotia, Canada, katie.gloade@dal.ca @katiegloade

**Speaker 3 Abstract Title:** From Curriculum to Care: Creating Pathways for Change
Speaker 3 Abstract: As we look to First Nation communities for guidance on how to best support them, we are consistently reminded that the way forward is through collaboration and in keeping with Indigenous Ways of Knowing. The Truth and Reconciliation Commission of Canada: Calls to Action (2015) #22 states that “we call upon those who can effect change within the Canadian healthcare system to recognize the value of Aboriginal healing practices” while call #24 “requires all students” in medical and nursing schools “to take a course dealing with Aboriginal health issues, including the history and legacy of residential schools, the United Nations Declaration on the Rights of Indigenous Peoples, Treaties and Aboriginal rights, and Indigenous teachers and practice” None of these actions, of course, can be done without recognition of the intergenerational impacts of colonization and trauma-informed, culturally safe approaches. Novel work has emerged from a collaboration between First Nations communities and healthcare providers in Mi’kma’ki to demonstrate that First Nations children’s pain is often undiagnosed, untreated, or not referred to specialists. Pain is also experienced on a holistic level and incorporates the physical, mental, emotional, and spiritual dimensions, something that is often not considered in Westernized medicine. Our collective has created an Indigenous-led innovative multi-module cultural safety curriculum relevant for pre-licensure clinicians to learn about landmark documents and ways to apply the knowledge to pain care. This presentation will engage learners to know how to work towards reconciliation in a trauma-informed educational approach so as not to perpetuate harm.

Learning Objective 1: Recognize how colonizing historical events such as Indian Residential School and Indian Day School impact Indigenous Peoples current health and healthcare pain experiences

Learning Objective 2: Recognize why and how to meaningfully engage Indigenous Peoples in trauma-informed and culturally safe health care

Learning Objective 3: Identify ways that clinicians and organizations can use evidence and landmark reports such as the Truth and Reconciliation Commission (TRC) Calls to Action and the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), Missing and Murdered and Indigenous Women and Girls and 2SLGBTQQIA+ to create stronger policy that create trauma-informed health spaces that recognize Indigenous Peoples knowledge.
The role of the gut microbiome in chronic pain - mechanisms and clinical implications

Arkady Khoutorsky¹, Amir Minerbi², Weihua Cai³, Yoram Shir⁴

¹ McGill University, Montreal, Quebec, Canada
² Institute for Pain Medicine, Rambam Health Campus, Haifa, Israel
³ McGill University, Anesthesia, Montreal, Quebec, Canada
⁴ McGill University, The Alan Edwards Pain Management Unit, McGill University Health Centre, Montreal, Quebec, Canada

Symposium Chair: Arkady Khoutorsky, PhD, McGill University, Montreal, Quebec, Canada, arkady.khoutorsky@mcgill.ca

Symposium Abstract:
Changes in the gut microbiome have been recently observed in several chronic pain conditions, including visceral pain and chronic widespread pain. Accumulating evidence in human and animal studies suggests that these changes might contribute to the disease pathophysiology and enhance pain hypersensitivity, not only in these pain conditions but also in neuropathic pain. The underlying molecular mechanisms, however, are poorly understood. In this session, we will overview the field of the gut microbiome in chronic pain and discuss ongoing studies on the gut microbiome in different chronic pain conditions in humans. Specifically, we will present results supporting the causal role of the gut microbiome in fibromyalgia, providing evidence for: 1) alterations in gut microbiome composition and function in patients with fibromyalgia, and 2) the causal role of fibromyalgia-associated gut bacteria in causing pain hypersensitivity in animal models. Finally, we will discuss potential underlying mechanisms that could explain the role of the microbiome in pain, highlighting potential clinical implications of this new field, as well as its promising future directions.

Speaker 1: Amir Minerbi, MD PhD, Institute for Pain Medicine, Rambam Health Campus, Haifa, Israel, minerbi@tehnion.ac.il,

Speaker 1 Abstract Title: Gut microbiome alterations in fibromyalgia are associated with changes in serum bile acid profile and symptom severity

Speaker 1 Abstract: In recent years, there has been growing appreciation of the critical role the gut microbiome plays in health and disease. This rich ecosystem of micro-organisms living in and on our body is not only modelled by a variety of medical conditions, but also plays a role in pathologies pertaining to a wide range of medical fields. Could the gut microbiome play a role in chronic pain as well? To test this hypothesis, we explored the composition and function of the gut microbiome in a cohort of 77 women with fibromyalgia and 79 healthy controls. While the overall composition of the gut microbiome of patients was similar to that of controls, significant alterations were observed in the relative abundance of several specific bacterial species. Serum metabolomic analysis revealed substantial alterations in the concentration of gut-microbiome-derived metabolites, including short-chain fatty acids (SCFA) and bile acids. These differentially abundant serum metabolites are known to be metabolized by the differentially abundant bacterial
species identified in fibromyalgia patients, indicating an altered gut-microbiome function in addition to the observed alteration in its composition. Moreover, gut microbiome composition and serum bile acid concentrations were highly correlated with symptom severity, including pain intensity and fatigue. The changes observed in the composition of the gut microbiota, and the expression of circulating secondary bile acids seem congruent with the phenotype of increased nociception. These results demonstrate a unique biological signature of the gut microbiome and circulating bacterial metabolic end-products in patients with fibromyalgia.

**Speaker 2:** Weihua Cai, PhD, McGill University, Anesthesia, Montreal, Quebec, Canada, weihua.cai@mail.mcgill.ca

**Speaker 2 Abstract Title:** Fecal microbiome transplantation from fibromyalgia patients induces disease-like symptoms in mice

**Speaker 2 Abstract:** The gut microbiota consists of a diverse and dynamic community of microorganisms that inhabit the gastrointestinal tract and plays a role in host health and disease. Dysregulation of the gut microbial community has been linked to intestinal, metabolic, neurological, and psychiatric disorders. It has been recently shown that the composition of the gut microbiota is altered in individuals with fibromyalgia. Fibromyalgia is characterized by chronic widespread pain, coupled with fatigue, sleep disturbances and cognitive dysfunction. To study the causal role of the altered gut microbiota in the development of this syndrome, we performed fecal microbiota transplantation from patients with fibromyalgia and healthy controls to germ-free mice and measured mechanical and thermal sensitivity, and spontaneous pain. We also assessed general activity, memory functions, anxiety, and depression. Moreover, we performed comprehensive molecular analyses, including metabolomics, sequencing of different tissues and feces (16S), and assessment of peripheral blood mononuclear cell (PBMC) composition and neuroinflammation in the central nervous system. During this talk, I will present the results from these studies, showing that the gut microbiome plays a causal role in the fibromyalgia pathophysiology and discuss potential underlying mechanisms.

**Speaker 3:** Yoram Shir, MD, McGill University, The Alan Edwards Pain Management Unit, McGill University Health Centre, Montreal, Quebec, Canada, yoram.shir.med@ssss.gouv.qc.ca

**Speaker 3 Abstract Title:** Hopes for the future: can the gut microbiome be harnessed to improve chronic pain therapy?

**Speaker 3 Abstract:** At present, chronic pain is predominantly a cureless disease. This unfortunate reality stems from multitude reasons, including, but not limited to, our lack of understanding of basic pain mechanisms, lack of appropriate diagnostic tools, ignoring the role of the environment, inability to find meaningful association with genetic factors, lack of specific therapeutic modalities and focusing on pain palliation rather than prevention. Thus we, the frustrated clinicians, are left with no choice but to treat patients with the same non-specific, crude and many times ineffective therapeutic modalities. This dire state of affairs calls for exploring and developing new different, non-traditional tools to prevent and treat chronic pain. Gut microbiota play a critical role in diverse biological processes, including regulating neurologic signaling and neurotransmitters, and modifying the response to drugs. Its dysbiosis
could be associated with neurologic and psychiatric disorders and with chronic pain conditions. We, therefore, believe that gut microbiome could be directly or indirectly involved in the development and maintenance of chronic pain. In my talk, I will touch on few possible future research directions to further establish this assumption, including: 1) exploring the causality of dysbiosis in chronic pain; 2) screening patients with variety of chronic pain conditions to establish specific microbiome/pain trajectories; 3) exploring whether gut bacteria diversities and/or metabolomic changes could serve as diagnostic markers for specific pain conditions; 4) manipulating the composition of the gut microbiome as a potential therapeutic tool; 5) preemptively changing the microbiome to prevent the development of chronic pain.

**Learning Objective 1:** Upon completion of this session, attendees will be able to describe the altered microbiome composition observed in humans with fibromyalgia, accompanied by changes in circulating bacterial metabolic end-products

**Learning Objective 2:** Upon completion of this session, attendees will be able to describe the role of the gut microbiome from fibromyalgia patients in causing pain hypersensitivity in rodents

**Learning Objective 3:** Upon completion of this session, attendees will be able to describe the limitations of the currently available diagnostic and therapeutic tools to treat chronic pain, and the hope that the gut microbiome could be harnessed to improve our ability to prevent, diagn
Innovations in Primary Dysmenorrhea across the Lifespan: Perspectives on Conceptualization and Treatment

Michelle M. Gagnon¹, Kayla Wall², Nicole M. Alberts³

¹ University of Saskatchewan, Department of Psychology and Health Studies, Saskatoon, Saskatchewan, Canada
² University of Saskatchewan, Department of Psychology and Health Studies, Saskatoon, Saskatchewan, Canada
³ Concordia University, Department of Psychology, Montreal, Quebec, Canada

Symposium Chair: Michelle M. Gagnon, Ph.D., University of Saskatchewan, Department of Psychology and Health Studies, Saskatoon, Saskatchewan, Canada, michelle.gagnon@usask.ca @MicheGagnon

Symposium Abstract:
Dysmenorrhea, or menstrual pain, is the most common cause of pain in females of reproductive age. Researchers have reported prevalence rates of primary dysmenorrhea in girls and women to range from approximately 40% to over 90%. Moreover, one in four adolescents who menstruate and one in five adults who menstruate rate their pain as impairing. Despite a large proportion of individuals who menstruate experiencing clinically significant menstrual pain on a regular basis, dismissal of menstrual pain remains a major societal concern. The perception that menstrual pain is a “normal” part of life remains pervasive and many individuals who do seek help for their pain are too often dismissed. Interventions targeting pain with menstruation are limited, primarily pharmacological, and often inaccessible by individuals who menstruate. Psychological interventions that are effective in managing other pain conditions have remained virtually ignored in the context of menstrual pain. Individuals who menstruate deserve access to high-quality care that decreases the impact of pain on their daily lives and functioning. We will shed light on experiences and treatment needs for individuals with primary dysmenorrhea, with focus on improving conceptualization, understanding overlooked avenues for treatment, and presenting novel digital health-based interventions for youth with primary dysmenorrhea.

Speaker 1: Michelle M. Gagnon, Ph.D., University of Saskatchewan, Department of Psychology and Health Studies, Saskatoon, Saskatchewan, Canada, michelle.gagnon@usask.ca @MicheGagnon

Speaker 1 Abstract Title: Conceptualizing primary dysmenorrhea across the lifespan from a biopsychosocial perspective: What we know and what is still needed

Speaker 1 Abstract: Many individuals who menstruate suffer through menstrual pain because they believe that pain is a typical part of the female menstrual cycle that they must endure. The consequences of dysmenorrhea are not trivial, and can include regular incapacitating symptoms, increases in mental health symptoms, lower quality of life, and interference with work and school functioning. Nevertheless, primary dysmenorrhea has received little attention compared to other pain and gynecological conditions. Biopsychosocial models of pain emphasize the importance of psychological and social contributors to pain; however our recent work has
identified a significant lack of consideration of such factors in the conceptualization and treatment of primary dysmenorrhea. This presentation will review findings from our ongoing program of research and will focus on the psychological and social influences in primary dysmenorrhea. Additionally, lifespan influences on dysmenorrhea will be discussed to provide an overview of what we have learned about factors that influence primary dysmenorrhea across the reproductive years. Integrating findings from our research and research from other groups, recommendations for future research and practice will be provided.

**Speaker 2:** Kayla Wall, M.Sc., University of Saskatchewan, Department of Psychology and Health Studies, Saskatoon, Saskatchewan, Canada, kayla.wall@usask.ca

**Speaker 2 Abstract Title:** Treatment Preferences and Experiences of Adolescents and Young Adults with Primary Dysmenorrhea

**Speaker 2 Abstract:** Despite the prevalence of primary dysmenorrhea during adolescence, little is known about adolescents’ treatment needs and experiences for this condition. Current consensus guidelines for the treatment of primary dysmenorrhea (e.g., Society of Obstetricians and Gynecologists of Canada) recommend pharmacological interventions (e.g., NSAIDs or oral contraceptives) as the first line treatment. Yet, pharmacological interventions are not always accessible to adolescents and up to 25% of individuals do not experience symptom relief from pharmacological treatments. Further, psychological interventions are not included in treatment recommendations, which is misaligned with current recommendations for chronic and persistent pain conditions. There is a need to better understand adolescents’ experiences with pharmacological interventions as well as their interest in exploring alternative treatment options, such as psychological options, to improve dysmenorrhea care. We recruited a nation-wide sample of young adults between the ages of 18 and 25 to examine young adults’ retrospective account of their experience receiving treatment for their menstrual pain throughout their adolescence. This presentation will review our findings regarding (1) experiences with treatment for dysmenorrhea in adolescents, including barriers and facilitators to seeking treatment, (2) treatment preferences and recommendations for improvements to existing treatment options, and (3) perceptions and openness to engaging in psychological intervention to manage their menstrual pain during adolescence. The clinical implications and potential future directions for these findings will also be discussed.

**Speaker 3:** Nicole M. Alberts, Ph.D., Concordia University, Department of Psychology, Montreal, Quebec, Canada, nicole.alberts@concordia.ca @NAlbertsPhD

**Speaker 3 Abstract Title:** Menstrual Pain Management Across the Lifespan: Leveraging Digital Health and User-Centered Design to Improve Access and Outcomes

**Speaker 3 Abstract:** Menstrual pain is prevalent among adolescents and adults – with up to 90% of adolescents who menstruate experiencing menstrual pain and a quarter of these individuals reporting their pain to be severe or very severe. Psychological therapies are effective at reducing pain among adolescents and adults with chronic or persistent pain – yet many barriers to accessing this care exist. Digital health interventions have the potential to improve access to psychological treatments for menstrual pain and to overcome barriers to care, including
geographical distance, stigma, cost, and lack of trained providers. In this presentation, we will first present data from a scoping review of the content and quality of smartphone apps targeting menstrual pain and symptoms across the lifespan. Overall, results of this review showed a lack of self-management content within the identified apps and low overall app quality. Additionally, only one app was designed specifically for adolescents. Next, we will describe the user-centered design and development of a new app-based self-management intervention targeting menstrual pain among adolescents. Specifically, a three-phase approach will be discussed including: 1) identification of adolescents’ treatment needs and preferences, 2) usability testing and app refinement, and 3) feasibility testing to examine adolescents’ satisfaction with the app and preliminary treatment outcomes. Clinical implications and future research directions around the use of digital health interventions to target menstrual pain will be discussed. Recommendations and potential challenges with respect to generating appropriate and engaging intervention content for both adolescents and adults with menstrual pain will also be outlined.

**Learning Objective 1:** At the end of this session, attendees will be able to describe the psychological and social factors that influence primary dysmenorrhea experiences across the lifespan.

**Learning Objective 2:** At the end of the session, attendees will be able to recognize the treatment needs and interests of adolescents and young adults with primary dysmenorrhea.

**Learning Objective 3:** At the end of the session, attendees will be able to discuss how psychological and digital interventions can be leveraged to treat primary dysmenorrhea.
Central mechanisms of pediatric chronic pain: insights from novel neuroimaging studies

Melanie Noel¹, Laura Simons², Marina Lopez Sola³, Massieh Moayedi⁴

¹ University of Calgary, Calgary, Alberta, Canada
² Stanford University, Palo Alto, California, United States
³ University of Barcelona, Barcelona, Spain
⁴ University of Toronto, Toronto, Ontario, Canada

Symposium Chair: Melanie Noel, PhD, RPsych, University of Calgary, Calgary, Alberta, Canada, melanie.noel@ucalgary.ca @MelanieNoel

Symposium Abstract:
Chronic pain is a common childhood problem and can profoundly impact children's physical, psychological and social functioning. It affects one in five children, and often emerges in adolescence and persists into adulthood: 2/3 of youth with chronic pain become adults with chronic pain. Current treatments for chronic pain are suboptimal and have been tied to the opioid crisis. The nature and severity of pediatric pain varies with age and sex. Recent research has substantially advanced our understanding of the pathogenesis of these conditions. However, there are limited data to inform mechanism-based understanding and management of pain in adolescents. This workshop will present new research findings shedding mechanistic insight on pediatric pain and discuss novel behavioural, psychological, and neural risk factors associated with treatment responsiveness. Each talk brings forth novel approaches to investigate mechanisms of chronic pain. The chair, Dr. Melanie Noel, will formally lead a group discussion, and synthesize the evidence presented across the talks, and bring her expertise to inform the mechanisms and frameworks discussed. Together, these talks will highlight the heterogeneity of pediatric chronic pain, and the differing mechanisms contributing to these various phenotypes. They will provide a multimodal approach to understanding and treating pediatric chronic pain.

Speaker 1: Laura Simons, MS, PhD, Stanford University, Palo Alto, California, United States, lesimons@stanford.edu, @Laura_Simons

Speaker 1 Abstract Title: Pain stickiness: Predicting recovery or persistence in pediatric Complex Regional Pain

Speaker 1 Abstract: Only ~50% of adolescents with chronic pain who present for multidisciplinary pain treatment recover, as measured by clinical endpoints of pain severity and functional disability. Discovery of robust markers of the recovery vs. persistence of pain and disability is essential to develop more resourceful and patient-specific treatment strategies and to conceive novel approaches that benefit patients who are refractory. Given that chronic pain is a biopsychosocial process, the discovery and validation of a prognostic and robust signature for pain recovery vs. persistence requires measurements across multiple dimensions. This presentation will include introduction of brief screening tools for youth with chronic pain and their parents to rapidly assess risk factors and enhance targeted treatment allocation. Moreover, it will include neurobiological risk factors of brain structure and functional patterns in relation to
responsivity to treatment in youth with complex regional pain syndrome. Overall, the presentation will take into account psychosocial and neurobiological factors associated with treatment responsiveness on pain in youth.

**Speaker 2:** Marina Lopez Sola, MS, PhD, University of Barcelona, Barcelona, Spain, mlopezsola@ub.edu, @mlopezsola82

**Speaker 2 Abstract Title:** Neurophysiological and psychological mechanisms of fibromyalgia across the lifespan: understanding adult and juvenile forms of the disease

**Speaker 2 Abstract:** Fibromyalgia (FM) is a debilitating, chronic pain condition affecting primarily females. Although we are used to thinking about fibromyalgia as a disease affecting people in their 40s and 50s, it is also highly prevalent amongst children and adolescents, with 2-6% of schoolers affected. The majority of patients suffering from juvenile fibromyalgia during this critical period for brain development continue to experience persistent pain during adulthood. Due to the lack of physiological laboratory findings, both FM and JFM have been questioned as clinical entities and have been frequently regarded as merely an expression of anxiety or depression. This leads to poor understanding, stigmatization, and inappropriate disease management, underscoring the need for identifying objective pathophysiology early on. In this workshop we will present published evidence from the adult literature on the neurophysiology of adult fibromyalgia emphasizing brain correlates that are highly predictive of the disorder in the domains of pain, non-painful multisensory processing and emotional/cognitive processing. We will also present novel results on the neurophysiological and psychological mechanisms underlying juvenile fibromyalgia and brain correlates underlying different symptom dimensions. We will offer a qualitatively integrated perspective on brain and psychological findings overlap and separability between juvenile and adult forms of the disease.

**Speaker 3:** Massieh Moayedi, PhD, University of Toronto, Toronto, Ontario, Canada, m.moayedi@utoronto.ca @massihmoayedi

**Speaker 3 Abstract Title:** Developmental trajectories of pain-related brain regions in health and in neuropathic pain

**Speaker 3 Abstract:** Multimodal assessment and phenotyping is common in adults with neuropathic pain. In adolescents, however, neuropathic pain is associated with significant pain and pain-related disability, but the sources and causes of pain can differ from those in adults. Neuropathic pain is rarely systematically studied in children and young people, and the causes of the disease can vary from those in adults. Neuropathic pain in adults has been associated with widespread neural changes. However, the brains of children and adolescents undergo significant developmental changes. The impact of chronic pain on such rapidly changing brains remains unknown. Furthermore, there is very limited evidence about normative development of functional brain networks, including those involved in nociception and pain. Dr. Moayedi will discuss new findings from normative structural and functional developmental trajectories of brain regions involved in nociception and pain modulation. Next, he will discuss the feasibility and acceptability of MRI scanning in children with neuropathic pain, and present novel findings of brain functional connectivity abnormalities in children with neuropathic pain. These data
provide novel insights into the disease mechanisms of pediatric neuropathic pain, and potential novel therapeutic targets.

**Learning Objective 1:** Develop an understanding of the complexity and heterogeneity of pediatric chronic pain, and the underlying mechanisms

**Learning Objective 2:** Identify novel methods for phenotyping pediatric pain patients

**Learning Objective 3:** Learn how a precision medicine approach can improve treatment outcomes
An update on neuropathic pain across the lifespan

Jennifer Stinson¹, Anuj Bhatia², Vina Mohabir³, Giulia Mesaroli⁴

¹ The Hospital for Sick Children, Toronto, Ontario, Canada
² University of Toronto and Toronto Western Hospital, Toronto, Ontario, Canada
³ SickKids Research Institute, The Hospital for Sick Children, Toronto, Ontario, Canada
⁴ The Hospital for Sick Children, Toronto, Ontario, Canada

Symposium Chair: Dr Jennifer Stinson, RN PhD, The Hospital for Sick Children, Toronto, Ontario, Canada, jennifer.stinson@sickkids.ca

Symposium Abstract:
Neuropathic pain has a population prevalence of 4-8%, it often requires complex management, and it is often refractory to conventional therapies. It accounts for approximately 30% of referrals to tertiary care pain clinics. There have been significant advances in our understanding, diagnosis, and treatment of neuropathic pain over the last decade. In 2011, neuropathic pain was redefined by the International Association for the Study of Pain as ‘pain that arises from damage or disease of the somatosensory nervous system’, no longer encompassing pain from nervous system dysfunction (later termed nociplastic pain in 2016). This change in definition has important implications for diagnosis and this will be discussed in the symposium including the framework for screening and diagnosing neuropathic pain as possible, probable, and definite. Several advances in the treatment of neuropathic pain including pharmacological (e.g., long-acting gabapentinoids, cannabinoids), interventional (e.g., perineural steroids and botulinum, spinal cord and peripheral nerve neuromodulation), and rehabilitation (e.g., desensitization, graded motor imagery) will also be discussed. Presenters Dr Bhatia and Ms Mesaroli will provide an update on the current understanding of neuropathic pain, approach to screening, diagnosis, and treatment (pharmacological, interventional, rehabilitation). Dr Bhatia will speak to neuropathic pain in the adult population and Ms Mesaroli in the pediatric population. Ms Mohabir will provide a lived experience lens to neuropathic pain after experiencing neuropathic pain from adolescence to adulthood. Audience members will be engaged throughout the symposium by using interactive technologies such as Poll Anywhere and dedicated time (15 min) for questions for speakers.

Speaker 1: Dr Anuj Bhatia, MBBS MD PhD FRCPC (Anesthesia and Pain Medicine), University of Toronto and Toronto Western Hospital, Toronto, Ontario, Canada, anuj.bhatia@uhn.ca

Speaker 1 Abstract Title: An update on neuropathic care in adults

Speaker 1 Abstract: Neuropathic pain (NP) in adults is often severely debilitating, and its management and sequelae are a significant burden on health care resources. Knowledge gaps exist for health-care providers caring for patients with NP. A graded system has been proposed to determine the level of certainty with which the pain in question is neuropathic (and not nociceptive). The rationale and features of this system will be presented in the symposium along with the criteria for labeling NP as ‘possible’, ‘probable’, or ‘definite’. The characteristic
symptoms and signs of NP have led to the development of several validated questionnaires to screen for and assess it in clinical practice and research. Diagnostic characteristics of these instruments will be presented in the symposium. Investigations for evaluating somatosensory pathway function including quantitative sensory testing, nerve conduction studies, skin biopsy and corneal confocal microscopy will be elaborated. Treatment strategies for NP including pharmacological options, physical therapy, and cognitive behavioral interventions will be presented in the symposium. The role of more invasive therapies including perineural interventions and neuromodulation approaches (spinal cord or peripheral nerve stimulation and intrathecal therapies) in treating refractory NP in adults will also be discussed.

**Speaker 2:** Vina Mohabir, BSc(Hons), SickKids Research Institute, The Hospital for Sick Children, Toronto, Ontario, Canada, vina.mohabir@gmail.com @VinaMohabir

**Speaker 2 Abstract Title:** Living with neuropathic pain

**Speaker 2 Abstract:** Ms. Mohabir will provide a lived experience perspective on the content presented by both Dr. Bhatia and Ms. Mesaroli. As a teenager, Ms. Mohabir was injured by a softball. Unfortunately, this led to trigeminal neuralgia and chronic migraine. At the time, it was challenging to find healthcare providers who could understand her neuropathic pain. Eventually, Ms. Mohabir was able to access multidisciplinary pain treatment at the Hospital for Sick Children Chronic Pain Clinic. It was the first time Ms. Mohabir, her parents, and siblings had heard about neuropathic pain. Ms. Mohabir credits the 3P method to chronic pain treatment (psychological intervention, physical/rehabilitative methods, and pharmacological approaches). Using rehabilitative treatment methods, she was able to resume some parts of a normal adolescence. She was able to cope well for many years before a spinal cord injury. Treatment for neuropathic pain in adult care had different challenges and treatment options. She was treated at the Toronto Academic Pain Medicine Institute (TAPMI), where she received pharmacological (e.g., pregabalin, cannabinoids), interventional (e.g., steroids, spinal cord neuromodulation), and rehabilitation (e.g., desensitization, graded motor imagery) treatment. She copes with neuropathic pain every day using these methods – but is able to work, have a social life, travel, hike, and enjoy time with her rescue dog Milo.

**Speaker 3:** Giulia Mesaroli, MScPT, BASc, The Hospital for Sick Children, Toronto, Ontario, Canada, giulia.mesaroli@sickkids.ca @GMesaroli

**Speaker 3 Abstract Title:** Neuropathic pain in children and adolescents

**Speaker 3 Abstract:** Neuropathic pain (NP) in children is particularly problematic as it is associated with significant pain-related disability including social isolation, school absenteeism, physical disability, sleep and mood disorders, and is particularly costly to the health care system. NP in pediatrics is unique from that of adults as the etiology is more diverse and patterns of pain experience, coping strategies, and cognitive development vary significantly throughout childhood. Common causes of adult NP such as diabetic neuropathy and postherpetic neuralgia are much less common in pediatrics. Causes of pediatric NP are highly diverse and include trauma, cancer, infections, genetic and neurological disorders. Ms. Mesaroli will present an overview of neuropathic pain conditions in the pediatric setting informed by a scoping review of
the literature. The prevalence, clinical features, age and sex-based differences in pediatric NP conditions will be discussed. She will also highlight the challenges of screening and diagnosis for NP in the pediatric setting: (1) currently available screening tools were developed and validated in adults and (2) the new ICD-11 diagnostic codes do not reflect common causes of pediatric NP. A novel screening tool (Pediatric PainSCAN©) for pediatric NP will be introduced, developed by speakers G.M. and J.S. Rehabilitative treatment approaches for pediatric NP will be reviewed, including pain neuroscience education, graded motor imagery (e.g., laterality, visualization, and mirror therapy), sensory strategies (e.g., desensitization), virtual reality, and graded exercise.

**Learning Objective 1:** To identify the current approach to screening and diagnosing neuropathic pain in children and adults

**Learning Objective 2:** To describe multi-modal treatment approaches to neuropathic pain in children and adults

**Learning Objective 3:** To recognize the impact of neuropathic pain on children and adults - and the role of multidisciplinary treatment in coping with neuropathic pain.
Update on mechanisms of craniofacial pain and their clinical correlates

Brian Cairns¹, Barry Sessle², Carolina Beraldo Meloto³

¹ University of British Columbia, Faculty of Pharmaceutical Sciences, Vancouver, British Columbia, Canada
² University of Toronto, Faculty of Dentistry, Toronto, Ontario, Canada
³ McGill University, Faculty of Dentistry, Montreal, Quebec, Canada

Symposium Chair: Barry Sessle, MDS, PhD, DSc (h.c.), University of Toronto, Dentistry, Toronto, Ontario, Canada, barry.sessle@utoronto.ca

Symposium Abstract:
Acute and chronic pain conditions in the face or mouth are very common, and some are unique to the craniofacial region. However, many of the pain conditions, especially those that are chronic, are difficult to diagnose and manage, and their aetiology and pathogenesis are unresolved. This Symposium will review recent findings bearing on underlying mechanisms and factors influencing craniofacial pain, and outline their clinical implications. The presentation ‘Peripheral Trigeminal Pain Mechanisms’ by Dr BE Cairns (UBC) will explore what is known about peripheral pain mechanisms in craniofacial tissues and how this knowledge is being used to identify novel analgesic targets. The topic ‘Central Trigeminal Pain Mechanisms’ presented by Dr BJ Sessle (UToronto) will provide an overview of the mechanisms within the brain that underlie craniofacial pain, and also note the relevance of these findings to the diagnosis and management of craniofacial pain conditions. The presentation ‘Genetics of Craniofacial Pain’ by Dr. CB Meloto (McGill U) will discuss how genetics can be used to reconstruct the mechanisms underlying craniofacial pain, as well as what other health research fields can teach us about the applicability of genetic findings to clinical care.

Speaker 1: Brian Cairns, BSc, BSc(Pharm), PhD, DrMed, ACPR, University of British Columbia, Faculty of Pharmaceutical Sciences, Vancouver, British Columbia, Canada, brian.cairns@ubc.ca

Speaker 1 Abstract Title: Peripheral Mechanisms of Trigeminal Pain

Speaker 1 Abstract: Pain signals from craniofacial tissues are transmitted to the central nervous system by slowly conducting myelinated and unmyelinated afferent fibers whose cell bodies are located in the trigeminal ganglion. These trigeminal nociceptors are characterized by having non-specialized endings, which respond to high threshold mechanical and thermal stimuli, as well as a variety of noxious chemical stimuli. The endings of these nociceptors contain neurotransmitters (glutamate) and neuropeptides (CGRP, substance P, PACAP etc), which may be released to induce a localized vasodilation and afferent sensitization. In addition, the terminal endings of trigeminal nociceptors have been found to express receptors for neurotransmitters such as glutamate, GABA, serotonin, noradrenaline, and purines as well as for various neuropeptides. Glutamate, noradrenaline, serotonin, and adenosine triphosphate sensitize trigeminal nociceptors through NMDA, α1 adrenergic, 5HT 1a,b, & 3 and P 2 X receptors, respectively, while GABA,
although it appears to depolarize afferent endings, causes desensitization. Recent work has shown that trigeminal ganglion neurons also express these same receptors, and that ganglion neurons as well as their associated satellite glial cells, can release neurotransmitters and neuropeptides. In vivo administration of glutamate into the trigeminal ganglion excites ganglion neurons, and induces a delayed mechanical sensitization of their peripheral endings. In contrast, in vivo administration of GABA has no effect on ganglion neurons, but appears to induce a delayed mechanical desensitization of their peripheral endings. These and other findings suggest that agents which alter peripheral neuroreceptor function modulate nociceptive signals from craniofacial tissues by acting at their terminal endings and also within the trigeminal ganglion.

**Speaker 2**
Barry Sessle, MDS, PhD, DSc (h.c.), University of Toronto, Faculty of Dentistry, Toronto, Ontario, Canada, barry.sessle@utoronto.ca

**Speaker 2 Abstract Title:** Central Trigeminal Pain Mechanisms

**Speaker 2 Abstract:** Studies in rodent models of craniofacial pain have revealed that craniofacial injury or inflammation induces abnormal hyperexcitable or ectopic primary afferent inputs to the central nervous system (CNS) that produce neuroplastic changes expressed as an increased excitability of nociceptive neurons within trigeminal nociceptive CNS circuits. This “central sensitisation” has been documented as immunohistochemical changes as well as electrophysiological alterations in the receptive field and response properties of the nociceptive neurons that contribute to the accompanying nociceptive behaviour in the rodent models; this behaviour reflects allodynia, hyperalgesia, pain spread or spontaneous pain that are typical clinical features of many types of chronic pain. Several mediators, receptors and signalling mechanisms have been identified as crucially involved in the production of the increased excitability of the nociceptive neurons. These include glutamatergic, neurokinin (e.g., substance P; CGRP) and purinergic (e.g., ATP) mediators released from the CNS endings of the primary afferents, intracellular signalling processes such as nitric oxide and pERK, as well as mediators such as cytokines released from other cells (e.g., glia). These processes are potential targets for the development of novel analgesic agents or the re-purposing for pain control of agents currently used for other biomedical conditions. Also notable are recent findings in rodent craniofacial pain models that the predisposition to nociceptive behaviour as well as the accompanying trigeminal central sensitisation show considerable variability between genetically different rodent strains. This is consistent with findings from chronic craniofacial pain states in humans that genetic factors may contribute to pain expression or its predisposition.

**Speaker 3**
Carolina Beraldo Meloto, MSc, DDS, PhD, McGill University, Faculty of Dentistry, Montreal, Quebec, Canada, carol.meloto@mcgill.ca

**Speaker 3 Abstract Title:** Genetics of Craniofacial Pain

**Speaker 3 Abstract:** Chronic craniofacial pain conditions are disabling health problems that are poorly managed largely because our understanding of its pathophysiological mechanisms still is incomplete and available treatments are hence unspecific. In this presentation, I will discuss how genome-wide based approaches can aid in the reconstruction of these mechanisms. Specifically, pathway analysis based on genome-wide association data of four independent case-control
studies of chronic temporomandibular disorders, the most frequent form of chronic craniofacial pain condition, has implicated trigeminal nerve morphogenesis and semaphoring-plexin axonal guidance in the pathophysiology of this condition. Genes in these pathways are semaphorins, plexins and neuropilins that have canonical axonal guidance roles, suggesting that genetically driven abnormalities during CNV morphogenesis may contribute to TMD. Subsequent studies using an unprecedented neuroimaging approach begin to show differences in the shape and connectivity of the CNVs of people with or without TMD. Preclinical studies using mice with impaired semaphoring-signalling and consequent morpho-structural abnormalities in the CNV sensory pathways also show that these animals have increased susceptibility to orofacial pain. These findings are an example of how genetics can be used to reveal the pathophysiology of craniofacial pain. I will additionally discuss the current knowledge on the genetics of TMD and other common craniofacial pain conditions and how genetics may aid in the clinical care of chronic pain patients in the near future.

**Learning Objective 1:** Describe recent advances in understanding of the neural processes in craniofacial tissues and the brain that are involved in the development and maintenance of craniofacial pain.

**Learning Objective 2:** Document the role of molecular mechanisms involving glioplasticity as well as genetic factors in the expression of craniofacial pain and its control.

**Learning Objective 3:** Identify the implications of these recent findings for the diagnosis and novel management of craniofacial pain conditions.
Pain and Aging: Developments in Basic and Clinical Sciences

Jeffrey S. Mogil¹, Thomas Hadjistavropoulos², Mary-Ann Fitzcharles³

¹ McGill University, Montreal, Quebec, Canada
² University of Regina, Psychology and Centre on Aging and Health, Regina, Saskatchewan, Canada
³ McGill University, Faculty of Medicine, Montreal, Quebec, Canada

Symposium Chair: Thomas Hadjistavropoulos, Ph.D., FCAHS, University of Regina, Psychology and Centre on Aging and Health, Regina, Saskatchewan, Canada, thomas.hadjistavropoulos@uregina.ca @URHealthPsycLab

Symposium Abstract:
The primary objective of this symposium is to provide an update on recent developments in pain and aging from the perspectives of basic science, assessment and clinical management. From a basic science standpoint, we will present new data from animal research on the differential impact of pain on lifespan as a function of sex. In regards to assessment, we will present recent development and evaluation of advanced technologies (e.g., computer vision) designed to identify and monitor pain in older adults with limited ability to communicate due to advanced dementia. From a clinical science standpoint, we will review the increasing interest and research on the effects of cannabis on older adults with chronic pain and will present recommendations for clinicians.

Speaker 1: Jeffrey S. Mogil, PhD, FCAHS, FRSC, McGill University, Montreal, Quebec, Canada, jeffrey.mogil@mcgill.ca @JeffreyMogil

Speaker 1 Abstract Title: Pain, Sex, and Death

Speaker 1 Abstract: A major reason pain is not taken as seriously as it should is that it causes morbidity but not mortality. However, epidemiological studies using large data sets like the UK Biobank have revealed that chronic pain is associated with excess mortality risk. In an attempt to uncover the mechanisms underlying this relationship, we have been studying mice at time points long past the usual time span of preclinical pain studies. We observe that no earlier than 4 months after a spared nerve injury (SNI)—which causes persistent neuropathic pain—male but not female mice exhibit telomere length decreases and cellular senescence in spinal cord microglia. This senescence appears to maintain pain behaviour, since clearing of the senescent cells reverses such behaviour. Male and female mice display very different trajectories of pain over long periods of time, with stable evidence of pain until death in male mice, and a recovery followed by a renewal of pain behaviour in female mice. Although we found no significant effect of SNI on lifespan in either sex, in male but not female mice the average level of pain behaviour over 2–3 years is significantly and inversely correlated with lifespan. Autopsies are currently being performed in an attempt to determine whether the presence of chronic pain influences cause of death.
Speaker 2: Thomas Hadjistavropoulos, Ph.D., FCAHS, University of Regina, Psychology and Centre on Aging and Health, Regina, Saskatchewan, Canada, thomas.hadjistavropoulos@uregina.ca @URHealthPsycLab

Speaker 2 Abstract Title: The Role of Advanced Technologies in Pain Assessment and Management in Dementia

Speaker 2 Abstract: Some experts believe that, over the course of our lifetime, the best solutions to the problems of Alzheimer’s Disease and other dementias will not come from the health sciences but from technology development. Advanced technologies (e.g., self-driving vehicles, home monitoring technologies that detect injurious falls and call for help) have tremendous potential in the maximization of independence and quality of life in people with dementia. This presentation will review our recent work on development and evaluation of: a) computer vision technologies designed to detect and monitor pain expressions in older adults with dementia and limited ability to communicate; b) apps designed to help long-term care staff monitor pain in residents; c) interactive web-based pain education for long-term care staff working in rural and remote areas; and d) applications of social media in pain knowledge dissemination.

Speaker 3: Mary-Ann Fitzcharles, MD, FRCP (UK), McGill University, Faculty of Medicine, Montreal, Quebec, Canada, Mary-Ann.Fitzcharles.med@ssss.gouv.qc.ca

Speaker 3 Abstract Title: My Grandma Needs Medical Cannabis for her Pain

Speaker 3 Abstract: The worldwide prevalence of chronic pain in older adults is estimated to be 25-85%, a staggering number. Medication treatment options for older adults are fraught with challenges. To name just a few, attention must be given to comorbid illnesses, drug-drug interactions and effect on mobility and cognition. It is thus understandable that patients and families may be turning to medical cannabis, commonly seen as a natural product with less harmful effects than many traditional medications. The gold standard for understanding of any medication effect is reliant on evidence accrued from randomized controlled trials (RCTs). This traditional evidence is lacking for medical cannabis in general, and especially in older adults. It is therefore necessary to turn to real world experience that will include cohort and open label studies to best understand the effects of medical cannabis in older adults. With this information the healthcare community will be better informed and better able to provide safe and competent care for this patient population. Real-world pragmatic suggestions will provide guidance when there is consideration of medical cannabis use in these patients. Empathetic patient care will be emphasized with the premise of “do no harm”.

Learning Objective 1: To describe new findings, from animal studies, on the differential effects of pain on lifespan as a function of sex.

Learning Objective 2: To recognize an update on recent developments in and outcomes of advanced technologies (e.g., computer vision) in the pain assessment of people with severe dementia and limited ability to communicate.
**Learning Objective 3:** To reflect on research and clinical guidance on the use of cannabis for pain management in older adults.
From Risk to Sustainability: The Evolution of Transitional Pain Services Across the Lifespan

Joel Katz¹, Brittany N. Rosenbloom², Salima S. J. Ladak³, Kathryn A. Birnie⁴

¹ York University, Psychology, Toronto, Ontario, Canada
² The Hospital for Sick Children, Toronto, Ontario, Canada
³ Toronto General Hospital & Lawrence S. Bloomberg Faculty of Nursing, Department of Anesthesia and Pain Management, Toronto, Ontario, Canada
⁴ University of Calgary, Department of Anesthesiology, Perioperative, and Pain Medicine; Department of Community Health Sciences, Calgary, Ontario, Canada

Symposium Chair: Joel Katz, PhD, CPsych, York University, Psychology, Toronto, Ontario, Canada, jkatz@yorku.ca

Symposium Abstract:
Health Canada’s Canadian Pain Task Force established the prevention and management of chronic pain as a top priority for Canada. It is well known that a high proportion of individuals receiving surgical intervention go on to develop chronic postsurgical pain. Research has identified several risk factors for the transition from acute to chronic postsurgical pain in adults, however, this is a budding area of research for children and adolescents. This symposium will first discuss new research highlighting the psychosocial risk factors for the development of chronic postsurgical pain and identify areas for intervention. Identifying risk factors for chronic postsurgical pain is critical as it provides target areas for intervention. Second, this symposium will examine how The Transitional Pain Service at Toronto General Hospital has developed over time to secure sustainable multidisciplinary intervention for the prevention and management of chronic postsurgical pain. It will also discuss the evolution of the program towards opioid harm reduction. Third, this symposium will discuss the co-design of a “transitional pain service” for pediatrics. In partnering with youth, families, healthcare professionals, and health systems administrators the development of a sustainable patient-centered service is possible. Taken together, this symposium discusses the key ingredients for the prevention and management of chronic postsurgical pain across the lifespan.

Speaker 1: Brittany N. Rosenbloom, PhD, The Hospital for Sick Children, Toronto, Ontario, Canada, brittany.rosenbloom@sickkids.ca @BNRosenblm

Speaker 1 Abstract Title: Psychosocial risk factors for pediatric chronic postsurgical pain: Targets for intervention

Speaker 1 Abstract: Approximately 20% of youth develop chronic post-surgical pain (CPSP) that is associated with pain-related distress and co-morbid mental health outcomes, such as anxiety and depression. Identifying risk/protective factors for the development of CPSP in youth is at its infancy. This session examines youth and parent risk/protective factors associated with the development and maintenance of pediatric CPSP, including functional limitations. Dr. Rosenbloom will share data from a large sample of youth aged 8 to 17 years undergoing major orthopedic or general surgery and their parents (n = 264). These youths and their parents
completed questionnaires at four time points over the course of 12 months (pre-surgery, in-hospital, 6- and 12-months after surgery). She will discuss youth-related factors, such as presurgical general functional limitations and anxiety, as well as parent factors, such as anxiety sensitivity and anxiety, associated with the development and maintenance of CPSP. She will also discuss differences between predictors of 12-month pain-specific functional limitations as compared to general functional limitations. The findings discussed support the use of a combined diathesis-stress and interpersonal fear-avoidance model of pain to understand the transition from acute to chronic pain in the pediatric surgical population. The results of these studies also identify areas for intervention and future research.

**Speaker 2:** Salima S. J. Ladak, BScN, MN (NP), PhD, Toronto General Hospital & Lawrence S. Bloomberg Faculty of Nursing, Department of Anesthesia and Pain Management, Toronto, Ontario, Canada, salima.ladak@uhn.ca

**Speaker 2 Abstract Title:** Transitional Pain Program: Sustainability, Evolution and Lessons Learned

**Speaker 2 Abstract:** Established in 2014, the Toronto General Hospital Transitional Pain Service is now a routine part of the Organization’s pre-operative, peri-operative and post-discharge pathways. This session reviews the essential success factors in program sustainability, growth and development across 3 levels. These include the individual or patient, organizational level and community level. At the individual patient level, program awareness through the pre-operative anesthesia assessment clinics as well as ward-based awareness initiatives have remained a core mechanism of patient identification. Pre-operative assessments have helped identify patients requiring customized pain management through the peri-operative period. Customized pain care following discharge, which focuses on modifiable outcomes such psychological factors and functional goals have been key to patient success. At the organizational level, awareness created among the surgical services divisions and formal linkages to health care disciplines has helped to link patients to this service. At this level, the Program is increasingly addressing needs in the practice of harm reduction. The individual level factors have uncovered for our program patients who may be at risk for substance use disorder and are identified earlier. We will describe ways in which harm reduction and clinical capacity building is taking place to address this. Our challenge remains the community-based level, which continues to provide a sub-group of patients for longer term care – beyond the first 3 post-operative months. Our team-based model including anesthesiologists, nurse practitioners, psychologists and physiotherapists has been the single most critical factor to deliver comprehensive, customized, and patient focused services.

**Speaker 3:** Kathryn A. Birnie, PhD, RPsych, University of Calgary, Department of Anesthesiology, Perioperative, and Pain Medicine; Department of Community Health Sciences, Calgary, Ontario, Canada, kathryn.birnie@ucalgary.ca @katebirnie

**Speaker 3 Abstract Title:** Co-designing health services to prevent pediatric chronic postsurgical pain
Speaker 3 Abstract: Preventing the transition from acute to chronic pain is the top priority identified by youth, families, and healthcare professionals for pediatric chronic pain research. Given that about 20% of children who undergo surgery will develop CPSP, ensuring effective pain management for surgery presents an ideal opportunity to stop chronic pain before it starts. “Transitional Pain Services” (TPS) have emerged in adult tertiary care as an innovative and effective health service model to prevent CPSP, but evidence for how to optimize perioperative care to prevent CPSP in children is lacking. Dr. Birnie will share phases of a human-centered design project to co-design pediatric TPS funded by a CPS Early Career Investigator Grant. She will discuss a) a survey of 85 healthcare professionals that revealed significant differences between current pediatric surgical pain management and published clinical practice guidelines, as well as health system readiness for change in pediatric perioperative care at healthcare institutions in Canada; b) interviews with youth with CPSP, parents, and healthcare professionals revealing needs, gaps, and opportunities relevant to pediatric TPS design and implementation; and c) an interactive health service blue print for pediatric TPS created during two virtual design thinking workshops, as well as key outcomes for service evaluation according to 5 youth with CPSP, 6 parents, 9 healthcare professionals, and 6 health systems administrators.

Learning Objective 1: Attendees will be able to identify risk factors associated with the development of chronic postsurgical pain.

Learning Objective 2: Attendees will be able to describe key ingredients necessary for the development of an effective and sustainable transitional pain service.

Learning Objective 3: Attendees will be able to consider how partnering with patients and their families, healthcare professionals, and health systems administrators contributes to user-centered design of transitional pain services.
A Nobel therapeutic target - TRPV1-expressing sensory neurons

Christophe Altier¹, Feng Wang², Tomoko Ohyama³

¹ Snyder Institute for Chronic Diseases, University of Calgary, Calgary, Alberta, Canada
² CERVO Brain Research Centre, Québec Mental Health Institute, Laval University, Quebec City, Quebec, Canada
³ Quantitative Life Sciences, McGill University, Department of Biology, Montreal, Quebec, Canada

Symposium Chair: Feng Wang, PhD, CERVO Brain Research Centre, Québec Mental Health Institute, Laval University, Quebec City, Quebec, Canada, feng.wang.1@ulaval.ca

Symposium Abstract:
This year’s Nobel Prize in Physiology or Medicine was awarded to David Julius and Ardem Patapoutian for their discoveries of heat receptor (TRPV1) and touch receptor (Piezos), respectively. It reflects the exceptional achievement in the field of signal transduction in somatosensory system from the recent two decades. However, how the peripheral afferent information is presented and altered under different conditions still remains unclear. This symposium will cover a wide range of topics centered in nociceptors, including TRPV1-expressing sensory neurons. Speakers will address regulation of TRPV1-expressing neurons in chronic diseases, new insights of the function of TRPV1-expressing neurons, and how painful experiences during the early stages of development induces plasticity change of nociceptors and alters behavior in adulthood.

Speaker 1: Christophe Altier, PhD, Snyder Institute for Chronic Diseases, University of Calgary, Calgary, Alberta, Canada, altier@ucalgary.ca

Speaker 1 Abstract Title: New insights on the role of TRPV1 nociceptors in persistent pain

Speaker 1 Abstract: Sensory neurons that express the TRPV1 channel detect and transduce a variety of noxious stimuli. Sensitization of these nociceptors can lead to persistent pain in response to infection, inflammation, or injury. Identifying the mechanisms of sensitization has been key to defining the maladaptive long-lasting changes in nociceptive circuits which can precipitate the transition to chronic pain. Despite characterization of a large number of inflammatory mediators, their receptors and downstream signaling pathways, very few of these targets have led to new treatments for pain relief. Using a novel TRPV1 reporter mouse to investigate differentially expressed genes in nociceptors, we identified a previously unreported biomarker of inflammation-induced nociceptor sensitization. We examined its pronociceptive properties and tested the analgesic efficacy of clinically available inhibitors of its receptor signaling in mouse models of chronic pain. In the second part of my talk, I will present how, using chemogenetics, we demonstrated that silencing TRPV1-expressing visceral afferent neurons prevented spinal gliosis and subsequent visceral hypersensitivity (VHS) in a mouse model of colitis. In contrast, chemogenetic activation, in the absence of colitis, enhanced microglial activation associated with VHS. Our data demonstrated that activity of TRPV1 visceral afferents drive VHS through the microglial P2RY12. Targeting spinal P2RY12 signaling...
could be harnessed to relieve pain in IBD (Inflammatory Bowel Disease) patients who are in remission.

**Speaker 2:** Feng Wang, PhD, CERVO Brain Research Centre, Québec Mental Health Institute, Laval University, Quebec City, Quebec, Canada, feng.wang.1@ulaval.ca

**Speaker 2 Abstract Title:** Thermal and mechanical modalities converge in the noxious range

**Speaker 2 Abstract:** There are a few competing theories about how pain sensation arise from noxious stimuli, and labelled line theory has received most supports from behavioral approaches. Labelled line theory holds that distinct types of sensory neurons and neural circuits mediate different types of pain sensation. In mice, TRPV1⁺ sensory afferents were suggested as a labeled pathway for noxious heat, but not noxious mechanical sensation. However, their physiological sensitivity remains largely unknown. Using in-vivo Ca²⁺ imaging we found that most TRPV1⁺ neurons responded to heating, but not cooling stimuli. Although TRPV1⁺ neurons did not respond to innocuous brush stimulation, surprisingly, around half of them were sensitive to noxious mechanical stimulation. On the other hand, Mrgprd⁺ neurons, a subpopulation of nociceptors different from TRPV1⁺ neurons, were also sensitive to both noxious mechanical and thermal stimuli. Specifically inhibiting TRPV1⁺ neurons by using pharmacology or Mrgprd⁺ neurons with chemogenetics can inhibit both thermal and mechanical nociception, respectively. Thus, our data proved that around half of TRPV1⁺ neurons and Mrgprd⁺ neurons are polymodal nociceptors and involved in both thermal and mechanical nociception, indicating that thermal and mechanical modalities converge in the noxious range.

**Speaker 3:** Tomoko Ohyama, PhD, Quantitative Life Sciences, McGill University, Department of Biology, Montreal, Quebec, Canada, Tomoko.ohyama@mcgill.ca

**Speaker 3 Abstract Title:** Neurocircuit mechanisms underlying the plasticity changes by nociceptive experience during development in Drosophila larvae

**Speaker 3 Abstract:** Painful (nociceptive) experiences during the early stages of development are likely to alter behavior in adulthood. However, the mechanisms that mediate such behavioral alterations, which may include changes in the response properties of neurons, in particular sensory neurons (but perhaps central and motor neurons as well), remain unclear. Here we use the fruit fly larva as a model system to address this question, given the abundance of optogenetic tools that are available to manipulate the activity of its well-characterized nociceptive sensory neurons during development. We found that intense optogenetic stimulation of nociceptive neurons in early-stage larvae induced sensitization of escape behavior in late-stage larvae, whereas unstimulated control animals showed no such sensitization. To clarify the neural mechanisms underlying this change, we knocked down various neuromodulator receptors in nociceptive neurons and determined that the octopamine receptor was involved in the sensitization process. Furthermore, we found that activation of octopamine neurons mimicked the effects of nociceptive neuron activation during development. These data demonstrate a novel mechanism by which plastic changes specific to the sensory pathway can be induced within the nociceptive circuitry of larval Drosophila.
**Learning Objective 1:** At the end of this session, participants will be able to describe the function of TRPV1-expressing sensory neurons in physiological and pathological conditions.

**Learning Objective 2:** At the end of this session, participants will be able to appraise the current approaches to study the function of sensory neurons, including in vivo calcium imaging, genetics, optogenetics, and chemogenetics.

**Learning Objective 3:** At the end of this session, participants will be able to discuss the plastic change of pain sensation during development and the effect of painful experience at early developmental stage.
Chronic Multisystem Pains in Ehlers Danlos Syndromes: Diagnostic Framework, Clinical Characterization, And Biopsychosocial Model of Management

Hance Clarke¹, Nimish Mittal², Rosalind Robertson³, Maxwell Slepian⁴

¹ University of Toronto, Department of Anesthesiology and Pain Medicine, Toronto, Ontario, Canada
² University of Toronto, Department of Medicine, Division of Physical Medicine and Rehabilitation, Toronto, Ontario, Canada
³ Toronto, Ontario, Canada
⁴ York University, Toronto, Ontario, Canada

Symposium Chair: Hance Clarke, MD, FRCPC, PhD, University of Toronto, Department of Anesthesiology and Pain Medicine, Toronto, Ontario, Canada, hance.clarke@uhn.ca @Drhaclarke

Symposium Abstract:
Ehlers Danlos Syndromes (EDS) is a group of hereditary connective tissue disorders that present with multisystemic issues related to collagen metabolism. Traditionally, EDS was thought to induce defective collagen, predominantly in ligaments causing joint subluxations/dislocation and chronic pains. With the advancement of literature, the gamut of systemic issues in EDS has expanded and been associated with conditions like postural orthostatic tachycardia syndrome, mast cell activation disorder, and gastrointestinal manifestations. The vast constellation of medically unexplained multisystemic pain features makes EDS challenging to diagnose and treat due to the lack of knowledge about this disorder. This symposium will center around the patient journey and resources needed to support individuals living with EDS. This session will discuss the clinical presentation and pathogenetic connection in EDS and related connective tissue disorders (e.g. Hypermobility Spectrum Disorder). Data from 1200 patients assessed at the GoodHope Ehlers Danlos Syndrome Clinic at Toronto General Hospital will be presented to highlight distinctions and similarities amongst widespread chronic pain patients with multisystemic symptom concerns with and without connective tissue dysfunction. The speakers will discuss a comprehensive humanization approach combining evidence-based interdisciplinary interventions and delivery facilitation that adds value to patients overall experience. The guest speakers include an interdisciplinary panel of patients, psychologists, and individuals with lived experience on complex multisystemic pain conditions. Each speaker will deliver a 15-minute presentation, and the chair will facilitate a 20-minute discussion/question and answer session with the delegates.

Speaker 1: Nimish Mittal, MBBS, MD, MSc, University of Toronto, Department of Medicine, Division of Physical Medicine and Rehabilitation, Toronto, Ontario, Canada, nimish.mittal@uhn.ca @mittalnimish

Speaker 1 Abstract Title: Diagnostic Framework, Pain Characteristics and Pentad Connection in Ehlers Danlos Syndrome -Does it Differ from other Chronic Pain Conditions?
**Speaker 1 Abstract:** Defect in collagen function or maturation is theorized to be involved in several multisystemic pain disorders that present primarily with generalized joint hypermobility. The clinical phenotype in multisystemic pain disorders is complex and evolves over time. Quite commonly, it starts as loose clumsy joints with musculoskeletal pains and transitions to generalized progressive widespread musculoskeletal pains, pelvic pains, abdominal pains, headaches, orthostatic intolerance, fatigue, and cognitive slowness. Health professionals find persistent chronic illnesses with medically unexplained multisystemic features challenging to diagnose due to the lack of knowledge of these disorders. This leads to several years of delay in the diagnosis of these complex disorders that markedly impact the health and well-being of individuals. Patients feel discredited and develop dissatisfaction with the healthcare system. This presentation will provide an overview of the pathogenesis, and diagnostic framework in the hereditary connective tissue disorder of Ehlers Danlos Syndromes. Difference in pain characteristics and manifestations between EDS and non-EDS chronic pain conditions from the data collected at the GoodHope EDS clinic will be presented. Relevant investigations and an algorithm for interprofessional management will be discussed in light of the current evidence.

**Speaker 2:** Rosalind Robertson, BA (Journalism), Toronto, Ontario, Canada, rosalind.robertson@gmail.com

**Speaker 2 Abstract Title:** Living with Multi-Systemic Chronic Pains - Issues With My Tissues

**Speaker 2 Abstract:** I have had seemingly unrelated medical issues all my life - severe GI issues, a ruptured appendix, joints popping out, bruises, migraines - the list went on. No one could put it together until I was nearly 40 and was barely able to leave the house. I got a diagnosis, but I was stranded as a patient. No one knew what Ehlers Danlos Syndrome (EDS) was or how to treat it. I still have trouble getting people to believe me - that I have constant pain, fatigue, and other issues. EDS can be “liveable,” but it requires specific and constant medical interventions and management and relies on the patient being fully engaged in their care. I became my own health program advisor and built my own team of specialists and found best practices in managing EDS through rehabilitation and physiotherapy to lead a high functioning life.

**Speaker 3:** Maxwell Slepian, Ph.D., CPsych, York University, Toronto, Ontario, Canada, Maxwell.Slepian@uhn.ca

**Speaker 3 Abstract Title:** Psychological Processes and Treatment in Ehlers Danlos Syndrome and Generalized Hypermobility Spectrum Disorders

**Speaker 3 Abstract:** Individuals with chronic multisystemic pain disorders face an arduous journey to diagnosis and treatment. Along this journey, many become understandably wary of interacting with mental health professionals. Yet, these individuals experience co-morbid psychological disorders at much higher rates than the general population. In addition to pain and psychological distress, the majority of individuals with EDS or joint hypermobility experience complications arising from multiple physiological systems, including autonomic dysfunction and functional gastrointestinal problems. Data from patients assessed at the GoodHope EDS Clinic at Toronto General Hospital will be presented to describe rates and nature of psychological
concerns for amongst patients with multisystemic symptom concerns with and without connective tissue dysfunction. These data support a biopsychosocial model wherein repeated noxious sensory stimulation and autonomic dysfunction enhance emotional dysregulation and distress. These psychological features, in turn, contribute to the maintenance of physical symptoms. Psychological treatment is an essential component of the GoodHope EDS Clinic’s multidisciplinary care model. Development of a stepped care psychology treatment model, featuring interventions based on Acceptance and Commitment Therapy and Dialectical Behavior Therapy will be described, and the adaptation and implementation of this treatment model during the COVID-19 pandemic will be addressed.

**Learning Objective 1:** Identify the gaps in health care experienced by patients living with multisystemic pain disorder of Ehlers Danlos Syndromes

**Learning Objective 2:** Recognize the spectrum of clinical manifestations, common comorbidities and evidence-based chronic pain management strategies in patients with Ehlers Danlos Syndromes

**Learning Objective 3:** Identify psychological and physical comorbidity in Ehlers Danlos Syndrome and Generalized Hypermobility Spectrum Disorder and the role of psychology in a multidisciplinary clinic for these disorders

Tom Hoppe¹, Melanie Noel², Joy MacDerrmid³, Ryan and Rebekah Mitchell⁴

¹ Chair, Advisory Council for Veterans, Chronic Pain Centre of Excellence for Canadian Veterans, Veteran (Ret. Sgt), Awarded the Meritorious Service Cross and Medal of Bravery, Canadian Armed Forces, Vancouver, British Columbia, Canada
² University of Calgary, Calgary, Alberta, Canada
³ School of Physical Therapy, Faculty of Health Sciences, Western University, ON, Canada. Roth McFarlane Hand and Upper Limb Centre, St. Joseph's Hospital, London, ON Canada
⁴ Chronic Pain Centre of Excellence for Canadian Veterans, Hamilton, Ontario, Canada

Symposium Chair: Tom Hoppe, MSC, MB, CD, MA, Chair, Advisory Council for Veterans, Chronic Pain Centre of Excellence for Canadian Veterans

Veteran (Ret. Sgt), Awarded the Meritorious Service Cross and Medal of Bravery, Canadian Armed Forces, Vancouver, British Columbia, Canada, vapmanag@gmail.com

Symposium Abstract:
Chronic pain and associated mental health issues are alarmingly prevalent in Veterans (VanDenKerkhof et al., 2015; Vun et al., 2018; Seal et al., 2007), placing their children at heightened risk for the development of pain. Nevertheless, only one empirical study to date has examined pain in offspring of Veterans (Swedean et al., 2013). Given this scarcity, there is a critical need to characterize the prevalence of pain in children of Canadian Veterans and the mechanisms underlying intergenerational risk for chronic pain. Moreover, understanding of which pain treatments work best for which Veterans, is limited, and research examining sex and gender considerations and treatment components is critically needed. Through funding from the Chronic Pain Centre of Excellence for Canadian Veterans, Drs. Melanie Noel and Jennifer Stinson have brought people with lived experience (2 Veterans, a spouse, a child) to their team to be the first to examine the prevalence and drivers of chronic pain in Veterans and their children and provide deep understanding of how pain unfolds and is expressed and responded to within Veteran families. Dr. Joy MacDermid will also present novel research examining treatment needs of Veterans and how they may differ by gender and other individual differences. Finally, the lived experiences of a Veteran (Ryan Mitchell) with chronic pain and his spouse (Rebekah Mitchell) will be woven throughout and the session will be moderated by Tom Hoppe, who in recognition of his conspicuous leadership and bravery under fire was awarded the Meritorious Service Cross and Medal of Bravery.

Speaker 1: Melanie Noel, PhD, RPsych, University of Calgary, Calgary, Alberta, Canada, melanie.noel@ucalgary.ca

Speaker 1 Abstract Title: Intergenerational Transmission of Chronic Pain in Canadian Veterans and their Children
**Speaker 1 Abstract:** The etiology of chronic pain remains a mystery and current treatments are often ineffective for the majority of youth. Given that it is a treatment-resistant and often lifelong condition, uncovering prognostic biomarkers is essential for answering the most pressing research question facing the field: How do we prevent chronic pain in children before it begins? We believe the answer lies in parental chronic pain. Chronic pain can have devastating effects on a parent’s health, and in turn, the development of their children. Emerging research demonstrates that chronic pain runs in families, due to genetic and behavioral mechanisms. Chronic pain and mental health issues are alarmingly prevalent in Veterans, likely placing their children at heightened risk for the development of pain problems. Nevertheless, only one empirical US-based study has examined pain in offspring of veterans, revealing that risk for headaches was high and tended to worsen over time, especially in younger children. Given this scarcity, there is a critical need for empirical research to characterize and establish the prevalence of pain in children of Canadian veterans and understand the mechanisms underlying the intergenerational risk for chronic pain. Using a cross-sectional sample, Dr. Noel will characterize pain and mental health (PTSD, anxiety, depression, insomnia, substance use) in Canadian veterans and their children. Using in depth qualitative data from 20 Veterans, children and spouses, she will also provide an in-depth understanding of the pain experience of veterans and their children. Reflective thematic analysis will be applied to derive key themes that emerge.

**Speaker 2: Joy MacDerrmid, PhD, School of Physical Therapy, Faculty of Health Sciences, Western University, ON, Canada.**
Roth McFarlane Hand and Upper Limb Centre, St. Joseph's Hospital, London, ON Canada, jmacderm@uwo.ca

**Speaker 2 Abstract Title:** Identifying differences in chronic pain treatment needs and responses based on sex and gender in Canadian Veterans: planning for future customized interventions

**Speaker 2 Abstract:** Objective: #1: To assess whether current research on pain management in veterans considers sex and gender differences. #2: To describe the components of the chronic pain treatment programs, and possible relationships between treatment components and outcomes. Methods: Scoping Review: We searched 5 databases for studies of active-duty military and veterans with non-cancer pain who received rehabilitation or opioid/s interventions (vs. any control group) published from January 2000 to February 2021. Review #1 used Sex and Gender Equity in Research, and Sex and Gender Methods Review guidelines to assess sex and gender reporting. Review #2 used an intervention description checklist and guide to verify an intervention mapping approach to describe the content of programs. Results: Review #1: All 21 RCTs failed to report how sex/gender were integrated in their study design, sex/gender differences in their results, or how sex/gender affected their results. Review #2: Treatment programs and potential included general treatment targets (biologic, health literacy, psychologic, social) and strategies specific to certain mental health diagnoses. Process, patient, and health outcome systems benefits were variably reported. The preliminary framework for components and mechanisms of action for a chronic pain intervention is a start point for better definition of the conceptual basis for complex interventions for chronic pain. Conclusion: There is an urgent need to consider sex/gender and define the rationale or mechanistic framework to justify the components, targeting, and emphasis of multi-modal treatment programs. Without this chronic pain treatment will remain poorly understood or targeted to veterans.
Speaker 3: Ryan and Rebekah Mitchell, Lived Experience, Chronic Pain Centre of Excellence for Canadian Veterans, Hamilton, Ontario, Canada, tmcg@rogers.com

Speaker 3 Abstract Title: Lived experiences of a Veteran with chronic pain and their spouse: How pain unfolds within the family context.

Speaker 3 Abstract: Ryan joined the Canadian Armed Forces (CAF) at 16. He was the youngest commander with the Quick Reaction Force and served alongside the U.S. Army and other countries during the Bosnia-Herzegovina conflict. After 18 years of service and two tours, he was medically released due to injuries. After his release, Ryan battled with chronic pain and declining mental health. Between doctor’s visits, trying to make sense of his diagnoses, and raising his young family, chronic pain became a constant companion for not only Ryan, but also his wife and three children. It was at this time that Ryan’s wife, Rebekah, became the family advocate. With her support, Ryan entered an interdisciplinary pain program, through which he and his family learned lifelong coping strategies. Through their family journey of chronic pain, the Mitchells became advocates for, “Once one person serves, the whole family serves.” They now devote their time to bringing awareness to this topic and breaking down the stigma around mental health and psychoeducation for Veterans. Rebekah continues to volunteer in the Veteran community in support of her family with organizations such as Wounded Warriors Canada, the Together We Stand Foundation, and the Veterans Ombud Advisory Council. To further support the cause, the Mitchell family is participating in Dr. Melanie Noel’s intergenerational project with CPCoE. In this symposium, Ryan and Rebekah will share their firsthand experiences of how chronic pain has affected their family, and why this research is critically important for the next generation.

Learning Objective 1: To describe the experiences of chronic pain in Veterans and their children, its connection to mental health, and underlying mechanisms.

Learning Objective 2: To describe sex and gender differences in chronic pain treatment options for Veterans.

Learning Objective 3: To describe the lived experiences of a Veteran with chronic pain and a spouse and how pain is experienced within the family context.
Factors and mechanisms involved in the transition from acute to chronic orofacial pain

Ana Velly¹, Brian Cairns², Ayushi Naik³

¹ McGill University, Faculty of Dentistry, Montreal, Quebec, Canada
² University of British Columbia, Faculty of Pharmaceutical Sciences, Vancouver, British Columbia, Canada
³ McGill University, Faculty of Dentistry, Montreal, Quebec, Canada

Symposium Chair: Ana Miriam Velly, D.D.S., M.Sc., Ph.D., McGill University, Faculty of Dentistry, Montreal, Quebec, Canada, ana.velly@mcgill.ca @AnaMVelly

Symposium Abstract:
Orofacial pain (OFP) is common (30%) and has a substantial impact on quality of life. Our symposium will focus on two chronic OFPs, temporomandibular disorders (TMDs) and persistent dentoalveolar pain disorder (PDAP). These OFPs often persist regardless of the treatment received. We will examine the transition from acute to chronic OFP, looking for risk factors and mechanisms. As stated by the National Institutes of Health (NIH), “we do not fully understand how acute progresses to chronic pain at any level, from molecular to behavioral”. This search for knowledge is also a goal for the Network for Canadian Oral Health and Research (NCOHR) Orofacial Pain Working Group (OPWG), created in 2019. This symposium is a venue for researchers and clinicians involved in studying the transition from acute to chronic pain. The symposium will open with an orientation to factors associated with the transition from acute to chronic OFP, as well as a presentation of the OPWG aims by Ana Velly. This will be followed by presentations on “Potential mechanisms of the Temporomandibular disorders” by Brian Cairns; and “The impact and cost of treatment for temporomandibular disorders” by Ayushi Naik.

Speaker 1: Ana Velly, D.D.S., M.Sc., Ph.D., McGill University, Faculty of Dentistry, Montreal, Quebec, Canada, ana.velly@mcgill.ca @AnaMVelly

Speaker 1 Abstract Title: Factors associated with the transition from acute to chronic orofacial pain

Speaker 1 Abstract: Temporomandibular disorders (TMD) and persistent dentoalveolar pain disorder (PDAP) are the most common types of chronic orofacial pain (OFP). TMD is a collective term used to describe musculoskeletal conditions characterized by pain in the muscles of mastication and temporomandibular joint or both, and/or associated structures. PDAP is a dentoalveolar pain associated with infections, surgery, endodontic lesions, or treatment. Our study and others found that the transition from acute to chronic OFP (i.e., TMD), as well as the persistence of chronic OFP, are unfortunately common. We conducted a critical review aimed at assessing the risk factors associated with the transition from acute to chronic painful TMD. This review found that myofascial pain and pain intensity were associated with the transition risk assessed at 6-months follow-up. In 2019, the Network for Canadian Oral Health and Research (NCOHR) Orofacial Pain Working Group emerged, composed of research groups aiming to
design studies to (i) develop strategies and decision-making paradigms to prevent the transition from acute to chronic orofacial pain; (ii) assess risk factors and identify biomarkers to prevent the transition from acute to chronic orofacial pain; and (iii) assess the economic and social impacts of chronic orofacial pain and its prevention. This talk will provide an overview of the current state of knowledge on the transition from acute to chronic OFP.

Speaker 2: Brian Cairns, PhD, University of British Columbia, Faculty of Pharmaceutical Sciences, Vancouver, British Columbia, Canada, brian.cairns@ubc.ca

Speaker 2 Abstract Title: Potential mechanisms of the Temporomandibular disorders

Speaker 2 Abstract: A number of hypothetical mechanisms have been proposed to account for chronic joint and muscle pain in Temporomandibular disorders (TMDs) that include: referral, mechanical trauma, hypoxia, and neurogenic inflammation/neuropathy. Some studies find that local anesthesia reduces pain, what suggests that, for some patients, pain is due to a peripheral mechanism. There is also evidence that TMD patients show signs of central sensitization and a loss of endogenous analgesia. A number of neuroplastic changes are proposed to contribute to pain chronification in TMD patients. TMD pain mechanisms may be associated with changes in the chemical and physical environment of the affected tissues, and it is possible that these changes will be exploitable as future biomarkers. This talk will examine theoretical pathology underlying TMD-related pain and examine peripheral and central neurobiological changes that may contribute to the development of chronic pain in this craniofacial pain disorder.

Speaker 3: Ayushi Naik, BDS, M.Sc. student, McGill University, Faculty of Dentistry, Montreal, Quebec, Canada, ayushi.naik@mail.mcgill.ca @AyushiNaik13

Speaker 3 Abstract Title: The impact and cost of treatment for temporomandibular disorders

Speaker 3 Abstract: Temporomandibular disorder (TMD) is the most common chronic orofacial pain, and the second most common musculoskeletal disorder (after chronic back pain). Pain intensity is usually moderate, and clinically significant pain and/or disability (GCPS II-IV) are frequent, occurring in at least 20% of the patients. Patients also report social impacts: staying at home more than usual and taking time off work. The most used reversible treatments include patient education with self-care, intra-oral appliances, and pharmacological pain control. A study in England estimates that the 6-month period total cost per person varied from £321 to £519 (CAD 546 to CAD 883), where the major contributor was consultation. Significant pain and disability predicted an increased healthcare cost. The direct out-of-pocket cost averaged £334 (CAD 568) per person per 6-month period. The greatest impact of TMD on indirect cost was related to reduced productivity (e.g., problems with concentration), which averaged £905 (CAD 1539) per person. We are conducting a systematic review aimed at putting in evidence the cost outcomes (cost-effectiveness, cost-utility, and cost-benefit analyses) of the most common treatments used to manage TMD. Knowing the cost involved in treating TMD is significant, as it will help develop more effective and efficient health care pathways and policies for patients with TMD. This talk will provide an outline of the existing knowledge on the impact and cost of TMD.
Learning Objective 1: Examine the potential risk factors implicated in the transition from acute to chronic orofacial pain.

Learning Objective 2: Examine theoretical pathology underlying TMD and examine peripheral and central neurobiological changes that may contribute to the development of chronic pain in this craniofacial pain disorder.

Learning Objective 3: Review the impact and cost of temporomandibular disorders
**CLINICAL INNOVATION POSTERS**

**Covid-19 Infection and Pain in Adolescents with Sickle Cell Disease: A Case Series**

Doralina Anghelescu\(^1\), Heidi Meeks\(^2\), Mike Frett\(^3\), Latika Puri\(^4\), Nicole Alberts\(^5\)

\(^1\) St. Jude Children's Research Hospital, Pediatric Medicine, Memphis, Tennessee, United States;  
\(^2\) St. Jude Children's Research Hospital, Pediatric Medicine, Memphis, Tennessee, United States;  
\(^3\) St. Jude Children's Research Hospital, Pediatric Medicine, Memphis, Tennessee, United States;  
\(^4\) Loma Linda University, Pediatrics, Loma Linda, California, United States;  
\(^5\) Concordia University, Psychology, Montreal, Quebec, Canada

**Introduction/Aim:** Pain is the most common clinical manifestation among individuals with sickle cell disease (SCD). Clinically, increases in chronic pain, neuropathic pain, and frequency of acute vaso-occlusive pain have been observed in association with COVID-19 infection among adolescents with SCD. In this case series, we aimed to examine pain complexity in 5 adolescents with SCD who either tested positive for SARS-COV-2 infection or were presumed to have been infected based on detection of antibodies.

**Methods:** Eligible cases were identified through retrospective chart review of cases referred to the St. Jude Children’s Research Hospital Pain Management Service. The criteria utilized to define an increased level of pain complexity after COVID-19 infection included: 1) Increased frequency of acute care visits and/or admissions for pain; 2) New onset chronic pain; 3) New onset neuropathic pain; 4) Escalation in the complexity of pharmacologic therapies; and 5) Increased use of non-pharmacologic interventions.

**Results:** Three of the 5 cases reviewed demonstrated changes in all 5 pain criteria. One case did not display a pattern of increased acute pain episodes frequency and one case did not present a new component of neuropathic pain. However, both of these cases met the remaining criteria used to define increased pain complexity.

**Discussion/Conclusions:** While more research is needed to fully understand the implications of COVID-19 infection on pain in adolescents with SCD, these cases suggest the presence of a complex relationship. Implications of these findings including further investigation of COVID-19 and SCD pain will be discussed.
The Sensory Evaluation Network: Realigning the role of sensory testing

Martine Bordeleau¹, Jan Vollert², Miroslav Backonja³, Serge Marchand⁴, Guillaume Léonard⁵

¹ Université de Sherbrooke, Sherbrooke, Quebec, Canada; ² Imperial College London, London, N/A, United Kingdom; ³ University of Wisconsin, Madison, N/A, United States; ⁴ Université de Sherbrooke, Sherbrooke, Quebec, Canada; ⁵ Université de Sherbrooke, Sherbrooke, Quebec, Canada

Introduction/Aim: Chronic pain is a rising problem in aging societies. Accurate diagnostic methods are required to precisely differentiate pain phenotypes and select the best course of treatment. In clinical and research settings, methods for assessing somatosensory function have included quantitative sensory testing, conditioned pain modulation, nerve conduction studies, evoked potential studies, and others. There are numerous technical variations for each of these approaches, indicating a clear need to align them conceptually. An online private forum is an interesting method for gathering professional experiences and insights for strategic decisions. The main goal of the Sensory Evaluation Network (SEN) is to bring together international experts in the evaluation of somatic sensory function. Our first goal is to establish a forum of experts to bring forward new concepts, ideas, and recommendations. Our second goal is to build an open, online learning platform for researchers, clinicians, and trainees looking to improve their knowledge and skills about sensory evaluation.

Methods: To obtain systematic feedback from SEN members, an iterative approach will be used in conjunction with Slack, an online meeting platform that allows users to view and respond to each other’s comments. Members of the SEN will be asked to respond to open-ended “think aloud” prompts, which will be followed by increasingly specific probes prepared by the moderators. Emerging themes and proposed methodological best practices will be drawn from the online discussion, and the resulting recommendations will be disseminated via peer-reviewed articles and our online learning platform.

Results: Not applicable

Discussion/Conclusions: Not applicable
Developing a patient engagement strategy for youth and caregivers in pediatric pain research: Key considerations around equity, diversity, and inclusion

Yvonne Brandelli¹, Isabel Jordan², Christine Chambers³, Sean Mackinnon⁴, Jennifer Parker⁵, Adam Huber⁶, Jennifer Stinson⁷, Jennifer Wilson⁸

¹ Dalhousie University, Psychology and Neuroscience, Halifax, Nova Scotia, Canada; ² IWK Health Centre, Centre for Pediatric Pain Research, Halifax, Nova Scotia, Canada; ³ Dalhousie University & IWK Health Centre, Psychology and Neuroscience & Pediatrics, Halifax, Nova Scotia, Canada; ⁴ Dalhousie University, Psychology and Neuroscience, Halifax, Nova Scotia, Canada; ⁵ IWK Health Centre, Centre for Pediatric Pain Research, Halifax, Nova Scotia, Canada; ⁶ Dalhousie University & IWK Health Centre, Pediatrics & Rheumatology, Halifax, Nova Scotia, Canada; ⁷ University of Toronto & The Hospital for Sick Children, Lawrence S. Bloomberg Faculty of Nursing & Research Institute, Toronto, Ontario, Canada; ⁸ Cassie + Friends, Vancouver, British Columbia, Canada

Introduction/Aim: Patient engagement is a growing interest within the field of pediatric pain as the value that patient expertise can contribute to research is increasingly prioritized. Although the inclusion of diverse voices is a foundational principal of patient engagement, little guidance exists on how and where to find such expertise. This methods poster describes our team’s experiences developing a patient engagement strategy to recruit youth with juvenile idiopathic arthritis (JIA) and their caregivers as team members on a research study.

Methods: In partnership with Cassie + Friends, a community-based organization, we launched an open call to recruit four youth (13-18 years old) with JIA and/or their caregivers to collaborate on a research study. Advertisements detailing the study topic, eligibility, commitment, and benefits were created through the lens of equity and inclusion (e.g., intentional use of partnership language) and shared on social media (Facebook, Instagram, Twitter). Applicants provided demographic information (e.g., age, gender, disability) and qualitatively shared why this opportunity was of interest. Over 3 weeks, 57 applications were received.

Results: In consultation with a strategic lead on patient partnerships (IJ), the following criteria were hierarchically developed to select a diversity of voices to join the team: 1) diverse diagnoses, 2) diverse demographics, and 3) qualitative information.

Discussion/Conclusions: Developing patient partnerships is a burgeoning topic. This poster describes the development of a patient engagement strategy to recruit youth and caregiver collaborators. Considerations around the role of equity, diversity, and inclusion in research as well as research ethics will be discussed.
Improving Accessibility to Nitrous Oxide in a Pediatric Hospital Despite a Pandemic

Evelyne D.Trottier¹, Marie Joelle Doré-Bergeron², Julie Paquette³, Patricia Laforce⁴, Annie Lacroix⁵, Edith Villeneuve⁶

¹ CHU Sainte-Justine, Pediatric emergency, Montreal, Quebec, Canada; ² CHU Sainte Justine, Pediatric, Montreal, Quebec, Canada; ³ CHU Sainte Justine, Pediatric, Montreal, Quebec, Canada; ⁴ CHU Sainte Justine, Pediatric, Montreal, Quebec, Canada; ⁵ CHU Sainte Justine, Pediatric, Montreal, Quebec, Canada; ⁶ CHU Sainte Justine, Anesthesia, Montreal, Quebec, Canada

Introduction/Aim: For some children, distraction, comfort positioning and topical anaesthetic will not provide sufficient peri-procedural comfort and nitrous oxide (N2O) can be a key adjunct. The aim of this quality improvement (QI) initiative was to increase N2O accessibility in a pediatric tertiary care hospital in order to improve procedural pain and distress management.

Methods: This QI initiative was supported by the hospital-wide initiative Tout doux, which aims to decrease procedural pain and distress in a pediatric hospital. It includes training the healthcare providers (HP) in the 4Ps approach and a specific training on N2O use. E-learning and formal presentation sessions were available according to HP preferences. Certification with 2 simulated case-scenarios was obtained by all participants prior to supervised first-use with patients.

Results: In 2019, the training was first offered on the general wards to all the nurses(59), resulting in different levels of comfort using the technique. The implementation was then modified to focus on ‘N2O champions’. The QI initiative had a pause in March 2020 because of the covid-19 pandemic. A multidisciplinary guideline was created for the use of N2O in the institution in accordance with the new reality: http://www.urgencehsj.ca/protocoles/covid-19-sedation/. Update sessions were offered: http://www.urgencehsj.ca/savoirs/protoxyde-dazote-nitronox/. N2O Champion were trained nurses in the day hospital(18), ED(17), mobile team(7), nursing direction(13) and haematologic team(27) for a total of 141 HPs trained. HP reported use of N2O painful procedures and children with special needs.

Discussion/Conclusions: Education initiatives and collaboration successfully increased the use of N2O in a tertiary pediatric hospital despite the arrival of the pandemic.
Introducing the first Child Life Specialist in an ED for procedural pain and distress management: successes and challenges

Evelyne D. Trottier¹, Kaitlen Gattuso², Marie Joelle Doré-Bergeron³, Sarah Loemba⁴, Valérie Leclair⁵, Julie Paquette⁶, Annie Lacroix⁷, Corinne Thériault⁸, Jocelyn Gravel⁹

¹ CHU Sainte-Justine, Pediatric emergency, Montreal, Quebec, Canada; ² CHU Sainte Justine, Pediatric emergency, Montreal, Quebec, Canada; ³ CHU Sainte Justine, Pediatric, Montreal, Quebec, Canada; ⁴ CHU Sainte Justine, Pediatric, Montreal, Quebec, Canada; ⁵ CHU Sainte Justine, Pediatric, Montreal, Quebec, Canada; ⁶ CHU Sainte Justine, Pediatric, Montreal, Quebec, Canada; ⁷ CHU Sainte Justine, Pediatric emergency, Montreal, Quebec, Canada; ⁸ CHU Sainte Justine, Pediatric emergency, Montreal, Quebec, Canada; ⁹ CHU Sainte-Justine, Pediatric emergency, Montreal, Quebec, Canada

Introduction/Aim: Medical procedures can cause pain/distress for children in the emergency department (ED). Non-pharmacological strategies such as preparation, comfort positions, distraction and relaxation techniques can help children cope with procedures. Child Life Specialist (CLS) can facilitate these methods. Objective: To evaluate the impact of introducing a CLS in a pediatric ED for the procedural care of children.

Methods: This quality improvement (QI) project was supported by the hospital-wide initiative Tout doux, aiming to alleviate procedural pain/distress across a pediatric hospital. A pilot project involving the introduction of a CLS in the ED was implanted in July 2021. To evaluate the impact of pain/distress management techniques, CLS interventions were prospectively recorded to report the strategies used, including non-pharmacological methods, over a 2-month period.

Results: Between Sept 1st-Nov 1st, 2021, the CLS participated in 137 procedures over 40 shifts for 108 patients (mean age: 5.5 yo [6 months-17 yo]). Most frequent procedures were 82 (60%) blood draws/IV-lines insertion. Parents were present in 132 (96%). For 93 (68%) procedures, the child/parent had preparation. Distraction was done for all, using active (eg. electronic games 57 [42%]), or passive distraction (eg. video 47 [34%], music 39 [29%]). Deep breathing was utilized in 41 (30%). A restrained lying position was used in 61 (45%). Topical anesthetic was used for 16/71 (23%) children undergoing venous blood draws/IV-line insertions. For 72 (53%), procedural pain/distress were considered by the CLS as well managed. For the remaining, in (37/63 [59%]), only one strategy was employed.

Discussion/Conclusions: Procedures were considered a pain management success in about half of patients. Multimodal pain and distress management techniques and earlier implication of the CLS should be employed to improve this result.
Within-Person Analysis of Ubrogepant Treatment of Mild Versus Moderate-Severe Headache Pain during a Phase 3 Long-Term Safety Extension Trial

Goran Davidovic¹, Richard Lipton², David Dodick³, Peter Goadsby⁴, Sung Yun Yu⁵, Brittany Jordan⁶, Julia Ma⁶, Janette Contreras-De Lama⁶, Rami Burstein⁹
¹ AbbVie Inc., Markham, Ontario, Canada; ² Albert Einstein College of Medicine, Bronx, New York, United States; ³ Mayo Clinic, Scottsdale, Arizona, United States; ⁴ King's College Hospital, London, N/A, United Kingdom; ⁵ AbbVie Inc., Madison, New Jersey, United States; ⁶ AbbVie Inc., Madison, New Jersey, United States; ⁷ AbbVie Inc., Madison, New Jersey, United States; ⁸ AbbVie Inc., Irvine, California, United States; ⁹ Harvard Medical School, Center for Life Science, Boston, Massachusetts, United States

Introduction/Aim: We aimed to assess the efficacy of ubrogepant 50 or 100 mg within participants who treated migraine attacks with mild and moderate/severe pain during a 52-week treatment period. We hypothesized that ubrogepant efficacy within individual participants who treated both mild and moderate/severe pain attacks would be similar to that observed in the previous pooled analysis which demonstrated improved ubrogepant efficacy.

Methods: Post-hoc analysis of a subset of the original pooled analysis, where ubrogepant-treated participants with valid efficacy data who treated both at least 3 mild and 3 moderate/severe pain migraine attacks, was performed from phase 3, open-label, long-term safety extension trial. Efficacy measures included pain freedom at two hours after initial dose (2hPF) and absence of migraine-related symptoms. A generalized linear mixed model with binomial distribution and logit link function was applied to assess the treatment effect of ubrogepant at different level of baseline pain intensities.

Results: Analysis population included 117 50 mg and 127 100 mg ubrogepant-treated participants. In the 100 mg ubrogepant group: 51.2% of participants with mild pain versus 28.9% with moderate/severe pain (Odds ratio [95% CI] 2.58 [2.24, 2.96]; p<0.001) experienced 2hPF; with absence of photophobia being 65.2% versus 47.5% (2.07 [1.80, 2.37]; p<0.001); absence of phonophobia being 76.6% versus 63.1% (1.91 [1.66, 2.20]; p<0.001); and absence of nausea being 88.0% versus 79.1% (1.94 [1.63, 2.31]; p<0.001), respectively. Results were similar in the 50 mg ubrogepant group.

Discussion/Conclusions: These results suggest that ubrogepant is more effective when treating migraine headache while pain intensity is mild versus moderate/severe.
Determining the Effectiveness of Incorporating Physician Assistants in a Chronic Pain Care Clinic to Improve Access to Care

Jaclyn De Azevedo¹, Deanna Kroetsch²

¹ McMaster University Medical Centre, Michael G. Degroote Pain Clinic, Hamilton, Ontario, Canada; ² McMaster University Medical Centre, Michael G Degroote Chronic Pain Clinic, Hamilton, Ontario, Canada

Introduction/Aim: The Physician Assistant (PA) profession has continued to be incorporated into the Canadian health care system. PAs help address challenges patients face seeking timely access to health care services. Our goal was to determine if PAs can reduce patient wait times for initial consultation, increase capacity of patients seen both in person and virtually, and assess the efficacy of having multiple PAs.

Methods: Reviewed total volume of patients seen at clinic pre-PA vs with PA, number of patients seen by each PA, and average wait time to receive a consultation.

Results: The number of new consult and follow up visits have increased from 2,560 in 2014 to 6,911 in 2019 and 8,754 in 2021. This represents a 2.70 & 3.42 fold increase, respectively, since the addition of PAs. The PA’s work collaboratively with 14 physicians on an alternating schedule seeing an average of 35% of all new consultations and 19% of all follow up appointments. Wait times for a new consult have reduced from an average of 2 years in 2014, to 7 months in 2021. In addition to this dramatic reduction in new consult wait time, the physician is now able to see follow up patients much sooner, in person or on a virtual basis.

Discussion/Conclusions: Overall, the data supports the value and role of multiple PA’s within the MGD Pain clinic, as this allows a patient to be seen in a timely fashion and also addresses the issue of access to specialized chronic pain care treatment.
From research to clinical practice: the use of Transcranial Direct Current Stimulation as a new clinical service at "Centre Intégré de Santé et Services Sociaux Abitibi-Témiscamingue" to treat chronic pain

Rodrigo Deamo Assis1, Dat Nhut Nguyen2, Marie Philippe Harvey3, Guillaume Leonard4

1 "Centre Intégré de Santé et Services Sociaux Abitibi-Témiscamingue", Rouyn-Noranda, Quebec, Canada; 2 "Centre Intégré de Santé et Services Sociaux Abitibi-Témiscamingue", Rouyn-Noranda, Quebec, Canada; 3 Université de Sherbrooke, Sherbrooke, Quebec, Canada; 4 Université de Sherbrooke, Sherbrooke, Quebec, Canada

Introduction/Aim: Although tDCS is very known at the research field, it is not used at the clinical practice. Since 2018, the CISSS-AT uses the tDCS to treat chronic pain. Our aim is to describe the effects of tDCS to manage chronic pain in a clinical practice environment.

Methods: 5-consecutive-days of active tDCS, 20 minutes combined with mindfulness meditation; anode electrode over the M1 region; cathode electrode over contralateral supraorbital region; and intensity of 2 mA. Inclusion criteria’s: to be a patient of CISSS-AT clinic of pain; to have signs of central sensibilization; and do not progress with the exercise’s program. Exclusion criteria: to have a neurodegenerative disease or a cognitive impairment. The Visual Analog Scale of Pain (VAS), McGill Pain Questionnaire – short version (MPQ) and the Central Sensibilization Inventory (CSI) were administered during 3 periods: first day of tDCS (T1), last day of tDCS (T2) and 1 month after the last day of tDCS (T3). For the analysis, we calculated the medium and the standard deviation.

Results: 61 patients made the protocol. Decrease of the score in all the tests were observed between T1/T2 and T1/T3. VAS: T1 6,1 ± 1,7; T2 3,6 ± 1,8 and T3 4,5 ± 1,6. MPQ: T1 21,4 ± 7,8; T2 8,9 ± 5,1 and T3 12,6 ± 5. CSI: T1 55,9 ± 11,2; T2 24,9 ± 9,6 and T3 29,4 ± 9,2. Side effects: fatigue, headache and tingling sensation.

Discussion/Conclusions: tDCS seems to be effective to treat chronic pain in the clinical practice environment.
Chronic Pain and Disability Management in Newfoundland Labrador: A Virtual Stepped Care Approach

Julie Dwyer¹, Heather Foley²

¹ University of Edinburgh, St. John's, Newfoundland & Labrador, Canada; ² Memorial University, St. John's, Newfoundland & Labrador, Canada

Introduction/Aim: The Centre for Pain and Disability Management (CPDM) is an interprofessional pain rehabilitation program located in St. John’s, Newfoundland. In March 2020, the CPDM suspended its in-person five-week program due to the COVID-19 lockdown and modified it to virtual delivery incorporating a stepped-care approach. The goal was to provide equitable, uninterrupted access to person-centred, evidence-informed services despite continuously changing public health measures.

Methods: The program launched in August 2020 and included changes to the referral screening process. The stepped care model followed a biopsychosocial approach and was comprised of four steps: virtual coaching by a CPDM therapist through a webinar series; virtual coaching by a CPDM therapist through the Therapy Assistance Online pain education modules; virtual participation in the five-week intensive rehabilitation program; and virtual participation in follow-up tailored to individual needs. The CPDM clinicians were responsible for assisting the clients in their set-up and use of the technology required to participate in the program.

Results: Since August 2020, there was no interruption in program delivery despite fluctuations in public health guidelines. The wait time to first contact post-referral was reduced from 20-26 months to 12 months. Access barriers associated with travel/accommodations were reduced allowing clients living in rural areas to participate.

Discussion/Conclusions: Benefits include more efficient waitlist management, reduced barriers to service access based on residential location, and a clear path towards providing the appropriate service at the appropriate time. Challenges include increased technical support demands on clinicians, barriers to access based on client technology limitations, and loss of in-person physical assessment.
Use of Trigger Point Injection for Intractable Calf Pain From Charcot-Marie-Tooth: A Case Report

Michael Finnern¹, Michelle Poliak-Tunis²

¹ University of Wisconsin Hospitals and Clinics, Department of Orthopedics and Rehabilitation, Madison, Wisconsin, United States; ² University of Wisconsin Hospitals and Clinics, Department of Orthopedics and Rehabilitation, Madison, Wisconsin, United States

Introduction/Aim: Charcot Marie Tooth Disease (CMT) is the most common form of inherited neuromuscular disease and is generally characterized by progressive distal weakness, muscle atrophy, and sensory loss¹. Muscle cramps have been reported as a significant ailment to quality of life (QOL) in CMT². Studies indicate that patients with subtype CMT1A have an increased frequency of calf cramps which worsen with age, and the resulting calf pain is detrimental to overall QOL in CMT1A³. Various treatment methods exist to address this symptom, but little, if any, literature exists regarding the use of trigger point injections (TPI) to address chronic calf pain in patients with CMT.

Methods: This case involves a 78-year-old female with a history of CMT who presented with worsening chronic bilateral calf pain. Exhaustive physical therapy, pharmacotherapy, and stretching did not provide adequate relief. The patient was therefore deemed a candidate for TPI, and the more problematic right gastrocnemius was targeted by itself first as a trial. Using a 30-gauge 1/2 inch needle and sterile technique, two trigger points were injected with a total of 1.5mL 1% lidocaine using repeated mechanical lysis. There was reproduction and then cessation of local twitch response. There were no adverse sequelae.

Results: One month after the first injection, the patient reported a 50% reduction in pain. She therefore underwent bilateral gastrocnemius TPI with continued monitoring for thus far successful relief of symptoms.

Discussion/Conclusions: This report illustrates the use of TPI for the successful treatment of intractable calf pain resulting from CMT.
Chronic Pain Management in Cancer: An exploratory analysis of electroencephalograph activity during virtual reality pain distraction therapy

Bernie Garrett¹, Henry Fu², Gordon Tao³, Elliott Cordingly⁴, Zahra Ofoghi³, Crystal Sun⁶, Teresa Cheung⁷, Tarnia Taverner⁸

¹ University of British Columbia, School of Nursing, Vancouver, British Columbia, Canada; ² Simon Fraser University, , Vancouver, British Columbia, Canada; ³ University of British Columbia, , Vancouver, British Columbia, Canada; ⁴ University of British Columbia, , Vancouver, British Columbia, Canada; ⁵ Simon Fraser University, , Vancouver, British Columbia, Canada; ⁶ University of British Columbia, , Vancouver, British Columbia, Canada; ⁷ Simon Fraser University, , Vancouver, British Columbia, Canada; ⁸ University of British Columbia, , Vancouver, British Columbia, Canada

Introduction/Aim: This presentation explores the recording and analysis of electroencephalogram data (EEG) during virtual reality (VR) pain distraction therapies in cancer patients with chronic pain associated with cancer and its treatment. Experimental design, recruitment, recording, and analysis of EEG signals and findings will be discussed.

Methods: A single-subject design study was used to explore EEG activity during the VR therapy, and pain levels pre and post exposure. Participants were purposively selected, completing or had completed cancer treatment and had ongoing cancer or cancer-treatment related chronic pain. Sixty-four channel EEGs were recorded during an 8-minute pre-exposure rest, 30-minute VR therapy, and 8-minute post-exposure rest. The power of EEG waveforms was compared between each condition using cluster-based permutation testing. A topographic analysis and coherence exploration was performed to identify the variations in power and coherence in different cortices of the brain.

Results: A power increase in the beta and gamma bandwidths during the VR therapy was observed with significance (P<.025). Coherence changes during meditation were observed predominantly between the frontal, parietal, and occipital cortices and in the theta, alpha and gamma bands (P<.0025). No significant relationships between pain scores and EEG power variations were observed.

Discussion/Conclusions: The study demonstrates specific EEG changes during the VR therapy, and provides novel EEG recording and analysis methods that can be used to investigate neurophysiological changes in VR pain applications. These approaches may guide further studies to explore and identify brain regions and wave bands with respect to VR therapies for patients with cancer related chronic pain.
Pediatric Pain in Alaska: A First Look at Equitable Access in Interdisciplinary Pain Care

Wendy Gaultney¹, Ben Ekstrom², Sarah Hanvy³, Hailey Lankford⁴, Charlee Laurie⁵

¹ Neuroversion, Anchorage, Alaska, United States; ² Neuroversion, Anchorage, Alaska, United States; ³ Advanced Physical Therapy, Anchorage, Alaska, United States; ⁴ Neuroversion, Anchorage, Alaska, United States; ⁵ Neuroversion, Anchorage, Alaska, United States

Introduction/Aim: There are approximately 180,000 children and adolescents in Alaska¹. Given global estimates, approximately 45,000 will meet IASP criteria for chronic pain at some time during childhood/adolescence². Many Alaskan children, especially Alaska Natives, live far from urban centers. Although adult research suggests that pain affects both rural and native populations disproportionately³, little is known about the epidemiology of pediatric pain in Alaska. To address the unmet need for high quality pediatric pain care in Alaska, we formed an interdisciplinary program in May 2021. Our team consists of a physician, psychologist, physical therapist, physician’s assistant and medical assistant. This poster aims to describe our program’s reach thus far.

Methods: We reviewed demographic information from new patients seen for evaluations to describe who has accessed interdisciplinary pain services.

Results: Fifteen patients attended evaluations from June through November. Ages ranged from 8 to 18 years (M=14.15, SD=3.63); 66% identified as female, 20% male and 14% non-binary. Patients identified as white non-Hispanic (66%), Asian Non-Hispanic (13%), white Hispanic (7%), Asian/Black/Hawaiian (7%), Alaska Native (7%). Pain problems included head, abdomen, neck, back, limb and multi-site pain. Patients resided in largely urban areas: Anchorage (47%), the Kenai Peninsula (20%), Matanuska-Susitna (13%), Fairbanks (13%) and Southeast Fairbanks (7%). Patients were evaluated in-person and via telehealth.

Discussion/Conclusions: During our first six months we have increased access to interdisciplinary pediatric pain care in Alaska via in-person and telehealth services. As part of our quality improvement efforts we will continue to evaluate and emphasize equity in access to care.
Unraveling the neuropsychological profile of patients with chronic pain

Erika Gentile¹, Mathieu Roy²
¹ McGill University, Psychology, Montreal, Quebec, Canada; ² McGill University, Psychology, Montreal, Quebec, Canada

Introduction/Aim: Previous studies aiming to objectify cognitive complaints among patients with chronic pain have several methodological limitations (e.g., low sample sizes, heterogeneity of measures) that make it difficult to get a clear portrait of their cognitive impairment. The present study aimed to examine whether chronic pain is predictive of deficits in cognition relative to participants without pain using a large databank in which participants have undergone uniform testing procedures.

Methods: 9,339 participants with chronic pain (57% women, mean age: 64.4 years) and 12,620 healthy controls (49% women, mean age: 65.25 years) completed a battery of cognitive tests that were synthesized into the following domains: executive function, learning and memory, processing speed, perceptual reasoning, and fluid reasoning. Sociodemographic and psychological data were accounted for with a psychosocial burden score, calculated from specific questionnaire items.

Results: The findings of the present study demonstrate that patient with chronic pain demonstrated poorer performance on tasks of executive functions, fluid reasoning, and memory. Additionally, participants with multiple (two or more) sites of pain performed worse on these measures than those with one pain site or no pain at all.

Discussion/Conclusions: The results provide preliminary support for a neurocognitive profile in chronic pain. Such a profile can provide insight into the conceptualization of patient complaints as well as guide differential diagnosis and neuropsychological testing procedures within this population. Further, it can inform treatment plans and targets and be used as a foundation for future investigations of neuropsychological interventions in chronic pain.
A friend for life: Customized avatar development in an immersive multi-platform virtual environment for children with cancer - Effects on pain, anxiety and satisfaction

Estelle Guingo¹, David Paquin², Casey Côtes-Turpin³, Christine Genest⁴, Léandra Desjardins⁵, Pascal Bernier⁶, Michel Duval⁷, Cathy Vézina⁸, Marie-France Langlet⁹, Félix Côtes-Charlebois¹⁰, Sylvie Le May¹¹

¹ Université du Québec en Abitibi-Témiscamingue, Rouyn-Noranda, Quebec, Canada; ² Université du Québec en Abitibi-Témiscamingue, Rouyn-Noranda, Quebec, Canada; ³ Université du Québec en Abitibi-Témiscamingue, Rouyn-Noranda, Quebec, Canada; ⁴ Université de Montréal, Montréal, Quebec, Canada; ⁵ Centre Hospitalier Universitaire de Sainte-Justine, Montréal, Quebec, Canada; ⁶ Centre Hospitalier Universitaire de Sainte-Justine, Montréal, Quebec, Canada; ⁷ University Hospital Center Sainte-Justine, Pediatric oncology department, Montreal, Quebec, Canada; ⁸ Université du Québec en Abitibi-Témiscamingue, Rouyn-Noranda, Quebec, Canada; ⁹ University Hospital Center Sainte-Justine, Patients-Family-Caregivers partnership office, Montreal, Quebec, Canada; ¹⁰ Université du Québec en Abitibi-Témiscamingue, Creation and new medias department, Rouyn-Noranda, Quebec, Canada; ¹¹ Université de Montréal, Montréal, Quebec, Canada

Introduction/Aim: Our objective is to study the feasibility, acceptability and effects on pain, anxiety and satisfaction of parents and children undergoing cancer treatment, related to an immersive multi-platform distraction (virtual reality and mobile) based on a customized friendly avatar.

Methods: Hospitalized children from 6 to 17 yo. with cancer will be recruited (N=5). Qualitative feedback will be collected from a parent logbook and by semi-structured child-parents interviews. The mobile application will be used as a logbook for children during the trial. A focus group will be organized to collect clinicians’ opinions. We will also measure pain and anxiety using the Numerical Rating Scale and the Child Fear Scale, respectively. Satisfaction will be measured by surveys. Our study follows a co-design approach in art-based research (Research action design). Children will be involved in game’s conception by creating their virtual friend. Game data will be collected to learn about children’s experience.

Results: Our preliminary tests are currently running on healthy participants (N=4) following a Think Aloud design approached. The first test provided feedback on how to adapt user’s experience in virtual reality in young children. One of the children (6 yo) expressed difficulties interacting with virtual objects. More results are pending.

Discussion/Conclusions: While videogames have previously been tested as therapeutic tools for pain and anxiety management, no studies have evaluated the benefit of a custom avatar-based game for children with cancer. This is an innovative intervention adapted to hospital context.
**Partners in Pain: evaluation of a virtual community engagement group for people living with chronic pain in Saskatchewan**

Cassie Jones¹, Jessica Jack², Megan Hewson³, Alexandria Pavelich⁴, Dr. Colleen Dell⁵, Dr. Karen Lawson⁶, Dr. Pamela Downe⁷, Dr. Krista Baerg⁸, Ross McCreery⁹, Erin Beckwell¹⁰, Sharon Okeeweehow¹¹, Jeannie Coe¹², Cristina Ugolini¹³, Karen Juckes¹⁴, Dr. Susan Tupper¹⁵

¹ University of Saskatchewan, College of Nursing, Yorkton, Saskatchewan, Canada; ² University of Saskatchewan, Archaeology and Anthropology, Saskatoon, Saskatchewan, Canada; ³ Saskatchewan Health Authority, Regina, Saskatchewan, Canada; ⁴ University of Saskatchewan, Sociology, Saskatoon, Saskatchewan, Canada; ⁵ University of Saskatchewan, Psychology, Saskatoon, Saskatchewan, Canada; ⁶ University of Saskatchewan, Archaeology and Anthropology, Saskatoon, Saskatchewan, Canada; ⁷ University of Saskatchewan, Psychology, Saskatoon, Saskatchewan, Canada; ⁸ University of Saskatchewan, Pediatrics, Saskatoon, Saskatchewan, Canada; ⁹ No Affiliation, Patient Partner, Regina, Saskatchewan, Canada; ¹⁰ University of Regina, Social Work, Saskatoon, Saskatchewan, Canada; ¹¹ No Affiliation, Patient Partner, Saskatoon, Saskatchewan, Canada; ¹² Saskatchewan Health Authority, Primary Health, Saskatoon, Saskatchewan, Canada; ¹³ Saskatchewan Health Authority, Primary Health, Saskatoon, Saskatchewan, Canada; ¹⁴ University of Saskatchewan, College of Nursing, Regina, Saskatchewan, Canada; ¹⁵ Saskatchewan Health Authority, Clinical Excellence, Saskatoon, Saskatchewan, Canada

**Introduction/Aim:** People living with persistent pain report social isolation. The Improving Pain in Saskatchewan (IPSK) research team and the Saskatchewan Pain Society (SaskPain) developed Partners in Pain (PiP), a virtual community support and education group offered twice per month. Results are presented on evaluation responses collected between October 2021 and February 2022.

**Methods:** Each hour-long PiP session consists of brief education, a personal story by someone living with pain, and a facilitated activity (e.g. art project, gentle movement). Participants are adults living with pain, family caregivers, or healthcare providers in Saskatchewan recruited through social media, traditional media, and word of mouth. Participants receive an emailed survey after each session consisting of 18 questions tailored to the session content along with links to resources discussed in the session.

**Results:** Attendance per session averaged 24 participants (85% female). An average of 9 survey responses were received per session (response rate = 37%). 85% agree or strongly agree that they are more aware of how to manage their pain after attending the webinar. 85% intend to use the information learned to support pain management. In response to the patient story: 44% felt less alone, 53% could relate, 31% felt encouraged to connect with others, and 83% agreed or strongly agreed to feeling better connected.

**Discussion/Conclusions:** Although attendance was lower than projected, this may suggest the benefit of smaller scale programs driven by local communities. Participants were predominantly women, suggesting PiP meets the unique needs of this population. Further work is needed to identify needs of other populations.
Indigenous Peoples and Interprofessional Health Care Providers Collaborating to Manage Chronic Pain: Building Relationships and Learning Through the Project ECHO Indigenous Chronic Pain and Substance Use

Andrew Koscielniak¹, Donna Garstin², Chris Mushquash³, Paul Francis⁴, Ronan Wesley⁵, Teresa Trudeau-Magiskan⁶, Marinna Read⁷, Andrea Furlan⁸, Patricia Poulin⁹

Introduction/Aim: Chronic pain (CP) disproportionally affects Indigenous Peoples. We describe the development and evaluation of the first Project Extension for Community Healthcare Outcomes (ECHO) Indigenous Chronic Pain and Substance Use program, through St. Joseph’s Care Group (SJCG). This program connects community-based health care providers (HCPs) to an interprofessional “hub” via videoconference for lectures and case-based learning to improve culturally safe CP care for Indigenous Peoples.

Methods: The first ten months consisted of knowledge exchange and partnership building between ECHO leadership and the Indigenous Health Department at SJCG, Indigenous and non-Indigenous HCPs, Elders, and the First Nations, Inuit, and Metis Wellness ECHO. We developed the interprofessional hub and 10-session curriculum (January to March, 2022). Sessions include a 20-minute lecture, and a case discussion guided by the Medicine Wheel. Participants provide practice/demographic characteristics and complete questionnaires including self-efficacy, attitudes and behaviours about CP, facilitators and barriers to implementing learning, along with open feedback.

Results: This first pilot includes eighty registrants (26% nurses, 13% social workers, 10% physicians) from 7 provinces. We will summarize participants’ demographic and practice characteristics, pre-post changes on all measures, as well as open feedback. We have identified the need to improve our evaluation framework anchored in Indigenous methodologies to improve cultural safety.

Discussion/Conclusions: Supported by the initial positive results, we are developing a culturally safe evaluation and research plan for future ECHOs with the goal of improving HCPs’ experience and ability to provide culturally safe care and ultimately lead to better outcomes for Indigenous Peoples living with CP.
Improving procedural pain and distress management in a tertiary care centre through a quality improvement initiative: The "Tout doux" project.

Sarah Loemba¹, Patricia Laforce², Marie-Joëlle Doré-Bergeron³, Annie Lacroix⁴, Julie Paquette⁴, Marie-France Langlet⁵, Valérie Leclair⁶, Kaitlen Gattuso⁷, Emilie Trempe⁸, Evelyne D Trottier¹⁰ ¹ CHU Sainte-Justine, , Montreal, Quebec, Canada; ² CHU Sainte-Justine, , Montreal, Quebec, Canada; ³ CHU Sainte-Justine, Pediatrics, Montreal, Quebec, Canada; ⁴ CHU Sainte-Justine, , Montreal, Quebec, Canada; ⁵ CHU Sainte-Justine, , Montreal, Quebec, Canada; ⁶ CHU Sainte-Justine, , Montreal, Quebec, Canada; ⁷ CHU Sainte-Justine, , Montreal, Quebec, Canada; ⁸ CHU Sainte-Justine, , Montreal, Quebec, Canada; ⁹ CHU Sainte-Justine, , Montreal, Quebec, Canada; ¹⁰ CHU Sainte-Justine, Emergency, Montreal, Quebec, Canada

Introduction/Aim: Optimal procedural pain management can decrease children’s distress and pain, increase the child’s collaboration, and improve the family’s health care experience while reducing procedural time and increasing success on the first attempt for healthcare providers (HCP). “Tout doux” is an institutional quality improvement (TD-QI) initiative that aims to improve procedural pain and distress management throughout CHU Sainte-Justine. Aim: To demonstrate the strategic deployment currently being implemented institutionally, to improve procedural pain and distress management to pediatric patients.

Methods: With a coordinated structure, TD-QI is organized through eight work teams with different mandates. A pre-established deployment plan has been approved by the hospital’s governance. For each sector, we hold a meeting with the nursing advisors and chief departments to organize the deployment. Afterward, we conduct audits of the procedures. Through an e-learning module or official lectures, HCP received procedural pain training including the “4P” approaches. Field support is offered for 2 months by a pain champion and tools and resources are distributed to HCP. We conduct audits every three months to evaluate the impact of the deployment.

Results: So far, 190 HCP have received training, including the hematology-oncology department(169), outpatient pediatric clinic(3+), plastic clinic(14), and collection center(13). The project will be further deployed in the Orthopedics, ENT, ED, and Surgery departments.

Discussion/Conclusions: As TD-QI’s initiative to improve procedural pain management, the next step will be to ensure its optimal dissemination through the organization. Moreover, using the CHUSJ’s mandate with SolutionKidsInPain as their Francophone Regional Hub, diffusion through the network is ongoing.
Providing French-speaking Canadians families with adequate tools and resources on vaccination for their children in the context of a pandemic.

Sarah Loemba¹, Patricia Laforce², Julie Paquette³, Marie-Joëlle Doré-Bergeron⁴, Annie Lacroix⁵, Marie-France Langlet⁶, Valérie Leclaire⁷, Kaitlen Gattuso⁸, Emilie Trempe⁹, Evelyne D Trottier¹⁰
¹ CHU Sainte-Justine, Montreal, Quebec, Canada; ² CHU Sainte-Justine, Montreal, Quebec, Canada; ³ CHU Sainte-Justine, Montreal, Quebec, Canada; ⁴ CHU Sainte-Justine, Pediatrics, Montreal, Quebec, Canada; ⁵ CHU Sainte-Justine, Montreal, Quebec, Canada; ⁶ CHU Sainte-Justine, Montreal, Quebec, Canada; ⁷ CHU Sainte-Justine, Montreal, Quebec, Canada; ⁸ CHU Sainte-Justine, Montreal, Quebec, Canada; ⁹ CHU Sainte-Justine, Montreal, Quebec, Canada; ¹⁰ CHU Sainte-Justine, Emergency, Montreal, Quebec, Canada

Introduction/Aim: With the ongoing COVID-19 pandemic, distribution of vaccination resources is important to help protect the population. It is noticed that resources for procedural pain and distress management are not as abundant and diverse for French-speaking knowledge users.

Methods: Through their partnership with the organization Solutions for Kids in Pain, the institutional quality improvement initiative Tout doux (TD-QI), from CHU Sainte Justine, aims at further improving access to resources for pediatric French-speaking patients and healthcare providers (HCP) on pain and distress prevention and management related to procedures, including vaccination.

Results: In summer 2021, TD-QI established to develop a web page with French-written resources for parents and HCP. With frequent demands for getting access to more resources on vaccination, TD-QI decided to produce concise, and accessible tools dedicated to this procedure. This included an infographic handout as well as two educational videos in French intended for patients and families, one of them being specifically made for children. Moreover, an e-learning module was created to help HCP improve their practice of pain and distress management during vaccination.

Discussion/Conclusions: The next step will be to ensure optimal dissemination of the tools through the ongoing vaccination campaign.
Feasibility of implementation of environmental interventions from the CARD (Comfort Ask Relax Distract) system to reduce fear, pain, and fainting during school-based immunizations

Charlotte Logeman¹, Anna Taddio², Sarah Fadaleh³, Joanne Coldham³, Cheri Little⁵, Tracy Samborn⁶, Lucie Bucci⁷, Victoria Gudzak⁸, Meghan McMurty⁹, Joanne Snider¹⁰, Noni MacDonald¹¹, Cindy Dribnenki¹²

¹ Hospital for Sick Children, Toronto, Ontario, Canada; ² Hospital for Sick Children, Leslie Dan Faculty of Pharmacy, Toronto, Ontario, Canada; ³ Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, Ontario, Canada; ⁴ Alberta Health Services, Calgary, Alberta, Canada; ⁵ Alberta Health Services, Calgary, Ontario, Canada; ⁶ Alberta Health Services, Calgary, Alberta, Canada; ⁷ Immunize Canada, Ottawa, Ontario, Canada; ⁸ Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, Ontario, Canada; ⁹ University of Guelph, Department of Psychology, Guelph, Ontario, Canada; ¹⁰ Alberta Health Services, Calgary, Alberta, Canada; ¹¹ Dalhousie University, Department of Pediatrics, Halifax, Nova Scotia, Canada; ¹² Alberta Health Services, Calgary, Alberta, Canada

Introduction/Aim: Environmental factors contribute to students’ fear, pain, and fainting/dizziness during school-based immunizations. The CARD™ (C-comfort, A-ask, R-relax, D-distract) system provides a framework for immunization program delivery that includes environmental interventions (e.g., reducing fear cues, enhancing privacy, and providing separate waiting areas). We evaluated public health staff’s ability to implement these interventions during school-based immunizations.

Methods: Four community health centres providing immunization services in Calgary, Alberta implemented CARD across 50 schools with grade 6 and 9 students. Public health staff were educated about environmental interventions ahead of time. Staff reported compliance with the interventions during immunization clinics, including preferred clinic space, private room, separate waiting areas with seating, distraction kits, exercise mat, obscuring fear cues (equipment and individuals getting immunized), and window coverings for clinic doors.

Results: Altogether, 62 vaccination clinics were conducted across participating schools. Staff reported high compliance with most interventions: preferred clinic spaces (92%), availability of private rooms (95%), distraction kits (100%), exercise mat (95%), obscuring fear cues (100%), and covering windows (89%). In some cases, however, interventions were deemed inadequate (e.g., private spaces far from the main clinic space). Separate waiting areas with seating were available less frequently (79%) due to physical space limitations.

Discussion/Conclusions: Most CARD environmental interventions were feasible to implement across schools. Some interventions, however, were deemed inadequate. More education is recommended to allow staff to more effectively advocate for suitable environmental interventions to ensure that students have positive immunization experiences.
Choosing care collaboratively: Implementing shared decision making to improve families' engagement in choosing in-person versus virtual care for youth with chronic pain

Nicole E MacKenzie¹, Kathryn A Birnie²
¹ Dalhousie University, Psychology and Neuroscience, Halifax, Nova Scotia, Canada; ² University of Calgary, Department of Anesthesiology, Perioperative and Pain Medicine, and Department of Community Health Sciences, Calgary, Alberta, Canada

Introduction/Aim: Shared decision making (SDM) is desired by many families, however opportunities to engage in SDM for children’s pain management and care delivery are infrequently made available. The absence of SDM may result in inadequate pain management and lower satisfaction with care; however, engagement in SDM may lead to improved communication between health professionals and families, and improved fit of the decision.

Methods: Our team has engaged with diverse youth, families, and health professionals who identified a need for SDM about in-person versus virtual care for pediatric chronic pain. We have conducted a preliminary literature search to identify factors for consideration in SDM for pediatric pain, with conceptual application to deciding about in-person versus virtual care.

Results: Identified relevant factors to SDM in pediatric pain include weighing the available evidence-based options, quality and clarity of the evidence available, patient’s and/or parent’s preferences for decision making, decision complexity, and relevant ethical and practical considerations. Our work is identifying current practices and opportunities for decision making for in-person versus virtual care and will determine key features of a decision aid to support this choice.

Discussion/Conclusions: Based on these findings, we will create a decision aid that supports an evidence-informed and equitable approach for families and health professionals to reach a shared decision about in-person versus virtual care for pediatric chronic pain. Development and dissemination of this decision aid will empower all families to make a choice that ultimately enhances their engagement with pain management services for the child, resulting in improved pain management.
Providing specialized chronic pain care support to Primary Care Providers via the "Mobile Clinic": A preliminary analysis of implementing an evidence-based mobile consultation program at TAPMI

Ayesha Malik¹, Tania Di Renna²

¹ Women's College Hospital, Toronto Academic Pain Medicine Institute (TAPMI), Toronto, Ontario, Canada; ² Women's College Hospital, Toronto Academic Pain Medicine Institute (TAPMI), Toronto, Ontario, Canada

**Introduction/Aim:** Primary Care Providers (PCPs) struggle to care for patients with complex presentations of chronic pain. Complex pain patients who see multiple specialists have common comorbidities such as mental illness, lack of self-management strategies, difficulty accepting prognosis, and high dose opioids. To better support PCPs with such patients, a specialized “Mobile Clinic” was set up as part of a multi-hospital pain program partnership in Toronto (TAPMI). The Mobile Clinic consists of a one-time consultation offered with the PCP, patient, Mobile Clinic staff, and any other specialists willing to attend.

**Methods:** Between November 2020 to October 2021, TAPMI received 43 referrals for complex pain patients who had seen multiple specialists. A pre- and post-questionnaire was sent to the referring PCP before and after attending the Mobile Clinic consultation. The questionnaires gathered data on PCP practice, comfort managing chronic pain and experience with the mobile clinic.

**Results:** The mobile clinic offered a discussion around prognosis, a structured self-management program, and deprescription of high dose opioids. After this, patients were discharged back to PCPs with explicit instruction to promote self-management and decrease number of referrals specifically for pain. All PCPs who attended the clinic felt the clinic was useful in their ongoing management of patients and felt more comfortable managing complex chronic pain in the primary care setting.

**Discussion/Conclusions:** “Mobile clinics” are evidence-based solutions for PCPs struggling to manage patients with complex chronic pain and have shown to increase PCP comfort managing such patients.
Uncovering medial foot pain caused by tendon intersection syndrome: A Case Report

Joseph Anthony Petruccelli¹, Chan Gao²

¹ Sherbrooke University, Sherbrooke, Quebec, Canada; ² Peking University, McGill University, Vanderbilt University, Physical Medicine & Rehabilitation, Montreal, Quebec, Canada

Introduction/Aim: Intersection syndrome of the foot is a rare and poorly documented condition characterized by tenosynovitis of the flexor hallucis longus (FHL) resulting from repetitive friction at the crossover of the FHL and the flexor digitorum longus (FDL), known as the knot of Henry, in the plantar midfoot. The objective of this clinical case report is to increase the awareness of this condition when managing chronic foot pain.

Methods: An 18-year-old female swimmer presented with constant medial right foot pain, and intermittent redness and swelling on the dorsal medial foot for the past 2 years. The pain is exacerbated by walking more than 15 minutes and is temporarily relieved with ice. She had intermittent numbness, tingling, and cramping affecting the right calf and medial bottom right foot. The physical exam revealed tenderness at the medial right midfoot, with right FHL and FDL weakness, the inability to tiptoe, and single right leg stand. EMG, CT and MRI of the right foot were all negative except for mild thickening of the deltoid ligament.

Results: A tibial nerve block at the sustentaculum tali resulted in 70% pain relief for 3 weeks. Then, lateral FHL peri-tendon infiltration with 20 mg of triamcinolone and 1ml of 1% lidocaine at the knot of Henry led to persistent pain relief and the resolution of functional limitations for the past 3 months.

Discussion/Conclusions: This presentation sheds light on pedal intersection syndrome as a differential diagnosis for chronic medial foot pain, and its management with ultrasound-guided corticosteroid injection at the knot of Henry.
Changes in brain GABA levels and improvements in physical functioning following intensive pain rehabilitation in youth with chronic pain

Taylor Pigott¹, Allison McPeak², Amanda de Chastelain³, Nivez Rasic⁴, Laura Rayner⁴, Melanie Noel⁵, Jillian Vinall Miller (co-senior author)⁷, Ashley Harris (co-senior author)⁸
¹ University of Calgary, Psychology; Biological Sciences, Calgary, Alberta, Canada; ² University of Calgary, Medicine, Calgary, Alberta, Canada; ³ Vi Riddell Children's Pain & Rehabilitation Centre, Alberta Children's Hospital, , Calgary, Alberta, Canada; ⁴ Vi Riddell Children's Pain & Rehabilitation Centre, Alberta Children's Hospital, Anesthesiology, Perioperative & Pain Medicine; Child Brain & Mental Health Program, Calgary, Alberta, Canada; ⁵ Vi Riddell Children's Pain & Rehabilitation Centre, Alberta Children's Hospital, Anesthesiology, Perioperative & Pain Medicine, Calgary, Alberta, Canada; ⁶ Vi Riddell Children's Pain & Rehabilitation Centre, Alberta Children's Hospital; Owerko Centre, Alberta Children's Hospital Research Institute; The Mathison Centre for Mental Health Research & Education, Hotchkiss Brain Institute, Psychology; Anesthesiology, Perioperative & Pain Medicine; Child Brain & Mental Health Program; Brain and Behaviour, Calgary, Alberta, Canada; ⁷ Vi Riddell Children's Pain & Rehabilitation Program; Owerko Centre, Alberta Children's Hospital Research Institute; The Mathison Centre for Mental Health Research & Education, Hotchkiss Brain Institute, Psychology; Anesthesiology, Perioperative & Pain Medicine; Child Brain & Mental Health Program; Brain and Behaviour, Calgary, Alberta, Canada; ⁸ Owerko Centre, Alberta Children's Hospital Research Institute, Radiology, University of Calgary; Child Brain & Mental Health Program; Brain and Behaviour, Calgary, Alberta, Canada

Introduction/Aim: A 3-to-6-week multidisciplinary, day-treatment, Intensive Pain Rehabilitation Program (IPRP) was developed at the Alberta Children’s Hospital to help youth with unmanaged chronic pain (pain >3 months) and functional disability. Dysregulation of GABA is thought to play a role in the chronification of pain due to over-excitation of inhibitory brain pathways. We investigated the effect of IPRP on levels of GABA in pain-related brain regions: the anterior cingulate cortex (ACC) and left posterior insula (LPI). We hypothesized that GABA would decrease across IPRP in the ACC and LPI, and this decrease would correlate with improved functioning.

Methods: 3T MRI scans were obtained on 23 youth (mean age=16.09±1.40, female=82.6%) at baseline and discharge from IPRP. GABA concentrations were measured using GABA-edited MEGA-PRESS and analyzed using Gannet. At baseline and discharge objective physical measures including the 6-minute walk test were recorded, and patients completed the PROMIS® pain interference questionnaire.

Results: Repeated MANOVA revealed a significant decrease in LPI GABA (F=5.374, p=.031), but not ACC GABA (n.s.) after controlling for time between scans. Applying GEE, the decrease in LPI GABA accounted for increased distance in the 6-minute walk test (B=149.378, p<.001) and decreased pain interference (B=5.744, p=.014).
**Discussion/Conclusions:** LPI is involved in intensity encoding, localization, learning, and memory of painful events. IPRP may have contributed to the normalization of inhibitory tone within this region. Appropriate functioning of the LPI could have contributed to the improvements in physical outcomes pre- to post-IPRP. This research provides objective evidence for IPRP’s role in inhibitory control of pain pathways in youth.
Family physicians' adherence to pharmacological recommendations of the clinical pharmacist and the chronic pain anesthesiologist.

Anne-Marie Pinard¹, Dominique Cronier², Élodie Traverse³, Orlane Ballot⁴, Laurence Vezina⁵, Arianne Jalbert⁶

¹ Centre d'Expertise en Gestion de la Douleur Chronique au CHUL du Chu de Québec - Université Laval.; Centre Interdisciplinaire de Recherche en Réadaptation et Intégration Sociale., Québec, Quebec, Canada; ² Centre d'Expertise en Gestion de la Douleur Chronique au CHUL du Chu de Québec - Université Laval., Québec, Quebec, Canada; ³ Centre d'Expertise en Gestion de la Douleur Chronique au CHUL du Chu de Québec - Université Laval; Centre Interdisciplinaire de Recherche en Réadaptation et Intégration Sociale., Québec, Quebec, Canada; ⁴ Centre d'Expertise en Gestion de la Douleur Chronique au CHUL du Chu de Québec - Université Laval; Centre Interdisciplinaire de Recherche en Réadaptation et Intégration Sociale., Québec, Quebec, Canada; ⁵ Faculté de pharmacie, Université Laval, Québec, Quebec, Canada; ⁶ Faculté de pharmacie, Université Laval, Québec, Quebec, Canada

Introduction/Aim: Access to pain clinic services is difficult due to the waiting time and the limited number of centers. The Chu de Québec-Université Laval pain clinic is offering a new type of intervention. First, the pharmacist analyses the pharmaceutical treatment of patients suffering from chronic pain; the anesthesiologist discusses the conclusion with the patient and suggestions are sent to their family physician. This study assesses family physicians’ adherence and satisfaction with pharmaceutical recommendations.

Methods: Patients who underwent an evaluative pharmacy consultation validated by an anesthesiologist were included in the study. To evaluate if recommendations were respected, pre- and 6-month post-evaluation drug profiles are obtained from patients’ pharmacy. At the same time, family physicians answered to an online questionnaire to confirm their adherence, clinical impact, and satisfaction with the procedure.

Results: Twenty-six patients (± 51.5 years old; 58% women) and thirteen physicians were included. The initial medication for pain treatment was mainly the acetaminophen (65%), opioids (62%) and gabapentinoid (58%). Our recommendations were essentially to cross-over with opioids (60%), discontinuation of gabapentinoids (32%), and initiation of Tramadol/Tapentadol (79%), SNRIs (40%), antipsychotic (86%) and topicals (81%). Reasons for suggestions were: medication required but not prescribed (40%), lack of efficacy (25%) and adverse effects (16%). 92% of physicians agreed with the recommendations and 100% were satisfied with the procedure. 77% of recommendations had a positive clinical impact.

Discussion/Conclusions: Preliminary results show that this type of intervention is beneficial, by reducing waiting time and improving the management of chronic pain by primary care physicians.
Implementation of a remote, stepped care mental health program for pain and mental health or opioid use concerns at Toronto General Hospital during the COVID-19 pandemic

P. Maxwell Slepian¹, Joel Katz², Rachel Siegal³, Miki Peer⁴, Aliza Weinrib⁵, Nimish Mittal⁶, Hance Clarke⁷

¹ Toronto General Hospital, University Health Network, Anesthesia and Pain Management, Toronto, Ontario, Canada; ² York University, Psychology, Toronto, Ontario, Canada; ³ Toronto General Hospital, University Health Network, Department of Anesthesia and Pain Management, Toronto, Ontario, Canada; ⁴ Toronto General Hospital, University Health Network, Department of Anesthesia and Pain Management, Toronto, Ontario, Canada; ⁵ Toronto General Hospital, University Health Network, Department of Anesthesia and Pain Management, Toronto, Ontario, Canada; ⁶ Toronto General Hospital, University Health Network, GoodHope Ehlers Danlos Syndrome Program, Toronto, Ontario, Canada; ⁷ Toronto General Hospital, University Health Network, Anesthesia and Pain Management, Toronto, Ontario, Canada

Introduction/Aim: With support from the CIHR, we implemented a remote, stepped care mental health program for individuals with chronic pain and mental health or opioid use concerns during the COVID-19 pandemic. The objectives of the program were to leverage an already-in-use chronic pain app (Manage My Pain, MMP) to identify patients at need for mental health care, and provide efficient, virtual interventions for these individuals.

Methods: All patients in the GoodHope Ehlers-Danlos Syndrome (EDS) Program and the Transitional Pain Service (TPS) at Toronto General Hospital were first invited to engage with MMP, a self-management app, and complete baseline screening for mental health and opioid use (Step 0). Those scoring above clinical cut-offs were offered a one-time virtual Acceptance and Commitment Therapy workshop (Step 1). Patients who remained above cut-offs after the workshop were invited to participate in a 6 session group program based in Dialectic Behavior Therapy (Step 2).

Results: 261 EDS and 127 TPS patients were invited to the program. Of these, 128 EDS and 127 TPS patients registered for MMP. 47 EDS and 33 TPS patients completed screening questionnaires, and 31 EDS and 16 TPS patients scored above the clinical cut-offs and were invited to attend mental health programming.

Discussion/Conclusions: We successfully created and implemented a remote, virtually-delivered stepped care mental health program for individuals with chronic pain and mental health or opioid use concerns. However, the majority of patients contacted did engage with the program. Barriers to program uptake and strategies to overcome these barriers will be discussed.
Introduction/Aim: Chronic headache (i.e., headache for 3 months or more) is prevalent and debilitating. Pain catastrophizing has been implicated in the chronification of headache. It is not known whether pain catastrophizing mediates brain activity to increase headache frequency in youth.

Methods: Youth (N=30) aged 10-18 years with chronic headache and 30 age- and sex-matched controls tracked their headache attacks for a one-month period and underwent a 3T fMRI scan. fMRI was used to detect signal changes during the presentation of validated pictures of facial affect (i.e., neutral, happy, fearful, and scrambled images). Youth also completed the Pain Catastrophizing Scale. Contrasts for emotional versus scrambled images were compared between patients and controls, and related to average number of headache attacks, per day. Further, relationships between pain catastrophizing, brain activity, and average headache attacks were explored.

Results: Youth with chronic headache showed heightened activation to emotional versus scrambled stimuli compared to controls in the right anterior cerebellum and right medial temporal gyrus (FWE-corrected cluster P < 0.05). Greater pain catastrophizing and medial temporal gyral activity was associated with increased average headache attacks (P < 0.05). Greater pain catastrophizing mediated the relationship between heightened medial temporal gyral activity and average headache frequency in youth with chronic headache (P < 0.05).

Discussion/Conclusions: Patients demonstrated heightened brain activity in response to emotional stimuli compared to controls. Greater pain catastrophizing explained the relationship between greater medial temporal brain activity and increased headache frequency in youth with chronic headache. Reducing pain catastrophizing may help to reduce headache frequency among youth with chronic headache.
Examining the coping strategies used by female vs male students during school-based immunizations

Sarah Abu Fadaleh¹, Anna Taddio², Charlotte Logeman¹, Victoria Gudzak⁴, Joanne Coldham⁴, Cheri Little⁶, Tracy Samborn⁷, Lucie Bucci⁸, C. Meghan McMurtry⁹, Noni MacDonald¹⁰, Cindy Dribnenki¹¹, Joanne Snider¹²

¹ Leslie Dan Faculty of Pharmacy, University of Toronto, , Toronto, Ontario, Canada; ² Leslie Dan Faculty of Pharmacy, University of Toronto The Hospital for Sick Children, , Toronto, Ontario, Canada; ³ Leslie Dan Faculty of Pharmacy, University of Toronto The Hospital for Sick Children, , Toronto, Ontario, Canada; ⁴ Leslie Dan Faculty of Pharmacy, , Toronto, Ontario, Canada; ⁵ Alberta Health Services, , Calgary, Alberta, Canada; ⁶ Alberta Health Services, , Calgary, Alberta, Canada; ⁷ Alberta Health Services, , Calgary, Alberta, Canada; ⁸ Immunize Canada, , Ottawa, Ontario, Canada; ⁹ Department of Psychology, University of Guelph McMaster Children's Hospital, , Hamilton, Ontario, Canada; ¹⁰ Department of Pediatrics, Dalhousie University, , Halifax, Nova Scotia, Canada; ¹¹ Alberta Health Services, , Calgary, Alberta, Canada; ¹² Alberta Health Services, , Calgary, Alberta, Canada

Introduction/Aim: School-based immunizations are commonly associated with pain and fear. We implemented an evidence-based framework (CARD – Comfort, Ask, Relax, Distract) that educates students about how to cope with pain and fear. In this study, we compared the coping strategies used during immunization between male and female students.

Methods: This analysis is part of a large randomized cluster trial in Calgary, Alberta. Students in grade 6 or 9 from 50 participating schools were included. They were educated about CARD (i.e., coping strategies) before immunization day. On immunization day, nurses documented coping strategies used on a checklist.

Results: Altogether, 3324 students participated (50.2% female). Female students utilized verbal distraction (56% vs 50%, p<0.001), deep breathing (15% vs 10%, p<0.001), peer support (41% vs 18%, p<0.001), adult support (7% vs 5%, p=0.006), topical anesthetics (2% vs 1%, p<0.001), privacy (8% vs 4%, p<0.001) and lying down (2% vs 1%, p=0.008) more than male students. There was no difference in the use of external distractions (44% vs 42%, p=0.17) or muscle tension (2% vs 1%, p=0.19). Within the external distraction category, however, females used cell phones more frequently (18% vs 14%, p=0.005) and males used fidget spinners more frequently (9% vs 6%, p=0.002).

Discussion/Conclusions: Female students utilized more strategies across different coping categories. A variety of distraction items are recommended to address student’s preferences. More research is recommended to determine students’ satisfaction with chosen strategies.
Utilization of Clinical Informatics to Examine Opioid Analgesic Prescribing Trends in a Single Urban Emergency Department

Rubaiat Ahmed¹, Jemer Garrido², Sergey Motov³, Rukhsana Hossain⁴
¹ Maimonides Medical Center, Emergency Medicine, Brooklyn, New York, United States; ² Maimonides Medical Center, Brooklyn, New York, United States; ³ Maimonides Medical Center, Emergency Medicine, Brooklyn, New York, United States; ⁴ Maimonides Medical Center, Emergency Medicine, Brooklyn, New York, United States

Introduction/Aim: Pain is the most common reason for emergency department (ED) visits, making opioids a prevalent analgesic for ED pain management. We aim to examine our ED’s opioid prescribing practices using clinical informatics (CI) through a U.S. federal grant project on opioid reduction initiatives.

Methods: Unique data visualization dashboards were developed from queried data points of interest from electronic medical records across defined parameters concerning our ED’s opioid utilization. The data was then qualitatively analyzed to evaluate ED opioid prescribing.

Results: During a 12-month reporting period (01Dec2020 – 30Nov2021), 41% of all ED patient visits were for pain conditions, of which 81.6% received analgesics in the ED and at-discharge (D/C). Of those treated with analgesics, 24.3% received opioids compared to 75.7% receiving non-opioids in the ED and D/C. A daily average of 18.5 ED orders and 1.9 D/C prescriptions per 102.4 ED patient visits received opioids for the period. About 91% of all opioids prescribed were ordered in the ED. Intravenous (IV) morphine, morphine sulfate immediate release (MSIR) tablets, IV fentanyl, and oxycodone/acetaminophen, comprised 96.1% of total opioid ED orders. MSIR and oxycodone/acetaminophen comprised 84.3% of total opioid D/C prescriptions. Compared to other specialties within our institution, 2.0% of opioid D/C prescriptions are given by ED providers, compared to the national average of 4.8%.

Discussion/Conclusions: We accurately examined and assessed our ED’s opioid prescribing practices using CI through dashboard reporting. Such reporting tools identify performance indicators and prioritize data to enhance pain management and promote safe prescribing in the emergency setting.
Utilization of Clinical Informatics to Transform Emergency Department Data into a Simplified Reporting System to Highlight Emergency Department Analgesic Prescribing Practices

Rubaiat Ahmed¹, Jemer Garrido², Sarah Kabariti³, Jefferson Drapkin⁴, Rukhsana Hossain⁵, Antonios Likourezos⁶, Sergey Motov⁷

¹ Maimonides Medical Center, Emergency Medicine, Brooklyn, New York, United States; ² Maimonides Medical Center, Emergency Medicine, Brooklyn, New York, United States; ³ Maimonides Medical Center, Emergency Medicine, Brooklyn, New York, United States; ⁴ Maimonides Medical Center, Emergency Medicine, Brooklyn, New York, United States; ⁵ Maimonides Medical Center, Emergency Medicine, Brooklyn, New York, United States; ⁶ Maimonides Medical Center, Emergency Medicine, Brooklyn, New York, United States; ⁷ Maimonides Medical Center, Emergency Medicine, Brooklyn, New York, United States

Introduction/Aim: Clinical informatics (CI) enables the streamlined collection and sharing of data to improve care quality and produce positive outcomes. Based on executing a US federal grant project, establishing a simplified reporting system using CI to identify and assess analgesic prescribing practices in the ED.

Methods: Unique data visualization dashboards were developed from queried data points of interest from electronic medical records across defined parameters concerning our ED’s analgesic utilization. Analgesic practices were qualitatively analyzed to determine prescribing trends.

Results: From project inception in December 2020 till August 2021, 40.3% of all ED patient visits (N = 67,386) presented with pain conditions. 79.5% of all ED pain patient visits received medications for treatment. Of 21,615 ED patients treated for pain, 26.1% received opioids, while 73.9% received opioid alternatives, including non-pharmacological modalities. 90.5% of all opioids prescribed were in the ED, with intravenous morphine and morphine sulfate immediate release (MSIR) tablets accounting for 86.4% of ED dispensed opioids. With 9.5% of all opioids prescribed at discharge, MSIR dispensed 74.7% of the time. Hydrocodone, oxycodone, and tramadol usage to only 10-20% of the time, and hydromorphone to <1%. Of opioid alternatives, NSAIDs were utilized 55%, 25% with local anesthetics/ultrasound-guided nerve blocks, and 8% acetaminophen as the primary non-opioid categories prescribed by ED providers. Non-pharmacological analgesia included virtual reality and other modalities.

Discussion/Conclusions: We accurately examined our ED’s analgesic prescribing by using CI and dashboard reporting. Such reporting tools easily identify important performance indicators and prioritize data to enhance pain management practices in the emergency setting.
Orofacial Clinical Characteristics Among Different Chronic Temporomandibular Disorders (TMDs) Patient Clusters

Faez Saleh Al Hamed¹, Aurelio Alonso², Shad Smith³, Carolina Beraldo Meloto⁴

¹ McGill University, Faculty of Dentistry, McGill University, 2001 McGill College Avenue, Montreal, QC, H3A 1G1, Canada; ² Duke University, Department of Anesthesiology and Center for Translational Pain Medicine, Duke University, North Carolina, USA; ³ Duke University, Department of Anesthesiology and Center for Translational Pain Medicine, Duke University, North Carolina, USA; ⁴ McGill University, Faculty of Dentistry, McGill University, 2001 McGill College Avenue, Montreal, QC, H3A 1G1, Canada

Introduction/Aim: Painful temporomandibular disorders (TMDs) are the most common type of orofacial pain conditions. The community based OPPERA study identified clusters of individuals with gradually increasing pain sensitivity and depression, anxiety and somatic symptoms. These were named as the adaptive (A), pain sensitive (PS), and global symptoms (GS) clusters. Here we aim to describe and compare the clinical characteristics, and additional psychological symptoms, among TMD patients seeking care assigned to different clusters.

Methods: We enrolled 150 [A=65, PS=55, and GS=30] TMD patients seeking care with a specialist-rendered TMD diagnosis and who provided consent. One of two orofacial pain specialists annotated clinical data and validated surveys were used to assess psychological symptoms. Regression analysis was used to calculate odds-ratios (ORs; reference cluster: Adaptive) and 95% confidence intervals (CIs) (SPSS v27).

Results: Females and smokers had increased odds of being in the PS [OR(CI): 3.4(1.2 to 9.2)] and GS [4.8(1.6 to 14.1)] cluster, respectively. The report of increased number of joint, masticatory muscle and cervical muscle pain were associated with increased odds of being in the PS and GS clusters. Stress and pain intensity were associated with increased odds of being in the GS cluster [1.2(1.1 to 1.5) and 1.05(1.02 to 1.08), respectively].

Discussion/Conclusions: Individuals seeking TMD care display clinical and psychological symptoms that are in line with cluster assignment, with those in the A cluster displaying milder symptoms, those in the PS cluster being more sensitive to pain, and those in the GS cluster reporting most severe psychological symptoms.
**Trigeminal nerve morphogenesis and susceptibility to chronic painful temporomandibular disorders (TMD): a neuroimaging study**

Elnaz Alikarami¹, Mathieu Roy², Iacopo Cioffi³, Massieh Moayedi⁴, Carolina B. Meloto⁵

¹ McGill University, Faculty of Dentistry, Montreal, Quebec, Canada; ² McGill University, Department of Psychology, Montréal, Quebec, Canada; ³ University of Toronto, Faculty of Dentistry, Toronto, Ontario, Canada; ⁴ University of Toronto, Faculty of Dentistry, Toronto, Ontario, Canada; ⁵ McGill University, Faculty of Dentistry, Montreal, Quebec, Canada

**Introduction/Aim:** Introduction/aim: Painful temporomandibular disorders (TMD) affect the orofacial region innervated by the trigeminal nerve (CNV). Genome-wide based pathway analysis has identified ‘trigeminal nerve morphogenesis’ as the top pathway associated with TMD. Genes in these pathways have crucial roles in the morphogenesis of neural tissues. Abolishing their signaling during morphogenesis results in abnormalities of the CNV axons in animals. We hypothesize that these abnormalities affect somatosensory processing and make central sensitization easier to produce, which is a risk factor for TMD. Thus, we will investigate if there are differences in the trajectory and/or branching measures of the CNV between patients with or without TMD and if these measures correlate with different measures of somatosensory processing.

**Methods:** Methods: We will recruit 50 TMD patients (myalgia > 3 months) and 50 pain-free controls who will undergo neuroimaging (DTI) and the temporal summation, conditioned pain modulation and offset analgesia tests. We will use tractography to compare the CNV trajectory between groups, and submit it to Sholl analysis to compare the number of CNV branches between groups.

**Results:** Results: Our pilot data shows the CNVs of TMD patients display a different trajectory and display reduced central and peripheral CNV branching compared to controls.

**Discussion/Conclusions:** Conclusion: Our pilot findings show differences in the trajectory and branching of the CNV of TMD patients. Of note, pilot data is based on secondary use of DTI which original analysis has not revealed any group differences (PMID 23685183S). Thus, we have putatively developed a more sensitive metric of nerve abnormalities in TMD.
Deficit in inhibition within the anterior cingulate cortex in a model of chronic pain-induced depression

Johanna Alonso¹, Ipek Yalcin², Yves De Koninck³

¹ CERVO research center, Québec, Quebec, Canada; ² Institut des Neurosciences Cellulaires et Intégratives, Strasbourg, France; ³ CERVO research center, Québec, Quebec, Canada

Introduction/Aim: Chronic pain is often associated with major depression. The neural substrate of this comorbidity remains elusive. A key brain area implicated in both conditions is the anterior cingulate cortex (ACC). We previously reported neuronal hyperactivity in the ACC in a mouse model of chronic pain-induced depression (CPID) and that reducing this hyperactivity by optogenetic inhibition reverses the CPID phenotype (Sellmeijer et al J.Neurosci 2018). Here we tested the hypothesis that a deficit in inhibition within the ACC underlies this hyperactivity.

Methods: To achieve this, we used a male mouse model of neuropathic pain-induced depression (via sciatic nerve constriction). To assess inhibition in the ACC, we used a viral-mediated transduction of the light-sensitive actuator Channelrhodopsin 2 under the control of the mDlx promoter to selectively target GABAergic neurons. We exploited a fiber-optics-based micro-optrode that we previously designed for simultaneously single-cell recording and optogenetic stimulation (LeChasseur et al Nat.Methods 2011).

Results: When recording from identified GABAergic neurons in the ACC in vivo, we found that those cells failed to follow optogenetic activation at frequencies >10 Hz in CPID animals. To test whether this translated into failure of inhibition at high frequencies, we recorded from non-GABAergic cells and tested their response to optogenetic stimulation of neighbouring GABAergic cells. We found that in CPID animals inhibition was weaker at stimulations frequencies >10Hz.

Discussion/Conclusions: These results point to a failure of inhibition within the ACC as a potential substrate of CPID and that this may be due to a failure of inhibitory GABAergic interneurons to sustain high activity.
Patients' perspectives towards medical cannabis for chronic pain: a qualitative research study

Mahmood AminiLari1, Natasha Kithulegoda2, Patricia H Strachan3, James MacKillop4, Li Wang5, Samuel Neumark6, Sushmitha Pallapothu7, Jagmeet Sethi8, Ramesh Zacharias9, Allison Blain10, Lisa Patterson11, Jason Busse12

1 McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; 2 Women's College Hospital, Institute for Health System Solutions and Virtual Care, Toronto, Ontario, Canada; 3 McMaster University, Faculty of Health Sciences, Hamilton, Ontario, Canada; 4 McMaster University, Hamilton, Ontario, Canada; 5 McMaster University, Department of Anesthesia, Hamilton, Ontario, Canada; 6 McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; 7 McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; 8 McMaster University, Department of Medicine, Hamilton, Ontario, Canada; 9 McMaster University, Michael G. DeGroote Pain Clinic, Hamilton, Ontario, Canada; 10 McMaster University, Michael G. DeGroote Pain Clinic, Hamilton, Ontario, Canada; 11 McMaster University, Michael G. DeGroote Pain Clinic, Hamilton, Ontario, Canada; 12 McMaster University, Department of Health Research Methods, Evidence, and Impact; Department of Anesthesia; The Chronic Pain Centre of Excellence for Canadian Veterans; The Michael G. DeGroote Centre for Medicinal Cannabis Research., Hamilton, Ontario, Canada

Introduction/Aim: Although there is a growing interest in medical cannabis for chronic pain, little is known about patients’ perspectives. We explored perceptions of people living with chronic pain regarding benefits and concerns surrounding their use of medical cannabis.

Methods: In this qualitative descriptive study, we conducted semi-structured interviews with 13 people with chronic pain who used medical cannabis for managing pain. We selected our participants from a hospital-based clinic in Hamilton and two community-based interdisciplinary pain clinics in Burlington, Ontario, Canada. We used an inductive coding approach and thematic analysis, with data collection, coding, and analysis occurring concurrently.

Results: People living with chronic pain reported financial costs and stigma as important barriers to use of medical cannabis. Moreover, while many perceived important benefits associated with use of medical cannabis, including substitution for prescription medication, most patients also acknowledged harms, and there was considerable variability in patient experiences.

Discussion/Conclusions: Understanding patient perspectives on MC, its impact on complex pain, and the individual- and system-level barriers associated with its use are important considerations as policy and clinical programs for MC continue to be developed. Evidence-based guidance that incorporates patients’ values and preferences may be helpful to inform the role of medical cannabis in the management of chronic pain.
Correction Therapy Tool: Supporting Active Aging in Older Women Suffering From Arthritis

Nuha Aneez¹, Michelle Tieu², Kamila Kolpashnikova³, Shital Desai⁴
¹ York University, , Toronto, Ontario, Canada; ² York University, , Toronto, Ontario, Canada; ³ University of Oxford, Sociology, Oxford, N/A, United Kingdom; ⁴ York University, School of Arts, Media, Performance & Design, Toronto, Ontario, Canada

Introduction/Aim: Arthritis impacts women because of their exposure to high levels of psychological stress in their lives which translates into chronic joint pain when they age. Mediating spikes in their cortisol levels can help them combat arthritis during everyday activities. A correction therapy tool could help women with arthritis perform instrumental activities of daily living (IADLs) by regulating their physical activity from the limits determined by their cortisol levels.

Methods: We used People, Activities, Context, and Technologies (P.A.C.T) analysis and our lived experiences (auto-ethnographic method) to collect information on arthritis in older adults in literature to understand their needs and challenges. The Seven Dimensions of Wellness were used as a framework to identify how arthritis impacts the everyday lives of older adults with arthritis. The information obtained was grouped together using Affinity Diagrams to structure our design problem statement.

Results: The Affinity Analysis revealed that women face societal stressors including a burden of unpaid domestic work and a higher share of mental health challenges. This increases arthritis risk and pain levels when they age. Thus, we designed a correctional therapy tool that generates vibrational haptic feedback to encourage physical activity and mediate users’ cortisol levels while performing IADLs.

Discussion/Conclusions: Conclusion: Direct correlation between rising cortisol levels and worsening arthritis in research suggests that a correctional therapy device would help mitigate chronic pain in older women with arthritis. We will present the conceptual design of the tool which will be developed and evaluated with older women with arthritis.
The Canadian version of the National Institutes of Health minimum dataset for chronic low back pain research: Community-based reference values

Adriana Angarita-Fonseca¹, M. Gabrielle Pagé², Carolina B. Meloto³, Erika Lauren Gentile⁴, Guillaume Léonard⁵, Hugo-Massé Alarie⁶, Iulia Tufa⁷, Jean-Sébastien Roy⁸, Laura S. Stone⁹, Manon Choinière¹⁰, Maryse Fortin¹¹, Mathieu Roy¹², Monica Sean¹³, Pasca Tétreault¹⁴, Pierre Rainville¹⁵, Simon Deslauriers¹⁶, Anaïs Lacasse¹⁷

¹ Department of Health Sciences, Université du Québec en Abitibi-Témiscamingue (UQAT), Rouyn-Noranda, Quebec, Canada; ² Research Center of the Centre hospitalier de l’Université de Montréal, Université de Montréal, Montreal, Quebec, Canada; ³ Department of Anesthesiology and Pain Medicine, Montreal, Quebec, Canada; ⁴ Faculty of Dentistry and Alan Edwards Centre for Research on Pain, McGill University, Montreal, Quebec, Canada; ⁵ Research Center on Aging, CIUSSS de l’Estrie-CHUS; School of Rehabilitation, Faculty of Medicine and Health Sciences, Université de Sherbrooke, Sherbrooke, Quebec, Canada; ⁶ Faculty of Medicine, Université Laval & Centre for Interdisciplinary Research in Rehabilitation and Social Integration, Quebec City, Canada; ⁷ McGill University Health Center, Montreal, Quebec, Canada; ⁸ Faculty of Medicine, Université Laval & Centre for Interdisciplinary Research in Rehabilitation and Social Integration, Quebec City, Canada; ⁹ Faculty of Dentistry and Alan Edwards Centre for Research on Pain, McGill University, Montreal, Quebec, Canada; ¹⁰ Research Center of the Centre hospitalier de l’Université de Montréal, Université de Montréal, Montreal, Quebec, Canada; ¹¹ Concordia University, Montreal, Quebec, Canada; ¹² McGill University, Montreal, Quebec, Canada; ¹³ Research Center of the Centre Hospitalier Universitaire de Sherbrooke (CHUS) - Department of Anesthesiology, Université de Sherbrooke, Sherbrooke, Canada; ¹⁴ Research Center of the Centre Hospitalier Universitaire de Sherbrooke (CHUS) - Department of Anesthesiology, Université de Sherbrooke, Sherbrooke, Canada; ¹⁵ Department of Stomatology, Faculty of Dentistry, Université de Montréal, Montréal, Québec, Canada; ¹⁶ VITAM - Centre de recherche en santé durable, Centre intégré universitaire de santé et de services sociaux (CIUSSS) de la Capitale-Nationale, Québec, Canada; ¹⁷ Université du Québec en Abitibi-Témiscamingue (UQAT), Rouyn-Noranda, Quebec, Canada.

Introduction/Aim: The National Institutes of Health (NIH) minimum dataset for chronic low back pain (CLBP) research was developed to standardize measures and facilitate the comparison
across studies. Normative data for the Canadian version of the NIH minimum dataset have not been published yet. This study aimed to generate normative data for the Canadian version of the NIH minimum dataset, overall and stratified by gender identity, age groups and pain impact subgroups.

**Methods:** This cross-sectional analysis of data from the Quebec Low Back Pain Study included a community sample of 2938 adults living with CLBP (43.9 ± 11.1 years old, 48.7% females). Data collection was done using a web-based survey. Means, standard deviation, and floor and ceiling effects were calculated for the pain intensity, pain interference, physical function, emotional distress/depression, sleep disturbance, and pain impact stratification score domains.

**Results:** Males reported significantly better physical function, and lower scores in emotional distress/depression, sleep disturbance, and pain impact domains. Younger participants (18 to 29 years) obtained significantly lower scores in pain intensity, pain interference, physical function, and pain impact score compared with the remaining five age groups. The physical function domain had ceiling effects among younger participants, and the emotional distress/depression domain had floor effects among males and missing gender subgroups, all pain impact subgroups (mild, moderate, severe), and all six age subgroups.

**Discussion/Conclusions:** This study provides normative data for the Canadian version of the NIH minimum dataset in a community-based sample and recommendations that will support its interpretation.
An investigation into the differential expression of NMDA receptor subunits in the spinal dorsal horn across development, sex, and species

Jennifer Armstrong¹, Santina Temi², Annemarie Dedek³, Christopher Rudyk⁴, Eve C Tsai⁵, Michael E Hildebrand⁶

¹ Carleton University, Department of Neuroscience, Ottawa, Ontario, Canada; ² Carleton University, Department of Neuroscience, Ottawa, Ontario, Canada; ³ 1. Carleton University, 2. Ottawa Hospital Research Institute, 1. Department of Neuroscience, 2. Neuroscience Program, Ottawa, Ontario, Canada; ⁴ Carleton University, Department of Neuroscience, Ottawa, Ontario, Canada; ⁵ Ottawa Hospital Research Institute, Neuroscience Program, Ottawa, Ontario, Canada; ⁶ 1. Carleton University, 2. Ottawa Hospital Research Institute, 1. Department of Neuroscience, 2. Neuroscience Program, Ottawa, Ontario, Canada

Introduction/Aim: N-methyl-D-aspartate receptors (NMDARs) are excitatory glutamatergic receptors located in the dorsal horn of the spinal cord consisting of subunit variants GluN2A, GluN2B, and GluN2D. The relative expression of GluN2 subunits in the superficial dorsal horn (SDH) in pain processing pathways remains unknown, especially between sexes and in humans. We aimed to identify the relative NMDAR subunit expression in the SDH of adult male and female rats in lumbar spinal cord tissue and also investigated whether NMDAR subunit expression patterns are conserved in humans.

Methods: Immunohistochemical staining of male and female rat and human tissue was used in conjunction with antigen retrieval, which removes cross-linkages that mask receptor proteins at synaptic sites.

Results: We identified an enhanced GluN2B and GluN2D expression in the SDH of adult male and female rats, as seen in a previous study using juvenile rats; while GluN2A expression is localized to the SDH in adult rats, which differs from its diffuse expression across the dorsal horn in juveniles. This result suggests a developmental switch in GluN2A expression across late postnatal development. In addition, we have identified a preferential localization of GluN2A, GluN2B, and GluN2D to the lateral SDH, unlike the selective localization of GluN2B only to the medial SDH in juvenile male rodents. Finally, our preliminary results suggest that GluN2 NMDAR expression patterns in the dorsal horn are conserved across species in rat and human spinal tissue.

Discussion/Conclusions: NMDAR subunit distribution in dorsal horn pain processing circuits appears to be conserved across species and sex but diverges across postnatal development.
**Introduction/Aim:** Approximately one in four total knee replacement patients develop persistent pain; identification of those at higher risk could help inform optimal management.

**Methods:** We searched MEDLINE, EMBASE, CINAHL, AMED, SPORTDiscus and PsycINFO for observational studies that explored the association between risk factors and persistent pain (≥3 months) after total knee replacement. We pooled estimates of association for all independent variables reported by >1 study.

**Results:** Thirty studies (26,517 patients) reported the association of 148 independent variables with persistent pain after knee replacement. High certainty evidence demonstrated an increased risk of persistent pain with pain catastrophizing (absolute risk increase [ARI] 20%, 95% CI 11 to 28), younger age (ARI for every 10-year decrement from age 75, 3%, 95% CI 0.3 to 5), and moderate-to-severe acute post-operative pain (ARI 17%, 95% CI 13 to 19). Moderate certainty evidence suggested an association with female sex (ARI 4%, 95% CI 2 to 6) and moderate-to-severe pre-operative pain (ARI 18%, 95% CI 6 to 21). Studies did not adjust for peri-operative pain and pain catastrophizing, which are unlikely to be independent. High certainty evidence demonstrated no association with BMI or pre-surgery physical functioning. Moderate to low certainty evidence suggested no association with race, diabetes, bilateral or unilateral knee replacement pre-operative range of motion, ASA physical status classification, patellar resurfacing, or type of implant.
**Discussion/Conclusions:** Rigorously conducted observational studies are required to establish the relative importance of higher levels of peri-operative pain and pain catastrophizing in the development of persistent pain after knee replacement surgery.
Investigating factors related to greater intensity of phantom limb pain after lower limb amputation

Andrea Aternali¹, Sander L. Hitzig², Amanda L. Mayo³, Joel Katz⁴

¹ York University, Psychology, Toronto, Ontario, Canada; ² Sunnybrook Research Institute, St. John’s Rehab Research Program, Toronto, Ontario, Canada; ³ Sunnybrook Health Sciences Centre, Physical Medicine & Rehabilitation, Toronto, Ontario, Canada; ⁴ York University, Psychology, Toronto, Ontario, Canada

Introduction/Aim: Phantom limb pain (PLP) is a chronic condition that occurs in up to 85% of individuals with acquired limb loss, yet there is still no widely accepted treatment. More knowledge about the relationship between PLP and health-related factors may be helpful in developing interventions. The current study examined the relationship between PLP and phantom sensations, demographic information, and psychological factors.

Methods: Adults living with a lower limb amputation for at least three months were asked to complete online questionnaires (available at https://demo.phantomlimbs.ca/) requesting demographic information, average PLP intensity over the past week (0-10 numeric scale), and the presence of telescoping (yes/no). Participants also completed the IDentification Pain questionnaire (ID-Pain), Patient Health Questionnaire-4 (PHQ-4), Revised Life Orientation Test (LOT-R), Connor-Davidson Resilience Scale (CD-RISC2), and the Chronic Pain Acceptance Questionnaire 8 (CPAQ-8). Bivariate point biserial correlation coefficients were used to evaluate the data.

Results: Twenty-three individuals with limb loss (12 female, M age = 50.7 ± 9.7 years) participated in the study. Twenty participants reported PLP over the past week, where the average intensity was 4.7 ± 3.1. PLP intensity was not significantly correlated with any of the explored factors except for level of amputation, r(22) = -.46, p = .026.

Discussion/Conclusions: Our study demonstrated that PLP was a significant health issue for our limb loss sample. PLP intensity was not related to telescoping, demographic information, or psychological factors. In contrast to the current literature, higher PLP intensity was associated with lower level of amputation. A larger sample size is needed to confirm these findings.
Online Cognitive Behavioural Therapy for Depression Reduces Pain intensity in Youth: A Randomized Controlled Trial

Nazanin Babaei1, Sabina Mirza2, Kevin Dang3, Paul Ritvo4, Joel Katz5

1 York University, Kinesiology and Health Sciences, Richmondhill, Ontario, Canada; 2 University of Toronto, The Dalla Lana School of Public Health, Toronto, Ontario, Canada; 3 York University, Kinesiology and Health Sciences, Toronto, Ontario, Canada; 4 York University, Kinesiology and Health Sciences, Toronto, Ontario, Canada; 5 York University, Psychology, Toronto, Ontario, Canada

Introduction/Aim: Pain is not frequently measured in Randomized Controlled Trials (RCT) assessing Cognitive Behavioural Therapy (CBT) interventions for depression. This RCT of online CBT for major depression disorder (MDD) in youth (18-30 y) investigated the effect of online CBT on pain intensity as a secondary outcome.

Methods: All participants were diagnosed by a Centre for Addiction and Mental Health (CAMH) psychiatrist with MDD diagnosis confirmed with a MINI International Neuropsychiatric Interview. The Brief Pain Inventory (BPI) was administered to assess pain at baseline, 3-month, and a 6-month follow-up. Participants in the control group received standard psychiatric care (SC). Participants in the treatment group received standard care plus an additional intervention, consisting of a CBT online program (in collaboration with NexJ Health, Inc.). Exposure to and interaction with 24 online workbooks was combined with health coaching (duration of 24 total hours), delivered by phone and text message interactions.

Results: Relatively high levels of baseline pain intensity were found in both SC (1.55 ± 2.26) and treatment (1.89 ± 2.46) groups which did not significantly differ. At the 6-month follow up, pain intensity was significantly lower in the treatment group than the SC group (mean difference in BPI Score = −1.99, P = .03). Pain reduction, walking exercise (monitored by Fitbits), and changes in mindfulness (assessed with the Five Factor Mindfulness Questionnaire) were significantly correlated.

Discussion/Conclusions: Baseline findings and between group differences suggest pain assessment is important in RCTs aimed at reducing depression symptoms.
Is nocebo hyperalgesia induced by observational learning stronger than placebo hypoalgesia? Findings from a psychophysiological study

Julia Badzińska1, Elżbieta A Bajcar2, Mateusz T Wasylewski3, Stefanie H Meeuwis4, Daryna Rubanets5, Marianna Di Nardo6, Joanna Kłosowska7, Giuliana Mazzoni8, Przemysław Bąbel9

1 Jagiellonian University, Pain Research Group, Institute of Psychology, Kraków, Poland; 2 Jagiellonian University, Pain Research Group, Institute of Psychology, Kraków, Poland; 3 Jagiellonian University, Pain Research Group, Institute of Psychology, Kraków, Poland; 4 Jagiellonian University, Pain Research Group, Institute of Psychology, Kraków, Poland; 5 Jagiellonian University, Pain Research Group, Institute of Psychology, Kraków, Poland; 6 Sapienza University of Rome, Department of Dynamic, Clinical Psychology and Health, Rome, Italy; 7 Jagiellonian University, Pain Research Group, Institute of Psychology, Kraków, Poland; 8 Sapienza University of Rome, Department of Dynamic, Clinical Psychology and Health, Rome, Italy; 9 Jagiellonian University, Pain Research Group, Institute of Psychology, Kraków, Poland

Introduction/Aim: Observing treatment of pain in other people (i.e., observational learning; OL) may modulate pain by eliciting placebo effects. Alternatively, observing pain worsening may elicit nocebo effects. No study to date has systematically compared the magnitude of OL-induced placebo- versus nocebo effects in pain.

Methods: 105 healthy participants will be randomized to a 1) placebo, 2) nocebo, or 3) no-observation control group. Depending on group allocation, participants observe a male model experience hypoalgesia or hyperalgesia during the application of a sham cream on one arm. Pain is evoked experimentally on both arms using thermal heat stimuli at baseline and post-OL. Participants rate both expected and experienced pain. Also, galvanic skin responses (GSR) and heart rate (HR) are recorded during all pain stimuli.

Results: Data collection is underway, and results of the full sample including GSR and HR data will be presented during the conference. Meanwhile, preliminary analyses (n=63) showed that participants in the nocebo group expected more pain following OL (M±SD=6.19±1.9) than the placebo (2.8±1.4) and control (3.0±2.1) groups (both p<.001). A significant three-way interaction between group, treatment (cream/no cream), and phase (baseline/post-OL) revealed that OL influences pain (p=.005). Planned comparisons revealed no between-group difference in pain (all p ≥ .051). In the nocebo group exclusively, pain significantly increased from baseline (3.5±1.6) to post-OL (4.6±1.8) for the intervention arm, indicating hyperalgesia.

Discussion/Conclusions: So far, there is limited evidence for OL-induced hypoalgesia. Nocebo hyperalgesia was found in the preliminary analyses, which suggests that it is easier to induce nocebo than placebo effects by observational learning.
Characteristics of children with chronic pain referred to a tertiary complex pain clinic: Preliminary Analysis of Parent Reports from the Saskatchewan Pediatric Chronic Pain Registry study

Krista Baerg¹, Nigatu Geda²

¹ University of Saskatchewan, Pediatrics, Saskatoon, Saskatchewan, Canada; ² University of Saskatchewan, Pediatrics, Saskatoon, Saskatchewan, Canada

Introduction/Aim: Pediatric chronic pain has become a public health concern. The aim of this study is to characterize pediatric chronic pain (intensity, duration, zonation) and differentials across selected variables among youth presenting to an interdisciplinary pediatric complex pain clinic.

Methods: Data was drawn from the baseline survey prior to their first clinic visit as part of a prospective cohort study, the Saskatchewan Pediatric Chronic Pain Registry. Participants completed online questionnaires using REDCap. Fifty-four parents of children aged 8–18 years rated child pain intensity over the past 1-week and current pain (11-point Numerical Rating Scale). Two main outcome variables were functional disability inventory (FDI) and number of school days missed due pain.

Results: Musculoskeletal (27%), neuropathic (21.2%), and abdominal (21.9%) pain were the most common primary pain sites. More than two thirds of parents reported pain duration more than 12 months. Mean pain score was 5.55 (SD=2.2). For the majority of children (57.8%), the pain was always present (intensity varies); mean FDI score was 17.71 (SD=7.48). Mean number of school days missed due to pain was 8.86 (SD=9.01). The marginal means of the two outcome variables varied across selected maternal and child characteristics, including gender of the child, marital status of parents, duration of pain, child’s primary pain site, having chronic disease, mental health problem, developmental disability, family history of chronic pain, and preexisting disabilities.

Discussion/Conclusions: Given the unacceptably high pain-related functional disability and school absence, child and parental characteristics should inform pain assessment and treatment.
A scoping review: Indigenous experience of physical pain in Canada

Nicole G. Bailey1, Georgia Grenier2, Kenneth D. Craig3, John L.K. Kramer4

1 University of British Columbia, Medicine, Vancouver, British Columbia, Canada; 2 University of British Columbia, Kinesiology, Vancouver, British Columbia, Canada; 3 University of British Columbia, Psychology, Vancouver, British Columbia, Canada; 4 University of British Columbia, Anaesthesiology, Pharmacology, and Therapeutics, Vancouver, British Columbia, Canada

Introduction/Aim: Pain is a complex, subjective, and variable experience, shaped by a variety of factors including previous life events, ongoing ethnocultural circumstances, and the context in which pain occurs. The subjective and variable nature of pain invites ample opportunity for racial and ethnic inequalities in pain management. We conducted a scoping review focused broadly on pain in Indigenous peoples of Canada. A scoping review is useful for mapping thematic areas of literature and directing future research with Indigenous community partners.

Methods: In June 2021, 9 databases were searched. A total of 9,382 studies were located, with 8,220 remaining after duplicates removed. After abstract screening by N.B. and three separate research assistants (including G.G.), a total of 199 studies progressed to full text screening.

Results: 77 papers were included for analysis. From these papers, five themes emerged: pain measures/scales (n=6), pain expression and experiences (n=21), pain conditions (n=53), interventions (n=8), and pharmaceuticals (n=8). In many cases, a single paper was categorized within multiple themes, resulting in a total sum greater than n=77. The lack of research in pain measurement and scales (n=6) is discouraging considering the emerging perspective that Indigenous peoples in Canada perceive their pain as ignored, minimized, or disbelieved. Conclusions drawn from the pain expression and experiences theme also highlight a divide between pain expression in Indigenous peoples and pain assessment in medical professionals.

Discussion/Conclusions: Careful research examining the burdens of chronic pain, health determinants, and resource availability is required to better address the pain needs of Indigenous peoples.
The effects of child maltreatment on pediatric pain and pain assessments: An exploration of healthcare professionals' knowledge and practices

Matthew Baker¹, Sarah Campbell², Shanna Williams³

¹ McGill University, Educational and Counselling Psychology, Montreal, Quebec, Canada; ² McGill University, Educational and Counselling Psychology, Montreal, Quebec, Canada; ³ McGill University, Educational and Counselling Psychology, Montreal, Quebec, Canada

Introduction/Aim: When considering pain management of pediatric populations, children’s pain is often underestimated by healthcare professionals and maltreated children are at increased risk for mismanagement of pain. As a result, accurate assessments of pain are critical. The aim of the current study is to examine how healthcare professionals (HCPs) assess children’s pain and if they consider the effects of child maltreatment on children’s pain and pain communication.

Methods: A survey was distributed to examine HCPs’ (N = 86, n female = 68) current practices in assessment of pain in pediatric populations, with an emphasis on those with a history of maltreatment. Knowledge of pediatric pain was examined using an adapted version of the Pediatric Nurses’ Knowledge and Attitudes Survey Regarding Pain.

Results: HCPs’ mean overall pediatric pain knowledge accuracy score was 78% while their mean child maltreatment knowledge accuracy score was 79%. Overall pediatric pain knowledge and child maltreatment knowledge scores did not predict if HCPs considered a history of maltreatment when assessing pain or deciding on a pain management strategy. However, HCPs who considered a history of maltreatment when assessing chronic pain (t(61) = 2.87, p = .004) and deciding on a pain management strategy (t(8.55) = 3.33, p < .001) used non-suggestive supportive statements significantly more than HCPs who did not consider a history of maltreatment.

Discussion/Conclusions: The results provide a recent inventory of the methods HCPs use to ask children about their pain and contribute novel findings about whether HCPs consider that child maltreatment influences children’s pain and pain communication.
Spinal cord injury severity impacts pain, neuroinflammation, and gut dysbiosis

Courtney Ann Bannerman¹, Katya Douchant², Julia Paige Segal³, Mitra Knezic⁴, Alexandra E Mack⁵, Caitlin Lundell-Creagh⁶, Jaqueline R Silva⁷, Scott Duggan⁸, Prameet M Sheth⁹, Nader Ghasemlou¹⁰

¹ Queen's University, Biomedical and Molecular Sciences, Kingston, Ontario, Canada; ² Queen's University, Biomedical and Molecular Sciences, Division of Microbiology and Gastrointestinal Diseases Research Unit, Kingston, Ontario, Canada; ³ Queen's University, Biomedical and Molecular Sciences, Kingston, Ontario, Canada; ⁴ Queen's University, Biomedical and Molecular Sciences, Kingston, Ontario, Canada; ⁵ Queen's University, Biomedical and Molecular Sciences, Kingston, Ontario, Canada; ⁶ Queen's University, Biomedical and Molecular Sciences, Kingston, Ontario, Canada; ⁷ Queen's University, Biomedical and Molecular Sciences, Centre for Neuroscience Studies, Anesthesiology & Perioperative Medicine, Kingston, Ontario, Canada; ⁸ Queen's University, Anesthesiology & Perioperative Medicine, Kingston, Ontario, Canada; ⁹ Queen's University, Biomedical and Molecular Sciences, Division of Microbiology and Gastrointestinal Diseases Research Unit, Pathology and Molecular Medicine, Kingston, Ontario, Canada; ¹⁰ Queen's University, Biomedical and Molecular Sciences, Centre for Neuroscience Studies, Anesthesiology & Perioperative Medicine, Kingston, Ontario, Canada

Introduction/Aim: Chronic pain is a common complication experienced by those living with spinal cord injury (SCI) and leads to worsened quality of life. The pathophysiology of SCI pain is poorly understood, delaying the development of safe therapeutics. We sought to develop a clinically relevant model of SCI with a strong pain phenotype and characterize the central and peripheral pathology after injury. We also decided to investigate the gastrointestinal microbiome, as it has been shown to be altered in SCI patients and has been shown to play a role in immune system maturation and pain.

Methods: A contusion (50 kdyn) injury, with and without sustained compression (60 seconds) of the spinal cord, was carried out on female C57BL/6J mice, with sham injuries being used as controls.

Results: Mice with compression of the spinal cord exhibited significantly greater heat and mechanical hypersensitivity starting at 7 days post-injury, concomitant with reduced locomotor function, compared to those without compression. Immunohistochemical analysis of the spinal cord revealed significantly less myelin sparing and increased macrophage activation in mice with compression compared to those without. As measured by flow cytometry, immune cell infiltration and activation were significantly greater in the spinal cord (phagocytic myeloid cells and microglia) and dorsal root ganglia (Ly6C+ monocytes) following compression injury. We also found increased dysbiosis of the gastrointestinal microbiome in an injury severity–dependent manner.
**Discussion/Conclusions:** The use of this contusion-compression model of SCI may help advance the preclinical assessment of acute and chronic SCI pain and lead to a better understanding of the mechanisms underlying this pain.
Associations between trauma symptoms, brain white matter connectivity and pain symptomatology in youth

Neta Bar Am¹, Melanie Noel², Catherine Lebel³, Richelle Mychasiuk⁴, Daniel Kopala-Sibley⁵, Nivez Rasic⁶, Jillian Vinall Miller⁷

¹ University of Calgary, Anesthesiology, Perioperative & Pain Medicine, Calgary, Alberta, Canada; ² University of Calgary, Psychology, Calgary, Alberta, Canada; ³ University of Calgary, Radiology, Calgary, Alberta, Canada; ⁴ Monash University, Neuroscience, Melbourne, Australia; ⁵ University of Calgary, Psychiatry, Calgary, Alberta, Canada; ⁶ University of Calgary, Anesthesiology, Perioperative & Pain Medicine, Calgary, Alberta, Canada; ⁷ University of Calgary, Anesthesiology, Perioperative & Pain Medicine, Calgary, Alberta, Canada

Introduction/Aim: Chronic pain and post-traumatic stress symptoms (PTSS) are highly comorbid, and mutually maintaining, partially due to changes in brain connectivity involved in emotional processing (e.g., cingulum). However, it remains unclear whether PTSS leads to the development of chronic pain in youth. Therefore, we examined the relationship between PTSS, emotion regulation, cingulum connectivity, and the development of pain symptoms in youth.

Methods: 40 youth, ages 14 to 18 years underwent 3T MRI, heat and pressure pain threshold testing, and answered questionnaires regarding pain interference, PTSS and emotion regulation two times, approximately 3 months apart. DTI was acquired, and tractography was conducted to obtain mean fractional anisotropy (FA) values (index of white matter maturation) bilaterally from the cingulum. Generalized Estimating Equations were used to examine the relationships between PTSS, cingulum FA, pain interference and heat/pressure threshold, accounting for age, gender, chronic pain status, and emotion regulation.

Results: Higher PTSS and lower mean FA of the left and right cingulum were associated with higher pain interference (P<0.05). Higher PTSS was associated with higher pressure pain threshold (P<0.05), and lower mean FA of the right cingulum was associated with higher heat pain threshold (P<0.05).

Discussion/Conclusions: Consistent with our previous work, greater PTSS and lower cingulum connectivity increases both pain threshold and pain interference. PTSS-related avoidance and/or dissociative symptoms may lead to heightened acute pain tolerance. However, the chronic occurrence of these symptoms may lead to decreased cingulum connectivity and greater pain-related disability. Appropriate management of PTSS may prevent the development of chronic pain in youth.
Concurrent or Previous Pain Facilitates Chronification of Stress-Induced Mechanical Hypersensitivity in Mice

Jennet Baumbach¹, Loren Martin²

¹ University of Toronto, Psychology, Toronto, Ontario, Canada; ² University of Toronto, Psychology, Toronto, Ontario, Canada

Introduction/Aim: The purpose of these experiments was to investigate the effect of inflammatory pain on stress-induced mechanical hypersensitivity in mice.

Methods: We used CFA hindpaw injection as a model of inflammatory pain, which caused mechanical hypersensitivity for 3 days, and recovered within one-week post administration. Following CFA administration, mice were exposed to a synthetic predator-odor (TMT) to investigate behavioural fear responses and stress-induced mechanical hypersensitivity. We tested mice that were in actively in pain (1 day post-CFA) and mice that had recovered from pain (10 days post-CFA), and compared these data to pain-naïve control mice.

Results: CFA-injected mice exhibited enhanced unconditioned fear (freezing) to predator odor relative to pain-naïve controls. TMT exposure caused bilateral mechanical hypersensitivity in all groups, but pain-naïve mice returned to baseline paw withdrawal thresholds within 3 days post-exposure. In contrast, both CFA groups exhibited long-lasting (>30 days) mechanical hypersensitivity after TMT in both the injured and non-injured hindpaws. NSAID administration dose-dependently reversed TMT-induced hypersensitivity in both CFA groups, suggesting that CFA-primed mice experienced a state of chronic pain that persisted long after predator odor exposure.

Discussion/Conclusions: These findings indicate that chronification of stress-induced mechanical hypersensitivity is regulated by previous experience with pain. Since CFA injection either 1 or 10 days before TMT exposure induced a state of bilateral hypersensitivity, our findings suggest that inflammatory pain rapidly induces long-lasting centralized changes that support the acquisition of a chronic pain state. The findings also indicate that the centralized changes produced by CFA administration persist beyond the resolution of the injury.
Distribution of delta and mu opioid receptors in dorsal root ganglia

Claudie Beaulieu¹, Béatrice Quirion², Laurie Côté³, Jean-Luc Parent⁴, Louis Gendron⁵
¹ Université de Sherbrooke, Pharmacologie-Physiologie, Sherbrooke, Quebec, Canada; ² Université de Sherbrooke, Pharmacologie-Physiologie, Sherbrooke, Quebec, Canada; ³ Université de Sherbrooke, Pharmacologie-Physiologie, Sherbrooke, Quebec, Canada; ⁴ Université de Sherbrooke, Médecine, Sherbrooke, Quebec, Canada; ⁵ Université de Sherbrooke, Pharmacologie-Physiologie, Sherbrooke, Quebec, Canada

Introduction/Aim: Opioids are commonly used to alleviate moderate to severe pain. Clinically used opioids act via the mu opioid receptors (MOP), which also cause numerous unwanted effects such as respiratory depression and addiction. Interestingly, two other distinct receptors belong to the opioid receptors family, namely the delta (DOP) and the kappa opioid receptors (KOP). Our group more specifically investigates the DOP and its potential role in nociception. In the current study, we sought to describe the distribution of MOP and DOP in dorsal root ganglia (DRG) neurons in various species.

Methods: The distribution of DOP and MOP mRNA in the DRGs was studied using RNAscope in situ hybridization. The identity of the neurons expressing these receptors was determined using various markers (NF200, IB4) and RNAscope probes (P2X3, Tac1) for myelinated, non peptidergic and peptidergic neurons, respectively.

Results: Our results show that DOP mRNA is mainly expressed in NF200-positive, myelinated neurons in rat while it is preferentially expressed in P2X3-positive, small non peptidergic neurons in mouse and monkey. The MOP mRNA was found to be located in small peptidergic (Tac1-positive) and non peptidergic neurons in rat (IB4-positive) and mouse (P2X3-positive). In monkey, MOP mRNA was mostly seen in small peptidergic, Tac1-positive neurons. In all species, the coexpression of DOP and MOP preferentially observed in myelinated fibers.

Discussion/Conclusions: Therefore, we conclude that despite interspecies differences, DOP and MOP are both expressed in all neuronal types, where they likely participate in regulating nociception.
Healthcare provider knowledge, beliefs, and attitudes regarding opioids for chronic non-cancer pain in North America: A systematic review

Louise Bell¹, Sarah Fitzgerald², Joshua Rash³

¹ University of New Brunswick, Psychology, Fredericton, New Brunswick, Canada; ² Memorial University of Newfoundland, Psychology, St. John’s, Newfoundland & Labrador, Canada; ³ Memorial University of Newfoundland, Psychology, St. John's, Newfoundland & Labrador, Canada

Introduction/Aim: There is a close balance between benefits and harms when considering the use of opioids to manage chronic non-cancer pain (CNCP). The aim of the review is to identify empirically supported barriers and facilitators for prescribing opioids for CNCP through a systematic review of qualitative literature.

Methods: Six databases were searched from inception to June, 2019 for qualitative studies reporting on provider knowledge, attitudes, beliefs or practices pertaining to prescribing opioids for CNCP in North America. Data were extracted, risk of bias rated, and confidence in evidence graded using Cochrane Confidence in the Evidence from Reviews of Qualitative research (CERQual).

Results: Twenty-seven studies reporting data from 599 healthcare providers were included. Nine themes emerged about influences of clinical decision-making when prescribing opioids. Providers were more comfortable to prescribe opioids when: 1) patients were actively engaged in pain self-management; 2) clear institutional prescribing policies were present and prescription drug monitoring programs were used; 3) longstanding relationships and strong therapeutic alliance were present; and 4) presence of interprofessional supports. Factors that reduced likelihood of prescribing opioids included: 1) uncertainty towards subjectivity of pain and efficacy of opioids; 2) concern for the patient (e.g., adverse effects) and community (i.e., diversion); 3) Previous negative experiences (e.g., receiving threats); 4) difficulty enacting guidelines; and 5) organizational barriers (e.g., insufficient appointment durations and lengthy documentation).

Discussion/Conclusions: Understanding barriers and facilitators that influence opioid-prescribing practices offers insight into modifiable targets for interventions that can support providers in delivering care consistent with practice guidelines.
Modulating Pain through Expectations: Placebo and Nocebo Study in Children with and without Attention Deficit and/or Hyperactivity Disorder

Carmen-Édith Belleï-Rodriguez¹, Dominique Lorrain², Serge Marchand³, Guillaume Léonard⁴

¹ Université de Sherbrooke, Health Science Research, Sherbrooke, Quebec, Canada; ² Université de Sherbrooke, Psychology, Sherbrooke, Quebec, Canada; ³ Université de Sherbrooke / Lucine, Surgery, Sherbrooke / Bordeaux, France, Quebec, Canada; ⁴ Université de Sherbrooke, Readaptation, Sherbrooke, Quebec, Canada

Introduction/Aim: Attention deficit disorder with or without hyperactivity (ADHD) has significant negative consequences extending to medical and somesthetic levels. Children are highly influenced by placebo and nocebo effects, two factors known to influence medical treatments, including pain interventions. The aims of this study were (1) to compare the placebo/nocebo effect on pain between children with and without ADHD and (2) to characterize the association between placebo/nocebo effects and clinical manifestations including ADHD symptoms, anxiety, pain catastrophizing, and sleep problems.

Methods: The data was collected from 44 children with/without ADHD. Placebo/nocebo effects were induced using inactive pills that “increase” (placebo) or “reduce” (nocebo) pain. Experimental pain was evoked using a thermode (thermal stimulation) and recorded using a computerized visual analog scale. We also used (1) parent-reported sleep and ADHD symptoms questionnaires and (2) child-reported sleep, anxiety, and pain catastrophizing questionnaires.

Results: Placebo and nocebo treatments generated similar effects with no general difference between groups. State and trait anxiety were both negatively associated with placebo analgesia, and trait anxiety was positively associated with nocebo hyperalgesia. Finally, parent-reported sleep problems were associated with higher placebo analgesia (positive association).

Discussion/Conclusions: This study highlights the health professional’s power to modulate children pain perception and the importance of managing children’s expectations in a medical context. Their influence would be similar for children with or without ADHD and anxiety would be more important to consider than ADHD symptoms for treatments. It’s also an important symptom to consider for children with no diagnosis in the medical context.
When Informing Cause more Harm Then Good: Placebo and Nocebo Side Effects in Children with and without Attention Deficit and/or Hyperactivity Disorder

Carmen-Édith Belleï-Rodriguez¹, Dominique Lorrain², Serge Marchand³, Guillaume Léonard⁴

¹ Université de Sherbrooke, Health Science Research, Sherbrooke, Quebec, Canada; ² Université de Sherbrooke, Psychology, Sherbrooke, Quebec, Canada; ³ Université de Sherbrooke / Lucine, Surgery, Sherbrooke / Bordeaux, France, Quebec, Canada; ⁴ Université de Sherbrooke, Readaptation, Sherbrooke, Quebec, Canada

Introduction/Aim: ADHD children are more at risk to use ADHD and pain medication, which can have harmful side effects. Patients’ expectations influence treatments side effects. The study aims to compare side effects during a placebo/nocebo treatment on pain between children with and without ADHD and to characterize the association between side effects and ADHD symptoms.

Methods: The data was collected from 44 children, 22 with and 22 without ADHD) Placebo/nocebo effects were induced using inactive pills “increasing” (placebo) or “reducing” (nocebo) pain. Each condition was presented with specific side effects, measured with symptoms scales ranging from 0 to 10 (0 = no side effects; 10 = maximum imaginable intensity). Sleep and ADHD symptoms were measured with parent-reported questionnaires. Correlations, repeated measures ANOVA, and linear regression analysis methods were used.

Results: Children had more side effects during the nocebo treatment than the placebo treatment. A few differences were associated with specific ADHD symptoms: Sleep and learning impairments were associated with a higher influence of the treatment on side effects (more side effects with nocebo, fewer side effects with placebo), a reversed tendency in the presence of executive functioning impairment, and hyperactivity/impulsivity or defiance/aggression symptoms (fewer side effects with nocebo, more side effects with placebo.

Discussion/Conclusions: This study highlights the health professional’s influence in modulating children’s side effects symptoms and the importance of managing children’s expectations in a medical context, especially if there is sleep or learning impairment.
The role of control and strength of lumbopelvic muscles, and movement competency in musculoskeletal disorder episodes in dancers

Justine Benoit-Piau¹, Nathaly Gaudreault², Hugo Massé-Alarie³, Mélanie Morin⁴

¹ Université de Sherbrooke, Sherbrooke, Quebec, Canada; ² Université de Sherbrooke, Sherbrooke, Quebec, Canada; ³ Université Laval, Québec, Quebec, Canada; ⁴ Université de Sherbrooke, Sherbrooke, Quebec, Canada

Introduction/Aim: Dancers suffer from musculoskeletal disorder episodes (MDE), often to the lower limb and lower back. It is suggested that alterations in motor control or strength could be risk factors for MDE but few studies investigated this in dancers. We aimed to examine the role of lumbopelvic muscles control/strength and movement competency in whole body MDE and lower quadrant MDE (lower limb and low back).

Methods: This prospective cohort study evaluated dancers at the beginning of the season where voluntary transversus abdominis (TrA) activation (ultrasound imaging), hip strength (hand-held dynamometer) and movement competency (Movement Competency Screen (MCS)) were assessed. Dancers completed an online weekly diary during the season, which registered hours of dance and MDE.

Results: A total of 118 preprofessional and professional, ballet and contemporary dancers were recruited. Multivariate linear regressions found that TrA activation (b=0.289, p=0.001) and hip abductor strength (b=-0.245, p=0.006) could significantly explain 12.7% of whole body MDE, whereas those same variables (b=0.307, p=0.001 ; b=-0.252, p=0.004) could explain 14.7% of lower quadrant MDE.

Discussion/Conclusions: Our results suggest that dancers with higher hip abduction strength and with lower level of voluntary TrA activation at preseason had less MDE during the dance season. It is usually suggested that the ability to recruit voluntary the TrA is protective. This result may suggest that TrA overactivation in some dancers may be detrimental. This study agrees with the literature that higher hip abductor strength could be a protective factor for MDE. Finally, MCS was not associated with risk of of MDE during the season.
**Pain Now or Later? The Influence of Delay Discounting and Dread on Choices about Pain**

Taryn Berman¹, Mathieu Roy²

¹ McGill University, Psychology, Montreal, Quebec, Canada; ² McGill University, Psychology, Montreal, Quebec, Canada

**Introduction/Aim:** Accepting pain is counterintuitive, yet individuals willfully accept immediate discomfort to gain long-term health benefits (e.g., vaccines, exercise, and medical tests). Some people prefer immediate pain, to avoid the dread of anticipating painful experiences. Our study sought to investigate how pain is discounted across time, the brain mechanisms underlying the delay discounting of pain, and what causes these intertemporal differences.

**Methods:** Twenty-four healthy adults were recruited for this study. First, we performed a sensory calibration procedure to assess pain tolerance. Participants were presented with discrete electrical stimulations, which increased incrementally in intensity until pain tolerance was achieved. Following this, participants performed a delay discounting task in an MRI, wherein they selected between two choices which differed in pain intensity and delay.

**Results:** We performed a one-way repeated measures ANOVA to assess mean differences in choice preference across delays. We found a significant effect of delay on choice preference, F(3, 23) = 16.12, p < .001. Post-hoc comparisons using pairwise t-tests with Bonferroni correction showed that more painful immediate offers were accepted when delays were long (p < 0.01).

**Discussion/Conclusions:** Overall, our findings suggest that people would rather accept more pain than wait a month for less pain. Dread plays a larger role when waiting for longer, than shorter, delays. This demonstrates that everyone's preferences are not necessarily the less painful choice and other variables, such as temporal delay, are likely impacting their decisions. This study has important implications for interventions aimed to reduce detrimental biases that lead to added suffering and diminished rewards.
Introduction/Aim: To ensure safe opioid prescribing, it is essential that healthcare professionals are well trained. The objectives of this study were to evaluate the availability and quality of online continuing education modules on opioid management offered by associations of healthcare professionals in North America.

Methods: We identified associations of professionals prescribing opioids as well as those related to pain and public health at the national and provincial levels in Canada and at the national level in the United States using the Google search engine. Two reviewers then searched their websites from June to August 2021 for continuing education modules. We examined whether the modules were accessible without constraints, whether they addressed opioid management, and their content. We assessed the quality of the modules using the Web Resource Rating Tool, which contains three categories of criteria: quality of evidence, transparency, and usability.

Results: One hundred and forty-two Canadian and 64 American associations were identified. Fifty online training modules were found; 15 (30%) for Canada and 35 (70%) for the United States. Of these modules, only 4 (8%) were free or accessible without membership in Canada and the United States. These modules focused on the use of guidelines for prescribing opioids, safety considerations, and how to dose and taper opioids. The median quality score for the modules was 64/100 (range: 40 to 85), with the Royal College of Physicians and Surgeons of Canada module obtaining the highest score.

Discussion/Conclusions: There are limited free high quality online continuing education opportunities for healthcare professionals in North America.
The Relation Between Parent Mental Health and Child Chronic Pain: A Systematic Review and Meta-Analysis

Jaimie K Beveridge1, Melanie Noel2, Sabine Soltani3, Alexandra Neville4, Serena L Orr5, Sheri Madigan6, Kathryn A Birnie7

1 University of Calgary, Psychology, Calgary, Alberta, Canada; 2 University of Calgary, Psychology, Calgary, Alberta, Canada; 3 University of Calgary, Psychology, Calgary, Alberta, Canada; 4 University of Calgary, Psychology, Calgary, Alberta, Canada; 5 University of Calgary, Pediatrics, Calgary, Alberta, Canada; 6 University of Calgary, Psychology, Calgary, Alberta, Canada; 7 University of Calgary, Anesthesiology, Perioperative and Pain Medicine, Calgary, Alberta, Canada

Introduction/Aim: Research suggests that clinically-elevated mental health symptoms, including anxiety, depressive, and posttraumatic stress disorder (PTSD) symptoms, are prevalent among parents of children with chronic pain and related to poorer child functioning. A comprehensive review and synthesis of this literature has not been conducted. Thus, this study aims to provide estimates of the: (1) prevalence of clinically-elevated mental health (diagnosis or meeting clinical cut-offs for anxiety, depression, PTSD) among parents of children with chronic pain; and, (2) magnitude of associations between parent mental health (exposure) and child chronic pain (outcome; presence of chronic pain and/or chronic pain-related outcomes).

Methods: EMBASE, Medline, PsycINFO, CINAHL, and Web of Science were searched from inception to August 2021 using a strategy developed with a medical librarian.

Results: A total of 30,571 records were identified and 74 met inclusion criteria (4124 duplicates, 26,207 excluded during screening, 168 excluded during full-text review). Most included studies use clinical/case-control (79.7%) vs. population/community (20.3%) samples and cross-sectional (75.7%) vs. longitudinal (24.3%) designs. Preliminary analyses show variability across studies and that meta-analysis is warranted: 0-62% of parents report elevated anxiety, 0-48.2% report elevated depressive, and 3.5-20% report elevated PTSD symptoms. Associations between parent mental health and child chronic pain will be examined.

Discussion/Conclusions: Prevalence of clinically-elevated mental health symptoms vary across studies, likely due to differences in study populations, measurement of mental health, and study design. The majority of studies examining associations between parent mental health and child chronic pain are cross-sectional, hindering understanding of directionality. Further prospective research in this area is needed.
The role of the type of reinforcers and punishers in placebo analgesia induced by operant conditioning

Helena Bieniek¹, Przemysław Bąbel²

¹ Jagiellonian University, Institute of Psychology, Cracow, Poland; ² Jagiellonian University, Institute of Psychology, Cracow, Poland

Introduction/Aim: Placebo analgesia can be induced by operant conditioning. However, it has been proven so far in only one study. We aimed at replicating and extending the previous results by investigating the role of the type of reinforcers and punishers in placebo analgesia elicited by operant conditioning.

Methods: 150 healthy volunteers will be randomly assigned to 3 experimental groups that differ in the type of reinforcers and punishers: 1) verbal (words “Good!” or “Bad!”), 2) social (GIFs presenting the experimenter expressing approval or disapproval), 3) tokens (given or taken away), and 2 control groups. Participants receive heat pain stimuli of the same intensity (=5 on the NRS) individually calculated during calibration. After the pretest, in all the groups (expect for one control group) a placebo cream is applied. Then, participants in the experimental groups undergo a session of operant conditioning (they are rewarded for experiencing low pain and punished for experiencing high pain). Then, all the groups undergo testing. After every phase, expectancies about subsequent pain intensity are measured.

Results: Data collection is underway, and results of the full sample will be presented during the poster presentation. Preliminary analysis (n=86) showed that placebo analgesia was induced in all the experimental groups and that there was no difference in the magnitude of the effect induced by different types of reinforcers and punishers.

Discussion/Conclusions: The study broadens the knowledge on operant conditioning as a mechanism of placebo analgesia. Preliminary data suggest that all three types of rewards and punishers are effective in eliciting placebo analgesia.
The Role of the Observational Learning in Producing Non-Deceptive Placebo Hypoalgesia

Justyna Brączyk¹, Przemysław Bąbel²

¹ Jagiellonian University in Krakow, Kraków, Poland; ² Jagiellonian University in Krakow, Kraków, Poland

Introduction/Aim: Non-deceptive placebo (NDP) was proven to alleviate pain. So far, NDP effects have been successfully induced with the use of verbal suggestions or classical conditioning. The main aim of this study was to verify whether another learning process, i.e. observational learning, may reinforce the NDP effect induced by verbal suggestion.

Methods: The experiment consisted of four groups: 1) NDP induced by verbal suggestion and observational learning, 2) NDP induced by verbal suggestion alone, 3) deceptive placebo induced by observational learning, 4) control group. In pretest and posttest measurements, participants rated the intensity of applied pain stimuli on the NRS. During the manipulation phase, placebo cream was openly administered in groups 1 and 2. Moreover, participants in group 1 watched a model experiencing hypoalgesia after the cream application. In group 3, participants received a placebo cream with no information about its effect, then they watched the model.

Results: Data collection is ongoing, and results of the full sample will be presented during the conference. Preliminary analyses (n=84) showed that placebo hypoalgesia was found in all experimental groups (1-3) but not in the control group. However, the magnitude of evoked effects did not differ significantly between groups, regardless of the placebo induction method.

Discussion/Conclusions: The results show that a similar magnitude of the pain-alleviating effect may be obtained by both deceptive and non-deceptive placebo. Moreover, it seems that observational learning combined with verbal suggestion does not produce a stronger NDP effect than verbal suggestion alone.
Investigating the function of polymorphisms in APOE in chronic pain

Nicole Brown¹, Shannon Tansley², Alba Ureña Guzmán³, Marc Parisien⁴, Luda Diatchenko⁵, Arkady Khoutorsky⁶
¹ McGill University, Department of Anesthesia and Faculty of Dentistry, Montreal, Quebec, Canada; ² McGill University, Department of Anesthesia and Faculty of Dentistry, Montreal, Quebec, Canada; ³ McGill University, Department of Anesthesia and Faculty of Dentistry, Montréal, Quebec, Canada; ⁴ McGill University, Department of Anesthesia and Faculty of Dentistry, Montréal, Quebec, Canada; ⁵ McGill University, Department of Anesthesia and Faculty of Dentistry, Montréal, Quebec, Canada; ⁶ McGill University, Department of Anesthesia and Faculty of Dentistry, Alan Edwards Centre for Research on Pain, Montréal, Quebec, Canada

Introduction/Aim: Activation of microglia in the spinal cord following peripheral nerve injury is critical for the development of long-lasting pain hypersensitivity. Single-cell RNA sequencing of isolated microglia revealed that Apolipoprotein E (ApoE) is the top upregulated gene in spinal cord microglia at chronic time points after peripheral nerve injury in mice. APOE is a lipoprotein that is essential for the regulation of neuroimmune functions, synaptic activity, and aging. In humans, there are 3 different isoforms of APOE: APOE-ε2, APOE-ε3 and APOE-ε4. APOE-ε4 is the strongest genetic risk factor for the development of Alzheimer’s disease. Previously, we have shown that carriers with APOE-ε2 have significantly higher risk to develop chronic pain, whereas carriers of APOE-ε4 have lower risk to develop distinct chronic pain conditions.

Methods: To test the functional role of ApoE in chronic pain, we knocked out ApoE in microglia (using Apoe⁶/⁶ TMEM119CreERT2 mice) and subjected the mice to spared nerve injury (SNI), a peripheral nerve injury assay. The deletion of ApoE was confirmed using immunohistochemistry. To determine pain behaviors, mice were tested using von Frey, radiant paw withdrawal, and cold plate tests.

Results: Mice with ablation of ApoE in microglia exhibited changes in cold alldynia as compared to control animals. There were no differences in thermal and mechanical alldynia.

Discussion/Conclusions: Our results suggest that ApoE may play a role in the peripheral nerve injury-induced cold allodynia. Altogether, these studies might facilitate better diagnosis and treatment of individuals living with different chronic pain conditions.
Procedural pain in hospitalized infants - is there an improvement in practice over the past 20 years?

Mariana Bueno¹, Megha Rao², Shirine Riahi³, Carol McNair⁴, Denise Harrison⁵, Marsha Campbell-Yeo⁶, Bonnie Stevens⁷

¹ THE HOSPITAL FOR SICK CHILDREN, Toronto, Ontario, Canada; ² THE HOSPITAL FOR SICK CHILDREN, Toronto, Ontario, Canada; ³ THE HOSPITAL FOR SICK CHILDREN, Toronto, Ontario, Canada; ⁴ THE HOSPITAL FOR SICK CHILDREN, Toronto, Ontario, Canada; ⁵ University of Melbourne, Melbourne, Australia; ⁶ Dalhousie University & IWK Health Centre, Halifax, Nova Scotia, Canada; ⁷ THE HOSPITAL FOR SICK CHILDREN & University of Toronto, Toronto, Ontario, Canada

Introduction/Aim: Despite exponential research growth on effective pain-relieving strategies, it is unclear if these findings have been translated into fewer painful procedures and increased interventions to ameliorate procedural pain in infants. We aimed to identify the daily frequency of painful procedures and analgesic administration in Neonatal Intensive Care Units (NICUs) globally.

Methods: We conducted a scoping review including publications reporting the nature, frequency, incidence or prevalence of painful procedures and analgesia in hospitalized neonates. Studies that focused on postoperative pain were excluded. No restrictions on publication date or language were imposed.

Results: 16 studies from 2003-2021 were included. Sample sizes varied from 50-582 neonates. There was significant discrepancy in the definition of painful procedures (e.g., skin-breaking, non skin-breaking, stressful), the data collection period (e.g., per day of life or whole hospital stay), and the outcomes reported. Between 2003 and 2010, the median number of painful procedures/neonate/day was 9.0 (range 1.4-22.9) in 5 studies. The median reported frequency for delivering non-pharmacological and pharmacological analgesia for the procedures was 30%. From 2011 to 2021, the daily median of painful procedures/neonate was 5.4 (range 0.8-12.8) in 11 studies; the median reported frequency for delivering analgesia was 32.5%.

Discussion/Conclusions: Although there is a downward trend in the frequency of painful procedures performed in the NICU, the use of analgesia continues to be insufficient. Knowledge translation efforts are required to increase knowledge and change practices to decrease procedural pain in neonates and to improve the use of analgesia.
**Introduction/Aim:** Many primary care patients receive both medical and chiropractic care; however, interprofessional relations between physicians and chiropractors are often suboptimal which may adversely affect care of shared patients.

**Methods:** A 50-item survey administered to a random sample of Canadian family physicians in 2010, and again in 2019, that inquired about demographic variables, knowledge and use of chiropractic.

**Results:** Among eligible physicians, 251 of 685 in 2010 (37% response rate) and 162 of 2,429 in 2019 (7% response rate) provided a completed survey. Approximately half of respondents (48%) endorsed a positive impression of chiropractic, 27% were uncertain, and 25% held negative views. Most physicians believed that chiropractors provide effective therapy for some musculoskeletal complaints (84%) and disagreed that chiropractic care was beneficial for non-musculoskeletal conditions (77%). Most respondents (59%) also indicated that practice diversity among chiropractors presented a barrier to interprofessional collaboration. In our adjusted regression model, attitudes towards chiropractic showed trivial improvement from 2010 to 2019. More negative attitudes were associated with older age, belief that adverse events are common with chiropractic care and reported use of the research literature or medical school as sources of
knowledge on chiropractic. More positive attitudes were associated with endorsing a relationship with a specific chiropractor, family and friends, or personal treatment experience as sources of information regarding chiropractic.

**Discussion/Conclusions:** Although generally positive, Canadian family physicians’ attitudes towards chiropractic are diverse, and most physicians felt that practice diversity among chiropractors was a barrier to interprofessional collaboration.
Medical cannabis and cannabinoids for chronic pain: a clinical practice guideline

Jason Busse¹, Patrick Vankrunkselsven², Linan Zeng³, Anja Fog Heen⁴, Arnaud Merglen⁵, Fiona Campbell⁶, Lars Petter⁷, Bert Aertgeerts⁸, Rachelle Buchbinder⁹, Matteo Coen¹⁰, David Juurlink¹¹, Caroline Samer¹², Reed A Siemieniuk¹³, Namisha Kumar¹⁴, Lynn Cooper¹⁵, John Brown¹⁶, Lyubov Lytvyn¹⁷, Dena Zeraatkar¹⁸, Li Wang¹⁹, Gordon H Guyatt²⁰, Per O Vandvik²¹, Thomas Agoritsas²²

¹ McMaster University, Department of Health Research Methods, Evidence, and Impact; Department of Anesthesia; The Chronic Pain Centre of Excellence for Canadian Veterans; The Michael G. DeGroote Centre for Medicinal Cannabis Research, Hamilton, Ontario, Canada; ² Belgian Centre for Evidence Based Medicine (CEBAM), Leuven, Belgium; ³ West China Second University Hospital, Pharmacy Department/Evidence-based Pharmacy Center, Chengdu, China; ⁴ Lovisenberg Diaconal Hospital, Department of Medicine, Oslo, Norway; ⁵ University of Geneva, Division of General Pediatrics, University Hospitals of Geneva & Faculty of Medicine, Geneva, Switzerland; ⁶ University of Toronto, Anesthesiology and Pain Medicine, Toronto, Ontario, Canada; ⁷ Oslo University Hospital, Department of Pain Management and Research, Division of Emergencies and Critical Care, Oslo, Norway; ⁸ KU Leuven, Academic Centre for General Practice, Department of Public Health and Primary Care, Leuven, Belgium; ⁹ Monash University, Department of Epidemiology and Preventive Medicine, School of Public Health and Preventive Medicine, Melbourne, Australia; ¹⁰ Geneva University Hospital, Division of General Internal Medicine, Department of Medicine, Geneva, Switzerland; ¹¹ University of Toronto, Department of Medicine, Toronto, Ontario, Canada; ¹² Geneva University Hospitals, Division of Clinical Pharmacology and Toxicology, Geneva, Switzerland; ¹³ McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; ¹⁴ Indiana University School of Medicine, Indianapolis, Indiana, United States; ¹⁵ Canadian Injured Workers’ Alliance, Thunder Bay, Ontario, Canada; ¹⁶ Chronic Pain Centre of Excellence for Canadian Veterans, Dorchester, Ontario, Canada; ¹⁷ McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; ¹⁸ McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; ¹⁹ McMaster University, McMaster University, Hamilton, Ontario, Canada; ²⁰ McMaster University, Hamilton, Ontario, Canada; ²¹ Innlandet Hospital Trust, Department of Medicine, Gjøvik, Norway; ²² McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada

Introduction/Aim: Medical cannabis is increasingly used to manage chronic pain, particularly in jurisdictions that have enacted policies to reduce use of opioids; however, existing guideline recommendations are inconsistent.

Methods: An international guideline development panel including patients, clinicians with content expertise, and methodologists produced this guideline in adherence with standards for trustworthy guidelines using the GRADE approach. The MAGIC Evidence Ecosystem Foundation provided methodological support. The panel applied an individual patient perspective.
**Results:** Based on a series of systematic reviews, the panel was confident that non-inhaled medical cannabis or cannabinoids: (1) Result in a small increase in the proportion of people living with chronic pain experiencing an important improvement in pain and sleep quality (high and moderate certainty evidence, respectively); (2) Result in a very small increase in the proportion of people living with chronic pain experiencing an important improvement in physical function (high certainty evidence); (3) Do not improve emotional functioning, role functioning, or social functioning (high certainty evidence), and (4) Result in a small to very small increase in the proportion of people living with chronic pain experiencing cognitive impairment, vomiting, drowsiness, impaired attention, diarrhoea, and nausea, and a moderate increase in the proportion of individuals experiencing dizziness that increased with longer follow-up (GRADE moderate to high certainty evidence).

**Discussion/Conclusions:** The panel made a weak recommendation to offer a trial of non-inhaled medical cannabis or cannabinoids, in addition to standard care and management (if not sufficient to manage pain symptoms), for people living with chronic cancer or noncancer pain.
Selective targeting of NaV1.7 via inhibition of the CRMP2-Ubc9 interaction reduces pain in rodents

Song Cai¹, Aubin Moutal², Jie Yu³, Lindsey Chew⁴, Jörg Isensee⁵, Reena Chawla⁶, Kimberly Gomez⁷, Shizhen Luo⁸, Yuan Zhou⁹, Aude Chefdeville¹⁰, Cynthia Madura¹¹, Samantha Perez-Miller¹², Shreya Bellampalli¹³, Angie Dorame¹⁴, David Scott¹⁵, Liberty Francois-Moutal¹⁶, Zhiming Shan¹⁷, Taylor Woodward¹⁸, Vijay Gokhale¹⁹, Andrea Hohmann²⁰, Todd Vanderah²¹, Marcel Patek²², May Khanna²³, Tim Hucho²⁴; Rajesh Khanna²⁵

¹ University of Arizona, Pharmacology, College of Medicine, Tucson, Arizona, United States; ² University of Arizona, Pharmacology, College of Medicine, Tucson, Arizona, United States; ³ The University of Arizona, Pharmacology, College of Medicine, Tucson, Arizona, United States; ⁴ The University of Arizona, Pharmacology, College of Medicine, Tucson, Arizona, United States; ⁵ University Cologne, Department of Anesthesiology and Intensive Care Medicine, Cologne, Germany; ⁶ The University of Arizona, Tucson, Arizona, United States; ⁷ The University of Arizona, Tucson, Arizona, United States; ⁸ The University of Arizona, Tucson, Arizona, United States; ⁹ The University of Arizona, Tucson, Arizona, United States; ¹⁰ The University of Arizona, Tucson, Arizona, United States; ¹¹ The University of Arizona, Tucson, Arizona, United States; ¹² The University of Arizona, Tucson, Arizona, United States; ¹³ The University of Arizona, Tucson, Arizona, United States; ¹⁴ The University of Arizona, Tucson, Arizona, United States; ¹⁵ The University of Arizona, Tucson, Arizona, United States; ¹⁶ The University of Arizona, Tucson, Arizona, United States; ¹⁷ The University of Arizona, Tucson, Arizona, United States; ¹⁸ Indiana University, Indianapolis, Indiana, United States; ¹⁹ BIO5 Institute, The University of Arizona, BIO5 Institute, The University of Arizona, Tucson, Arizona, United States; ²⁰ Indiana University, Indianapolis, Indiana, United States; ²¹ The University of Arizona, Tucson, Arizona, United States; ²² Bright Rock Path LLC, Tucson, Arizona, United States; ²³ University Cologne, Cologne, Germany; ²⁴ New York University, Molecular Pathobiology, New York, New York, United States

Introduction/Aim: The voltage-gated sodium NaV1.7 channel, critical for sensing pain, has been actively targeted by drug developers; however, there are currently no effective and safe therapies targeting NaV1.7. Here, we tested whether a different approach, indirect NaV1.7 regulation, could have antinociceptive effects in preclinical models.

Methods: The research objects were Sprague Dawley rats and CRMP2K374A/K374A mice as well as cultured DRG cells from rats and mice. DRGs from Yucatan miniswine and humans were also used. Experiments were completed in multiple time periods in male and female mice and rats, ensuring that replication was observed. Western blotting, electrophysiology, fluorescence in situ hybridization (FISH), and immunohistochemical imaging data were reproduced in multiple rats/mice. Animals were assigned randomly to experimental and control groups.

Results: We found that preventing addition of small ubiquitin-like modifier (SUMO) on the NaV1.7-interacting cytosolic collapsin response mediator protein 2 (CRMP2) blocked NaV1.7 functions and had antinociceptive effects in rodents. In silico targeting of the SUMOylation site in CRMP2 (Lys374) identified >200 hits, of which compound 194 exhibited selective in vitro and ex vivo NaV1.7 engagement. Orally administered 194 was not only antinociceptive in
preclinical models of acute and chronic pain but also demonstrated synergy alongside other analgesics—without eliciting addiction, rewarding properties, or neurotoxicity. Analgesia conferred by 194 was opioid receptor dependent.

**Discussion/Conclusions:** Our results demonstrate that 194 is a first-in-class protein-protein inhibitor that capitalizes on CRMP2-NaV1.7 regulation to deliver safe analgesia in rodents.
Barriers and Facilitators to Parental Involvement in Healthy Newborns’ Pain Management: A Scoping Review

Ligyana Candido¹, Paula Forgeron², Nicole Pope³, Xaand Bancroft⁴, Janet Squires⁵, Wendy Peterson⁶, Denise Harrison⁷
¹ University of Ottawa, School of Nursing, Ottawa, Ontario, Canada; ² University of Ottawa, School of Nursing, Ottawa, Ontario, Canada; ³ The University of Melbourne, Nursing, Melbourne, N/A, Australia; ⁴ University of Ottawa, Ottawa, Ontario, Canada; ⁵ University of Ottawa, School of Nursing, Ottawa, Ontario, Canada; ⁶ University of Ottawa, School of Nursing, Ottawa, Ontario, Canada; ⁷ The University of Melbourne, Nursing, Melbourne, N/A, Australia

Introduction/Aim: To identify factors influencing parents’ involvement in healthy newborns’ pain management (NPM) for non-urgent painful procedures.

Methods: Guided by Arksey and O’Malley’s framework, a scoping review of peer-reviewed journals and grey literature was performed using 6 databases. Eligibility criteria were: primary studies of any methodology and language, and reporting factors hindering or facilitating parents’ involvement in healthy NPM. Factors were mapped to the Theoretical Domains Framework (TDF).

Results: Searches returned 10,055 unique titles/abstracts. Of these, 248 were screened at full-text, resulting in the inclusion of 14 studies. Health care providers (HCP) (N = 1622) participated in 11 studies. From the 614 parents included in 7 studies, 203 were reported as birthing mothers and 39 as partners. Studies described suboptimal practices, despite parents’ and HCPs’ intentions to use/advocate for analgesic strategies. Participants positively evaluated the use of parent-targeted interventions including breastfeeding, skin-to-skin care, and sweet solutions during painful procedures. Two studies evaluating the effectiveness of parent-targeted educational interventions on NPM practices found no improvement. Parental involvement facilitators comprised parents’ and HCPs’ knowledge, skills, positive beliefs about their capabilities and consequences of NPM, intentions to use/advocate for analgesic strategies, social influences, and environmental context and resources. Barriers were: parents’ and HCPs’ lack of knowledge; HCPs’ lack of skills, negative beliefs about their capabilities and consequences of NPM, social influences, and inadequate environmental context and resources.

Discussion/Conclusions: Parents’ involvement in NPM requires HCPs’ support. Investigating parents’ perspectives, particularly non-birthing parents, regarding additional factors influencing their participation in NPM is warranted to inform interventions.
Long-term exposure to morphine induces myelin changes in mice

Julia Canet-Pons¹, Wulin Teo², Sierra Stokes-Heck³, Peter Stys⁴, Tuan Trang⁵

¹ University of Calgary, Departments of Comparative Biology & Experimental Medicine and Physiology & Pharmacology, Calgary, Alberta, Canada; ² University of Calgary, Department of Clinical Neurosciences, Calgary, Alberta, Canada; ³ University of Calgary, Departments of Comparative Biology & Experimental Medicine and Physiology & Pharmacology, Calgary, Alberta, Canada; ⁴ University of Calgary, Department of Clinical Neurosciences, Calgary, Alberta, Canada; ⁵ University of Calgary, Departments of Comparative Biology & Experimental Medicine and Physiology & Pharmacology, Calgary, Alberta, Canada

Introduction/Aim: Morphine remains an important analgesic for pain management. Alterations in the white matter of chronic opioid users have been linked to myelin pathology and cognitive deficits. How opioid treatment affects myelin is not known. Here we analyze the myelin biochemical alterations and cellular changes in the corpus callosum of a long-term morphine exposure mouse model.

Methods: 8 week old male C57/B6J mice were injected twice daily with escalating dose of morphine or saline for 14 days. Development of morphine tolerance was followed with the tail immersion test. Brain tissue was collected and slices containing the corpus callosum were stained with DAPI, NG2 (OPC marker), and OLIG2 (pan-oligodendrocyte marker) to determine changes in these cell populations. Same region sections were stained with Nile red and the myelin index polarity was calculated based on spectral profiles changes.

Results: Myelin is predominantly composed of lipids (~80% w/w). Using Nile red, we determined the biochemical alterations and identified changes in the myelin index polarity of long-term morphine exposed mice. NG2 and OLIG2 quantifications did not reveal any significant variation of oligodendrocyte cell counts.

Discussion/Conclusions: These results suggest that long term morphine exposure leads to pathological myelin changes while the overall oligodendrocyte cell count is not altered. Myelin provides essential support to neuronal axons and it is crucial for their normal function. Understanding the changes in myelin and oligodendroglia due to long-term or chronic morphine treatment may provide important insights into the behavioral and cognitive alterations observed in opioid users.
A systematic review of the association between recovery expectations and return to work in individuals with musculoskeletal pain

Junie Carriere¹, Stephania Donayre Pimental², Sabine Bou-Saba³, Blake Boehme⁴, Marie-José Durand⁵, Marie-France Coutu⁶

¹ Université de Sherbrooke, École de réadaptation, Longueuil, Quebec, Canada; ² McGill University, Psychology, Montreal, Quebec, Canada; ³ Berlin University, Berlin, Germany; ⁴ University of Regina, Regina, Saskatchewan, Canada; ⁵ Université de Sherbrooke, École de réadaptation, Longueuil, Quebec, Canada; ⁶ Université de Sherbrooke, École de réadaptation, Longueuil, Quebec, Canada

Introduction/Aim: This systematic review aimed to synthesize the existing evidence of the association between recovery expectations and return to work in individuals with musculoskeletal pain conditions.

Methods: Following the PRISMA guidelines, relevant articles were selected by 2 independent reviewers from Embase, PsycINFO, PubMed, Cochrane and manual searches. Of 2,050 unique citations, 29 articles were included in our review.

Results: The studies in this systematic review included a total of 11701 individuals with musculoskeletal injuries, such as mixed etiology musculoskeletal pain, acute, sub-acute and chronic low back pain, lumbar disk herniation, whiplash injury and advanced osteoarthritis. Most studies were prospective with follow-ups ranging from 3 months to 4 years. Although most studies used single item, non-validated measures of expectations, a tentative conclusion could be drawn that positive/high recovery expectations are associated with return to work, and negative/low expectations are associated with non-return to work in individuals with musculoskeletal pain. However, the low certainty of the evidence cautions against interpreting this review as exclusively informative and highlights the need to improve methodology in the examination recovery expectations in the context of work disability.

Discussion/Conclusions: This systematic review summarizes existing evidence on the association between recovery expectations and return to work in individuals with musculoskeletal conditions. There is strong evidence that recovery expectations are associated with occupational outcomes such as return to work, duration of sick leave, time to fitness for work, time receiving wage replacements, working ability and working impairment. Implications and directions for future research are discussed.
Examining the relationship of caregiver pain with stress and burden among family caregivers of people living with dementia

Louise Castillo¹, Thomas Hadjistavropoulos²
¹ University of Regina, Psychology, Regina, Saskatchewan, Canada; ² University of Regina, Regina, Saskatchewan, Canada

Introduction/Aim: Pain is highly prevalent among older adults. In Canada, almost a quarter of older adults aged 65 and older is an informal caregiver of a family member-relative with a health condition. Family caregivers of people living with dementia (PLWD) experience higher levels of stress than caregivers of people who are not living with dementia. As such, it is important to examine the extent to which pain contributes to the strain experienced by family caregivers of PLWD. We aimed to explore the relationship between caregiver pain, caregiver stress, and caregiver burden.

Methods: Thirty family caregivers of community-dwelling PLWD completed a series of questionnaires that included questions about the extent to which pain interferes with their daily life, stress/burden, and overall health.

Results: Greater pain-related interference with daily responsibilities was associated with higher levels of stress, r = 0.40, p < 0.05, even after controlling for self-reported overall health. Moreover, pain interference made significant and independent unique contributions to the prediction of overall stress even after caregiver burden was controlled for.

Discussion/Conclusions: Our results suggest that caregiver pain contributes to caregiver stress over and above caregiver burden. Given that many caregivers of PLWD are older adults, and pain is often undertreated in this population, understanding the factors that contribute to caregiver stress, including undermanaged pain, is important for improving health outcomes in this population.
Mobilizing knowledge for pain in dementia through a science-digital media partnership: The #SeePainMoreClearly initiative

Louise Castillo¹, Thomas Hadjistavropoulos², Mary Brachaniec³, Christine Chambers⁴, Kelly Chessie⁵, Alec Couros⁶, Andre LeRuyet⁷, Charmayne LeRuyet⁸, Lilian Thorpe⁹, Jaime Williams¹⁰

¹ University of Regina, Regina, Saskatchewan, Canada; ² University of Regina, Regina, Saskatchewan, Canada; ³ Centre on Aging and Health, Moncton, New Brunswick, Canada; ⁴ Dalhousie University, Halifax, Nova Scotia, Canada; ⁵ Saskatchewan Health Authority, Regina, Saskatchewan, Canada; ⁶ University of Regina, Regina, Saskatchewan, Canada; ⁷ N/A, Regina, Saskatchewan, Canada; ⁸ N/A, Regina, Saskatchewan, Canada; ⁹ University of Saskatchewan, Regina, Saskatchewan, Canada; ¹⁰ University of Regina, Regina, Saskatchewan, Canada

Introduction/Aim: We previously demonstrated that social media is effective in raising awareness of the underassessment/undertreatment of pain in dementia. After a successful pilot campaign, we scaled up the #SeePainMoreClearly knowledge mobilization (KM) initiative, with the aid of a digital media partner, in the dissemination of relevant resources.

Methods: We summarized evidence-based information about pain in dementia and transformed it into engaging content (e.g., videos) tailored to the needs of various stakeholders (e.g., health professionals, families, policymakers). We disseminated information using Facebook, Twitter, YouTube, Instagram, and LinkedIn and measured the success of the initiative over a 12-month period (2020-2021). The initial evaluation focused on web analytics and questionnaires tied to our social media content.

Results: Over the course of the campaign, we circulated over 700 posts across all platforms. Web analytics showed that we were able to draw over 60,000 users from 82 countries to our resource website. Of the platforms used, Facebook was the most effective in reaching stakeholders with over 1,300,000 people having been reached via Facebook. Questionnaire responses from stakeholders were favourable. For example, 82% of respondents indicated that the information would allow them to better communicate with a health professional, while 77% of respondents indicated to have benefitted from the information.

Discussion/Conclusions: Unlike our previous work focusing primarily on Twitter and YouTube, in this investigation, we demonstrated success in directing stakeholders to a resource website with practical information that health professionals can use in patient care and self-care and management information for caregivers and people living with dementia.
Managing infant pain: Exploring relationships between parent psychopathology and stress on parent behaviours during early vaccination.

Sybil Chan¹, Cheryl Chow², Rebecca Pillai Riddell³

¹ York University, Toronto, Ontario, Canada; ² York University, Toronto, Ontario, Canada; ³ York University, Psychology, Toronto, Ontario, Canada

Introduction/Aim: Findings suggest that parent psychological factors (Badovinac et al., 2018) are related to distinct behavioural responses to infant pain. This exploratory study aims to understand how parent reports of psychological distress and parenting stress are related to specific coping-promoting and distress-promoting behaviours during infant immunizations.

Methods: Parent-infant dyads (n=184) were examined from the OUCH Cardio Cohort study during their 12-and-18-month videotaped routine vaccinations. Parental behaviours were coded using the Measure of Adult and Infant Soothing and Distress (MAISD; Cohen et al., 2005) in 5-second epochs at 1-minute pre-vaccination (baseline) and 1-and-2-minutes post-vaccination (reactivity and regulation). The Brief Symptom Inventory (BSI; Derogatis, 1993) and Parent Stress Index Short Form (PSI-4 SF; Abidin, 2012) were used to assess parent psychological distress and parenting stress. Bivariate correlations were run to explore relationships between clusters of MAISD distress-promoting (verbal reassurance) and coping-promoting (distraction and proximal-soothing) behaviours.

Results: Negative correlations between proximal-soothing behaviours, parent psychological distress, and parenting stress were found across all three phases. Distress-promoting behaviours were negatively correlated with parent psychological distress and parenting stress during needle reactivity and regulation. Distraction and parent psychopathology were positively correlated during regulation. Only small effect sizes were shown across all significant relationships (p< .05-p<.01).

Discussion/Conclusions: The overall patterns of significance across all correlation matrices and their small effect sizes suggest that self-reports of parent psychological distress and parenting stress are not substantially related. Alternative methodologies such as in-person interviews should be explored to understand the impact of parent psychological distress on effective pain management during pediatric immunizations.
Pharmacist experience with chronic pain management and opioid stewardship in team-based primary care in Ontario

Feng Chang¹, Hung Nguyen², Atta Abbas Naqvi³, Christoph Laeer⁴, Eric Lui⁵
¹ University of Waterloo, School of Pharmacy, Waterloo, Ontario, Canada; ² University of Waterloo, School of Pharmacy, Waterloo, Ontario, Canada; ³ University of Waterloo, School of Pharmacy, Waterloo, Ontario, Canada; ⁴ Family Health Teams: ESFCEO and Family First in Ottawa; Adjunct Clinical Professor, School of Pharmacy, University of Waterloo, Ottawa, Ontario, Canada; ⁵ North York Family Health Team, Toronto, Ontario, Canada

Introduction/Aim: Team-based primary care now serves nearly 25% of Ontarians. Pharmacists are an integral part of team-based care. This study examines team-based primary care pharmacist experiences in chronic pain management and opioid stewardship in Ontario.

Methods: Pharmacists working in team-based primary care settings across Ontario who participated in a provincial survey about clinical activities in chronic pain management and opioid stewardship (N=88) were invited to conduct a follow-up individual semi-structured interview. The interview explored pharmacist perspectives on their role, challenges and opportunities in team-based primary care.

Results: Participants (N=15) demonstrated understanding for patients with chronic pain and the need for a balanced approach in management. Their role centred around advising prescribers on treatment decision-making, providing education to patients and team members, harmonizing prescriber-patient relations, making referrals and advocating for change as appropriate. Perceived challenges included patient engagement, understanding prescriber expectations, limited training resulting in low confidence with certain tasks, and lack of an effective funding model leading to inadequate time spent with patients, negatively impacting quality of care. Participants expressed positive attitudes toward team-based collaborative practice and appreciated the interdependence of team members. Managing competing interests or clinical approaches with prescribers and patients was described as challenging.

Discussion/Conclusions: Team-based primary care pharmacists engage in a wide range of clinical activities supporting patients with chronic pain and team members. Team-based practice offers unique collaborative opportunities but also distinct challenges. Better understanding of this relative novel role can help optimize pharmacist contribution in this setting.
Conditioned Pain Modulation in Humans

Laila Chaudhry¹, Marc O Martel², Jeffrey Mogil³

¹ McGill University, Montreal, Quebec, Canada; ² McGill University, Montreal, Quebec, Canada; ³ McGill University, Montreal, Quebec, Canada

Introduction/Aim: Conditioned pain modulation (CPM) is a well-known phenomenon whereby pain in one location can inhibit pain in another. In a previously published mouse study from our lab (Tansley et al., 2019), we observed that the direction of pain modulation depends on test stimulus intensity, with higher-intensity stimuli leading to hypoalgesia and lower-intensity stimuli leading to hyperalgesia. The aim of this study was to see if we could replicate these findings in human subjects; to determine whether test stimulus intensity is associated with the amplitude and direction of CPM.

Methods: Participants (N=30) underwent an individual heat pain threshold (HPTh) assessment, followed by two counterbalanced CPM trials, at either 1°C or 3°C above their HPTh. Each CPM trial (separated by a 20-min rest period) consisted of two suprathreshold heat pain stimulations, a 30-s cold pressor test (4°C), and a final heat pain stimulation at the same original temperature, with visual (0-100 VAS) and verbal (11-point NRS) pain ratings throughout.

Results: A two-way repeated measures ANOVA was conducted to assess changes in pain ratings between pre-CPT and post-CPT across HPTh+1°C or HPTh+3°C trials. We observed p=0.04 for the interaction effect of time and trial, indicating significant changes in pain ratings after CPT between temperature trials. Significant hypoalgesia (i.e., CPM) was observed in the +3°C condition (x̄=-6.80), but not in the +1°C condition (x̄=-1.38).

Discussion/Conclusions: Although no hyperalgesia was observed, reduction of noxious test stimulus intensity was found to abolish CPM, just like our mouse findings. Future trials will investigate if even less-intense stimuli can produce hyperalgesia.
Exploring the pain experience of children affected by acute lymphoblastic leukemia and their parents

Sara Cho¹, Brianna Henry², Andrew Tran³, Jenny Duong⁴, Amanda Wurz⁵, Fiona Schulte⁶

¹ University of Calgary, Department of Oncology, Division of Psychosocial Oncology, Cumming School of Medicine, Calgary, Alberta, Canada; ² University of Calgary, Department of Psychology, Calgary, Alberta, Canada; ³ University of Calgary, Department of Psychology, Calgary, Alberta, Canada; ⁴ University of Calgary, Department of Psychology, Calgary, Alberta, Canada; ⁵ University of the Fraser Valley, School of Kinesiology, Fraser Valley, British Columbia, Canada; ⁶ University of Calgary, Department of Oncology, Division of Psychosocial Oncology, Cumming School of Medicine, Calgary, Alberta, Canada

Introduction/Aim: Acute lymphoblastic leukemia (ALL) is the most common childhood cancer. The disease and its treatments are associated with a range of negative side effects, including pain – which is prevalent and distressing. However, very few efforts have been made to understand pain in the context of cancer, which precludes efforts to identify strategies to mitigate and cope with this negative effect. This study aimed to explore children’s and their parents’ experiences with and perspectives of pain in the context of cancer.

Methods: Children and one of their parents were recruited through the Alberta Children’s Hospital and completed a demographic survey followed by semi-structured, one-on-one interviews. Demographic information was analyzed using descriptive statistics, and interviews were transcribed verbatim and analyzed using reflective thematic analysis at the level of the individual and dyad (i.e., child and parent).

Results: Children’s (N=19; MAGE=15.3 years) and their parents’ (n=19; Mage= 45.4 years) insights were captured across 4 overarching and overlapping themes: (1) Pain is multidimensional, (2) A range of strategies are needed to manage pain, (3) The cancer experience impacted how pain is viewed, (4) Healthcare providers, family, and friends influenced the pain experience.

Discussion/Conclusions: Findings from this study extend prior work, suggesting pain is common, distressing, and multidimensional. Results also highlight the number of ways children and their parents attempt to manage their pain and the factors influencing how they experience pain, including but not limited to, leaning on support from family and their healthcare team. Efforts are needed to address pain during cancer treatment and survivorship.
Presence of the gamma band in intensity matched comparison of contact heat - and laser evoked potentials

Cassandra M Choles¹, Oscar Ortiz², Lukas D Linde³, John L K Kramer⁴
¹ University of British Columbia, Department of Anesthesiology, Pharmacology and Therapeutics, Faculty of Medicine, Vancouver, British Columbia, Canada; ² International Collaboration on Repair Discoveries (ICORD),, Vancouver, British Columbia, Canada; ³ University of British Columbia, Department of Anesthesiology, Pharmacology and Therapeutics, Faculty of Medicine, Vancouver, British Columbia, Canada; ⁴ University of British Columbia, Department of Anesthesiology, Pharmacology and Therapeutics, Faculty of Medicine, Vancouver, British Columbia, Canada

Introduction/Aim: Among the numerous challenges facing pain management, substantial variability in pain reporting between individuals is forefront. Contact heat evoked potentials (CHEPs) and laser evoked potentials (LEPs), offer a potential solution to better characterize neurophysiological contributions of pain. Previous research has demonstrated that LEPs produced a faster and larger amplitude of somatosensory cortical waveforms in comparison to CHEPs, despite matched perceived pain. The gamma band frequency range (30 – 100 Hz) has been found to be reflective of pain perception after exposure to laser stimulation, whereas equally salient non-painful stimulus was not. Our hypothesis being that the same experienced pain (CHEPs and LEPs) would result in similar gamma band oscillations (GBOs) with no significant differences observed between intensity matched delivery of stimulus.

Methods: EEG data previously collected (PMID: 33767259) from 21 participants during separate experimental sessions of LEPs and CHEPs was analyzed in the time-frequency domain. Evoked GBOs over the contralateral somatosensory cortex were extracted.

Results: We observed significantly greater gamma band activity for LEPs compared to CHEPs (t(16) = -4.27, p < 0.01).

Discussion/Conclusions: This is indicative of greater activation in somatosensory cortices and pain processing regions following laser vs contact heat stimulation, despite the matched pain perception between stimuli. This demonstrates GBOs are influenced by the modality of pain, as well as pain intensity. To our knowledge, this is the first study to investigate the comparativeness of GBOs between LEPs and CHEPs. Further quantification of these pain modalities provide insight into differential pain processing and perception within the central nervous system.
Risk and Protective Factors in Predicting Pediatric Acute Postsurgical Pain: A Systematic Review and Meta-Analysis

Cheryl Chow¹, Christy Yu², Sheila Yu³, Klement Yeung⁴, Louis Schmidt⁵, Norman Buckley⁶

¹ McMaster University, Department of Psychology, Neuroscience & Behaviour; Institute for Pain Research & Care, Hamilton, Ontario, Canada; ² McMaster University, Bachelor of Health Sciences Program, Hamilton, Ontario, Canada; ³ McMaster University, Bachelor of Health Sciences Program, Hamilton, Ontario, Canada; ⁴ McMaster University, Michael G. DeGroote School of Medicine, Hamilton, Ontario, Canada; ⁵ McMaster University, Department of Psychology, Neuroscience & Behaviour, Hamilton, Ontario, Canada; ⁶ McMaster University, Department of Anesthesia, Hamilton, Ontario, Canada

Introduction/Aim: Acute postsurgical pain (APSP) is reported in most surgical pediatric patients, and a significant number continue to experience pain interfering with daily life activities. While several perioperative predictors of APSP have been identified, no quantitative review has examined these associations. Objective: To identify perioperative and psychosocial factors associated with APSP severity in pediatric patients undergoing surgery.

Methods: Databases were searched from inception to present. Studies that reported an association between risk or protective factors and acute pain in children, as measured by standardized effect sizes, were included. Reviewers independently read and extracted data on eligible studies, and assessed the quality of each study.

Results: Thirty-four studies (7484 participants) aged 1 to 18 years were included. Meta-analysis of 12 studies (1192 participants) revealed child preoperative pain ($r=0.52$; 95% CI 0.36-0.65), pain immediately after surgery ($r=0.45$; 95% CI 0.39-0.51), anticipated pain 54 ($r=0.28$; 95% CI 0.07-0.46), temperament ($r=0.27$; 95% CI 0.13-0.40), pain catastrophizing ($r=0.20$; 95% CI 0.07-0.32), age ($r=0.12$; 95% CI 0.04-0.19), preoperative anxiety ($r=0.15$; 95% CI 0.07-0.23), parent pain catastrophizing ($r=0.21$, 95% CI 0.06-0.36), and parent preoperative anxiety ($r=0.17$; 95% CI 0.00-0.33) were positively associated with APSP. Child pain coping efficacy ($r=–0.33$; 95% CI –0.49 to –0.14) was protective against APSP.

Discussion/Conclusions: We identified several modifiable child and parent psychosocial factors as predictors of APSP severity. Recognizing patients at risk for moderate to severe APSP enables early implementation of interventions to minimize pain burden. Interventions to enhance coping, an adaptive characteristic, may also help to reduce APSP.
Brain Efficiency and the Chronification of Headache in Youth

Karen L Cobos¹, Xiangyu Long², Catherine Lebel³, Nivez Rasic⁴, Melanie Noel⁵, Jillian Vinall Miller⁶

¹ University of Calgary, Anesthesiology, Perioperative & Pain Medicine, University of Calgary; Behaviour & The Developing Brain, Alberta Children's Hospital Research Institute; Brain and Mental Health, Hotchkiss Brain Institute; Vi Ridell Children's Pain & Rehabilitation Centre., Calgary, Alberta, Canada; ² University of Calgary, Behaviour & The Developing Brain, Alberta Children's Hospital Research Institute; Brain and Mental Health, Hotchkiss Brain Institute; Radiology, University of Calgary., Calgary, Alberta, Canada; ³ University of Calgary, Behaviour & The Developing Brain, Alberta Children's Hospital Research Institute; Brain and Mental Health, Hotchkiss Brain Institute; Radiology, University of Calgary., Calgary, Alberta, Canada; ⁴ University of Calgary, Anesthesiology, Perioperative & Pain Medicine, University of Calgary; Behaviour & The Developing Brain, Alberta Children's Hospital Research Institute; Vi Ridell Children's Pain & Rehabilitation Centre, Alberta Children's Hospital., Calgary, Alberta, Canada; ⁵ University of Calgary, Behaviour & The Developing Brain, Alberta Children's Hospital Research Institute; Brain and Mental Health, Hotchkiss Brain Institute; Psychology, University of Calgary; Vi Ridell Children's Pain & Rehabilitation Centre, Alberta Children's Hospital., Calgary, Alberta, Canada; ⁶ University of Calgary, Anesthesiology, Perioperative & Pain Medicine, University of Calgary; Behaviour & The Developing Brain, Alberta Children's Hospital Research Institute; Brain and Mental Health, Hotchkiss Brain Institute; Vi Ridell Children's Pain & Rehabilitation Centre., Calgary, Alberta, Canada

Introduction/Aim: Adults with chronic headache have altered global and local brain efficiency networks. Less is known about the mechanisms underlying chronic headache in youth. We examined whether youth with chronic headache have lower global and regional brain efficiency compared to controls.

Methods: Thirty youth with chronic headache (10-18yrs), and 30 healthy, age- and sex-matched controls underwent an MRI scan. Resting-state fMRI data was acquired. Youth reported on their headache attacks daily, for one-month, and self-reported PTSD, anxiety and depression using validated measures. GRETNA toolbox was used to perform comprehensive graph-based topological analyses of brain networks, rendering global and regional efficiency values. T-tests were used to compare global and regional efficiency metrics between patients and controls. Linear regression was used to examine significant efficiency metrics in relation to headache frequency in patients and controls, controlling for age, gender, PTSD, anxiety, and depression.

Results: Global brain efficiency did not significantly differ between groups. There were, however, regional global efficiency differences such that the hippocampus, insula, and pallidum were more efficient in patients versus controls (P<0.05). Hippocampal efficiency was positively associated with headache frequency in youth with chronic headache (P=0.04), but not controls.

Discussion/Conclusions: Youth with chronic headache demonstrated altered regional brain efficiency as compared to healthy controls. Greater hippocampal efficiency was associated with greater headache frequency in patients. Thus, greater regional efficiency may be associated with
dysfunction. The hippocampus is largely involved in memory formation and retrieval. This data supports previous findings demonstrating the importance of the hippocampus and pain memories for the chronification of pain.
Accessing mental health services by people living with chronic pain: A scoping review

Jennifer Cohen-Reyes¹, Marc O. Martel², Manuela Ferrari³, Michel Perreault⁴
¹ McGill, Psychiatry, Montreal, Quebec, Canada; ² McGill, Anesthesiology, Montreal, Quebec, Canada; ³ McGill, Psychiatry, Montreal, Quebec, Canada; ⁴ McGill, Psychiatry, Montreal, Quebec, Canada

Introduction/Aim: Chronic pain and mental health conditions commonly co-occur. Mental health services have shown benefits for these mental health conditions as well as for chronic pain. Nonetheless, the accessibility of mental health services is frequently limited. Given their potential benefits for people living with chronic pain (PLWCP), it is important to examine the proportion of those who have successfully obtained mental health services in order to assess their accessibility for this population. Therefore, a scoping review was conducted to identify the existing research reporting the proportion of PLWCP who have used mental health services or providers.

Methods: The PRISMA Extension for Scoping Reviews guidelines were followed. Databases Scopus, Ovid PsycInfo and Web of Science were searched for original articles published in the last 10 years.

Results: A broad search strategy allowed to locate 531 unique articles, from which 8 publications met the inclusion criteria. In most studies, approximately one-third or less PLWCP reported having used mental health services or providers at least once (M = 27%; 95% CI [3%-42%]), and, where reported, less than half of participant with a mental health problem used such services (10%-40%).

Discussion/Conclusions: Poorer mental health and higher socioeconomic status were found to predict mental health care use, whereas pain severity did not predict service use. Accessibility issues which may be related to chronic pain might be impacting mental health care use of this population. Further research is needed to elucidate access barriers for different type of mental health services including those to manage pain.
The Sociocultural Context of Adolescent Pain: The Portrayal of Teen Pain in Popular Media

Allison Cormier¹, Kendra Mueri², Maria Pavlova³, Abbie Jordan⁴, Melanie Noel⁵

¹ University of Calgary, Psychology, Calgary, Alberta, Canada; ² University of Calgary, Calgary, Alberta, Canada; ³ University of Calgary, Psychology, Calgary, Alberta, Canada; ⁴ University of Bath, Psychology, Bath, United Kingdom; ⁵ University of Calgary, Psychology, Calgary, Alberta, Canada

Introduction/Aim: Past literature has demonstrated that media consumption may play a role in the socialization of painful experiences. Research focusing on popular children’s media has revealed trends in media depictions of pain, including narrow and maladaptive portrayals of pain, and gender stereotypes, which may contribute to pain-related stigma. However, a gap in the literature remains when we consider the progression of pain depictions in adolescent media. The current study aimed to: 1) characterize pain instances in adolescent media; 2) assess observer responses to pain.

Methods: A cross-section of adolescent media was selected based on popularity, including ten movies and the first season of six TV shows. Pain instances were coded using two established observational coding schemes assessing sufferer pain characteristics and observer responses.

Results: Across 616 pain instances, violent pain was the most frequent (57%), followed by injuries (20%), everyday (21%), chronic-type (1%), and procedural pains (<1%). Males accounted for 77% of all pain instances and were hurt more severely (M = 2.20, SD = 0.91) than female sufferers (M = 1.98, SD = 0.94), t(614) = 2.47, p = .014. Observers to pain were frequently non-responsive, with 87% of observers displaying no prosocial responses to pain.

Discussion/Conclusions: These findings suggest that the types of pain commonly experienced by adolescents are underrepresented in adolescent media. Despite females reporting higher rates of pain problems than males, they are underrepresented as sufferers in popular media. Given the lack of prosocial responses from observers, adolescents could internalize concerning and unrealistic messages about pain, thus propagating its stigmatization.
Impact of Medical Cannabis on Recovery from Playing-Related Musculoskeletal Disorders (PRMD) in Musicians: An Observational Cohort Study

Kathryn Cottrell1, John Chong2

1 McMaster University, Family Medicine, Hamilton, Ontario, Canada; 2 McMaster University, Family Medicine, Hamilton, Ontario, Canada

Introduction/Aim: PRMD are musculoskeletal symptoms that interfere with the ability to play at the level a musician is accustomed to. This study explores the safety and impact of medical cannabis for PRMD on pain, mental-health, and sleep.

Methods: Participants (n = 204) completed questionnaires at baseline and six-months: the Musculoskeletal Pain Intensity and Interference Questionnaire for Musicians (MPIIQM), Depression, Anxiety and Stress Scale (DASS-21), and Pittsburgh Sleep Quality Index. Participants self-selected their group: non-cannabis users (n = 42), new medical cannabis users (n = 61), long-term medical cannabis users (n = 101). Data were analysed using paired t-tests for within group and ANOVA for between group differences.

Results: At six-months, there was no difference (p=.579) in cannabidiol dose between new (24.87 ± 12.86mg) and long-term users (21.48 ± 12.50mg). There was a difference in tetrahydrocannabinol dose (p=.003) between new (3.74 ± 4.22mg) and long-term users (4.41 ± 5.18mg). At six-months, non-cannabis (p=.022) and long-term cannabis users (p =.001) had improvement in DASS-21. New users had improvement in MPIIQM (p=.001). Change in pain intensity (MPIIQM40), was the only difference between groups, F(2, 201) = 3.845, p=0.023. This difference was between long-term (0.83 ± 0.79) and new users (- 2.61 ± 7.15). No serious adverse events occurred, a minority experienced tiredness, cough, and dry mouth.

Discussion/Conclusions: All groups improved in some domains at six-months. Between-group difference existed for new-users who experienced significant reduction in pain intensity at six-months. Findings are consistent with recent guidelines and known safety profile, making medical cannabis a potential treatment for PRMD.
Pharmacological Management of Non-Low Back Acute Musculoskeletal Pain: A Systematic Review and Network Meta-Analysis of Randomized Trials

Holly Crandon1, Behnam Sadeghirad2, Rachel Couban3, Elisabetta Trinari4, Fan Yang5, Laura Olejnik6, Wimonchat Tangamornsuksan7, Pariya Alinia8, Victoria Gloy9, Stefan Schandelmaier10, Jason Busse11

1 McMaster University, Michael G. DeGroote Institute for Pain Research and Care, Hamilton, Ontario, Canada; 2 McMaster University, Hamilton, Ontario, Canada; 3 McMaster University, Michael G. DeGroote Institute for Pain Research and Care, Hamilton, Ontario, Canada; 4 McMaster University, Department of Pediatrics, Hamilton, Ontario, Canada; 5 Sun Yet-sen University, Sun Yet-sen Memorial Hospital, Guangzhou, China; 6 McMaster University, Department of Medicine, Hamilton, Ontario, Canada; 7 McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; 8 Tehran University of Medical Sciences, Tehran, Iran; 9 University of Basel, Basel Institute for Clinical Epidemiology and Biostatistics, Basel, Switzerland; 10 University of Basel, Basel Institute for Clinical Epidemiology and Biostatistics, Basel, Switzerland; 11 McMaster University, Department of Health Research Methods, Evidence, and Impact; Department of Anesthesia; The Chronic Pain Centre of Excellence for Canadian Veterans; The Michael G. DeGroote Centre for Medicinal Cannabis Research., Hamilton, Ontario, Canada

Introduction/Aim: Acute pain is the most frequent cause for patient admission to emergency departments. We undertook a network meta-analysis (NMA) to determine the comparative effectiveness of pharmacological treatments for pain associated acute non-low back musculoskeletal injuries.

Methods: We searched MEDLINE, Embase, CINAHL, PEDro, and Cochrane CENTRAL for trials that enrolled patients presenting with acute pain from non-low back, musculoskeletal injuries. We performed a random-effects frequentist NMA for pain, function, treatment satisfaction, and adverse events.

Results: Fentanyl demonstrated the greatest reduction in pain within 2 hours of treatment (mean difference [MD] 4.06; 95% CI: 2.70 to 5.43) but was also associated with the greatest risk of gastrointestinal adverse events. Oral non-steroidal anti-inflammatory drugs (NSAIDs) demonstrated significant pain reduction within 1-7 days, with oral diclofenac demonstrating a MD of 1.23 (95% CI: 0.60 to 1.86) vs. placebo. Compared to placebo, topical formulations of NSAIDs demonstrated the greatest improvements in pain relief at 1-5 weeks, physical functioning, and treatment satisfaction. In particular, topical diclofenac showed the greatest effect in pain relief at 1-5 weeks (MD 1.21; 95% CI: 0.65 to 1.77). We are currently assessing the certainty of evidence to establish our confidence in these effects, which will be completed in time for the 2022 Canadian Pain Society Conference.

Discussion/Conclusions: Our findings suggest oral NSAIDs show greatest pain relief at 1-7 days after injury, and topical NSAIDs appear to provide the greatest improvement in pain,
function, and satisfaction. Our confidence in these findings will be dependent on the overall certainty of the evidence.
Performance comparison of different machine learning techniques using brain-based biomarker to predict chronic pain

Ronrick Da-ano¹, Matt Fillingim², Etienne Vachon-Presseau³

¹ McGill University, Faculty of Dentistry, Montréal, Quebec, Canada; ² McGill University, Faculty of Dentistry, Montréal, Quebec, Canada; ³ McGill University, Faculty of Dentistry, Montréal, Quebec, Canada

Introduction/Aim: Chronic pain studies are needed to demonstrate the potential value of brain-based biomarkers as a prognostic tool. However, previous studies’ validation and generalization of the markers were hindered due to the smaller sample sizes. Our goal was to develop and evaluate brain-based biomarker by applying machine learning (ML) to neuroimaging data in a large population cohort.

Methods: A resting state functional MRI (rsfMRI) data with pain status were obtained from UK BioBank (UKBB) dataset. The brain was parcellated utilizing an adjusted Brainetome atlas of 279 regions of interest after preprocessing. After splitting the data 67/33% in training and testing sets, models to predict chronic widespread pain were built using 4 ML pipelines: i) logistic regression (LR), ii) XGBoost (XGB), iii) LightGBM (GBM) and iv) Support Vector Machine (SVM). All 4 pipelines used either the functional connectivity matrix only or with relevant covariates. They were compared using Area Under the Curve (AUC) and accuracy (Acc).

Results: With and without relevant covariates, XGB, GBM, and SVM provided a consistent performance (AUC: 0.90, 0.96, 0.96, and Acc: 88%, 87%, 87%, respectively). On the other hand, LR provided a slight increase with relevant covariates in AUC (0.95 vs 0.94), but a decrease in Acc (0.87 vs 0.88). For both scenarios, no relevant covariates were selected as important features in all 4 ML algorithms.

Discussion/Conclusions: The 4 different ML pipelines were consistent in the performance of predictive brain-based biomarker models. This indicates that for whatever ML techniques used, these biomarkers can be used to predict chronic pain.
The role of cannabis in chronic pain treatment: Understanding patients' and pharmacists' perspectives through qualitative research

Lise Dassieu1, Emilie Paul-Savoie2, Elise Develay3, Ana Cecilia Villela Guilhon4, Anaïs Lacasse5, Line Guénette6, Kadija Perreault7, Hélène Beaudry8, Laurent Dupuis9

1 University of Montreal Hospital Research Centre (CRCHUM), Université de Montréal, Montreal, Quebec, Canada; 2 Université de Sherbrooke, Longueuil, Quebec, Canada; 3 University of Montreal Hospital Research Centre (CRCHUM), Montreal, Quebec, Canada; 4 Université de Sherbrooke, Longueuil, Quebec, Canada; 5 Université du Québec en Abitibi-Temiscamingue, Rouyn-Noranda, Quebec, Canada; 6 Université Laval, Quebec City, Quebec, Canada; 7 Centre interdisciplinaire de recherche en réadaptation et en intégration sociale (CIRRIS), Université Laval, Quebec City, Quebec, Canada; 8 Quebec Pain Research Network, Sherbrooke, Quebec, Canada; 9 Quebec Pain Research Network, Sherbrooke, Quebec, Canada

Introduction/Aim: The efficacy and safety of cannabis in the treatment of chronic pain (CP) are currently under debate due to insufficient evidence. In the context of the recent legalization of recreational cannabis in Canada, this study aimed to understand the perspectives and concerns of people living with CP and community pharmacists regarding cannabis in the treatment of CP.

Methods: This study is part of a larger qualitative project examining patients’ and pharmacists’ perspectives regarding the adverse effects of chronic pain pharmacotherapy in Quebec, Canada. Between July 2020 and February 2021, we conducted 12 online focus groups (FGs): six FGs with pharmacists (n=19), and six FGs with individuals living with CP for more than six months (n=26). Cannabis emerged as a central topic in the discussions.

Results: Several patients hoped that cannabis could eventually replace their other pain medications such as opioids or antidepressants. Others were concerned with the relative novelty of cannabis as a CP therapy. Pharmacists, for their part, reported challenges related to the extreme diversity of cannabis products, insufficient training, and scarce data on drug interactions. Several of them highlighted the benefits of legalization for fostering dialogue with patients.

Discussion/Conclusions: This study highlighted the hopes and uncertainties of patients and pharmacists regarding the use of cannabis in the treatment of CP. To support pharmacists’ practice and improve patients’ experience, it is urgent to develop research assessing the interactions of cannabis with other pain medications, as well as training interventions tailored to pharmacists’ needs, and evidence-based information for patients.
Analgesic efficacy of oral VTS-Aspirin/Ketamine combination for management of acute musculoskeletal pain in the Emergency Department - A Proof of Concept Pilot Study.

Ashley Davis¹, Catsim Fassassi², Daniel Dove³, Jefferson Drapkin⁴, Antonios Likourezos⁵, Ankit Gohel⁶, Patrizia Favale⁷, Rukhsana Butt⁸, Mahlaqa Butt⁹, Louis Gorges¹⁰, Sergey Motov¹¹

¹ Maimonides Medical Center, Brooklyn, New York, United States; ² Maimonides Medical Center, Brooklyn, New York, United States; ³ Maimonides Medical Center, Brooklyn, New York, United States; ⁴ Maimonides Medical Center, Brooklyn, New York, United States; ⁵ Maimonides Medical Center, Brooklyn, New York, United States; ⁶ Maimonides Medical Center, Brooklyn, New York, United States; ⁷ Maimonides Medical Center, Brooklyn, New York, United States; ⁸ Maimonides Medical Center, Brooklyn, New York, United States; ⁹ Maimonides Medical Center, Brooklyn, New York, United States; ¹⁰ Maimonides Medical Center, Brooklyn, New York, United States; ¹¹ Maimonides Medical Center, Brooklyn, New York, United States

Introduction/Aim: We aimed to assess the analgesic efficacy and safety of a combination of oral VTS-Aspirin® and Ketamine in managing acute musculoskeletal (MSK) pain in adult Emergency Department (ED) patients.

Methods: This was a prospective, proof-of-concept, single-arm, clinical trial evaluating the efficacy and safety of a single dose of oral VTS-Aspirin® and Ketamine in adult ED patients with acute moderate-to-severe MSK pain. The primary outcome included the difference in pain scores, on an 11-point numeric pain rating scale, at 60 minutes. Secondary outcomes included the need for rescue analgesia, the occurrence of adverse events at 60 minutes, and a change in pain scores at 120 minutes.

Results: We enrolled 25 patients to the study. The mean baseline pain score was 8.6 and the mean pain score at 60 minutes decreased to 4.8. The oral ketamine dose ranged from 24 mg to 50 mg with a mean dose of 37.8mg. No clinically concerning changes in vital signs were noted. No serious adverse events occurred in any of the subjects. All adverse effects were transient and weak in intensity.

Discussion/Conclusions: Our prospective proof-of-concept clinical trial describing the use of oral VTS-Aspirin® and Ketamine in adult patients presenting to the ED with acute MSK pain demonstrated that this analgesic combination resulted in clinically significant (greater than 1.3 points) pain relief in the 80% of enrolled subjects with short-lived adverse effects of weak intensity.
Improving the vaccination experience of residents in long-term care facilities: is there a role for topical anesthetics?

Adrian de Boer¹, Anna Taddio², Victoria Gudzak³, Charlotte Logeman⁴, Lucie Bucci⁵, Meghan McMurtry⁶, Noni MacDonald⁷

¹ University of Toronto, Leslie Dan Faculty of Pharmacy, Toronto, Ontario, Canada; ² University of Toronto, Leslie Dan Faculty of Pharmacy, Toronto, Ontario, Canada; ³ University of Toronto, Leslie Dan Faculty of Pharmacy, Toronto, Ontario, Canada; ⁴ University of Toronto, Leslie Dan Faculty of Pharmacy, Toronto, Ontario, Canada; ⁵ Immunize Canada, Selwyn, Ontario, Canada; ⁶ University of Guelph, Department of Psychology, Guelph, Ontario, Canada; ⁷ Dalhousie University, Department of Pediatrics, Halifax, Nova Scotia, Canada

Introduction/Aim: The most recent (2015) Clinical Practice Guideline on pain mitigation during vaccination identifies topical anesthetics (TA) as an effective pharmacologic intervention for use in individuals across the lifespan. The practices of long-term-care (LTC) facilities with respect to uptake of TA for improving comfort during vaccination of elderly residents has not been evaluated. Our aim was to determine the acceptability and feasibility of TA to mitigate pain during COVID-19 vaccinations in LTC facilities.

Methods: This analysis was part of a larger study aimed at improving residents’ vaccination experiences in three LTC facilities in rural Ontario. Care managers were provided resources/tools to support implementation. Six care managers participated in four semi-structured interviews to discuss TA implementation experiences. Inductive and deductive content analysis was used.

Results: One center used TA during the vaccine clinics. Internal factors affecting implementation acceptability and feasibility included required application time, number of immunizers, buy-in from key institutional leaders, and perceived importance of pain. External factors included time constraints imposed by public health staff who oversaw vaccination roll-out. Relative advantages of using TA included: reduced physical cues of distress/pain (shoulder tensing, anxious expression) and physical behaviours (slapping at needle/clinician) among non-verbal and cognitively impaired residents; and positive feedback from residents and caregivers.

Discussion/Conclusions: Acceptability of TA varied. There was high buy-in and plans for sustained use in the LTC facility that implemented TA. Feedback is recommended from residents and caregivers to communicate the value of comfort during vaccinations to further inform implementation efforts.
Pain inhibition induced by working memory is moderated by attention control capacity

Zoha Deldar¹, Todd Vogel², Maedeh Mostanadi¹, Mathieu Roy³, Mathieu Piche⁵
¹ McGill University, Department of Psychology, Montreal, Quebec, Canada; ² McGill University, Department of Psychology, Montreal, Quebec, Canada; ³ Universite du Quebec a Trois-Rivieres, Department of Anatomy, Trois-Rivieres, Quebec, Canada; ⁴ McGill University, Department of Psychology, Montreal, Quebec, Canada; ⁵ Universite du Quebec a Trois-Rivieres, Department of Anatomy, Trois-Rivieres, Quebec, Canada

Introduction/Aim: Previous studies have shown that pain may be inhibited by the execution of a cognitive task that involves the engagement of working memory (WM). These findings may contribute to the development of cognitive-based interventions for pain management. However, individual differences in attention control capacity may moderate the effectiveness of these interventions. Indeed, it has been suggested that WM performance is associated with attention control capacity. It remains unclear, however, if pain inhibition by WM is affected by attention control capacity. The aim of the present study was to examine if attention control capacity moderates pain inhibition by WM and whether this effect depends on WM load.

Methods: Seventy healthy volunteers performed the complex operation span task (4, 5, 6 items) with and without pain evoked by transcutaneous electrical stimulation, to probe load dependent pain inhibition by WM. They also performed the antisaccade task to measure attention control capacity.

Results: Pain was inhibited by WM engagement (p<0.001) but this effect was not load dependent (p=0.3). After controlling for attention control capacity (ANCOVA), pain inhibition by WM was no longer significant (p=0.3).

Discussion/Conclusions: These findings indicate that attention control capacity moderates pain inhibition by WM. This is consistent with the association between attention control and WM and should be taken into account in the design of cognitive-based interventions for pain management.
Influence of Psychosocial Factors on The Experience of Pain Synaesthesia

Harashdeep Deol¹, Loren Martin²

¹ University of Toronto Mississauga, Psychology, Mississauga, Ontario, Canada; ² University of Toronto Mississauga, Psychology, Mississauga, Ontario, Canada

Introduction/Aim: Pain synesthesia is an extreme form of empathy where an individual can personally feel the pain of another within their own body. This phenomenon has been noted in populations who have experienced physical trauma. Synesthetes typically experience pain in a pre-sensitized region of the body (i.e., a previously broken leg), when observing or imagining others in pain. However, the influence of psychosocial factors has not been explored in pain synesthesia.

Methods: Undergraduate students (N=137) were asked to complete a series of questionnaires to assess various psychosocial factors along with past pain experiences. Participants were then shown a series of photographs displaying right hands and feet in painful versus non-painful scenarios; They were asked to rate each image for perceived pain experienced by the scenario and whether the images triggered synesthetic pain.

Results: The results of the study support the notion that various aspects of empathy play a central role in the experience of pain synaesthesia, especially in participants with a previous injury. Many other psychosocial variables, generally attributed to increasing hypervigilance towards pain cues, were also identified as significant predictors of increased pain perception (e.g., own pain severity).

Discussion/Conclusions: The results suggest having a previous injury, may compel some to be more sensitive to the pain of others because of the merging in self-other perspectives causing synaesthesia for various types of pain. The focus on empathy in this study was utilized to highlight and tease apart the importance of empathy in the experience of pain synesthesia.
Practice of occupational therapists in family medicine groups for the management of chronic pain: a scoping review

Andréa Dépelteau¹, Catherine Hudon², Émilie Lagueux³

¹ Université de Sherbrooke, Sherbrooke, Quebec, Canada; ² Université de Sherbrooke, Sherbrooke, Quebec, Canada; ³ Université de Sherbrooke, Sherbrooke, Quebec, Canada

Introduction/Aim: Family Medicine Groups (FMG) offer interprofessional and integrated primary care to improve access and quality of care. Front-line care teams can benefit from the unique and complementary expertise of occupational therapists (OT) to improve patients’ functioning. However, occupational therapists are rarely part of FMGs’ team. It is thus important to synthetize the evidence currently available in the literature to promote their integration. The objective is to describe the current knowledge about the practice of OT in primary health care teams.

Methods: Study design: Scoping review. Article selection: French and English articles published before June 2021 were searched in 8 databases with keywords related to occupational therapy and primary care. To be included, studies had to: 1) document occupational therapy practice; 2) take place in primary care settings; and 3) use a scientific methodology. Studies were excluded if it was not possible to extract results related to OT only. Grey literature search included dissertations and theses.

Results: Initial search generated 4 049 references and after removing duplicates, 1619 articles were screened by reading titles and abstracts. Three hundred and seventy-seven articles are actually in screening following the inclusion and exclusion criteria. Next steps are to complete reading of full articles, to extract and synthesize the data of selected articles and, finally, present the results at the CPS annual meeting. OT practice will be presented in terms of roles, interventions, context, and population served.

Discussion/Conclusions: This study is an important step to describe the practice of OT in primary health care.
Examining the role of task difficulty and performance in distraction analgesia

Sophie Desjardins¹, Todd A Vogel², Mathieu Roy³

¹ McGill, Psychology, Montreal, Quebec, Canada; ² McGill, Psychology, Montreal, Quebec, Canada; ³ McGill, Psychology, Montreal, Quebec, Canada

Introduction/Aim: Distraction is a useful method to reduce acute pain. For instance, performing a demanding cognitive task can inhibit concurrent pain. Task difficulty has often been highlighted as an important factor in distraction analgesia, but its exact role remains unclear. Here, we sought to identify the optimal level of difficulty to achieve task analgesia.

Methods: Forty-five healthy young adults were recruited to participate in the study. We first performed calibration procedures to adjust the level of pain and the levels of difficulty for each participant. Following this, participants performed a demanding cognitive task at three levels of difficulty while receiving painful and non-painful thermal stimulations and subsequently rating them.

Results: We performed a one-way repeated measures ANOVA to assess mean differences in pain ratings at three different levels of difficulty. Additionally, we performed several multilevel mediation models to identify mediators of the relationship between task difficulty and pain ratings. Overall, we found that medium difficulty is most optimal to reduce concurrent pain and that this is largely mediated by how well participants are performing on the task.

Discussion/Conclusions: Our findings suggest that task difficulty plays a crucial role in distraction analgesia. More specifically, distraction analgesia is most effective when the task is neither too difficult nor too easy. This optimal difficulty creates a sense of flow whereby participants are completely immersed in the task and better able to ignore the pain.
Is chronic back pain different from fibromyalgia in pain and emotion?

Meenakshi Dev¹, Karim Mukhida², Javeria Ali Hashmi³
¹ Nova Scotia Health, Department of Anesthesia, Pain Management and Perioperative Medicine, Halifax, Nova Scotia, Canada; ² Nova Scotia Health, Dalhousie University, Department of Anesthesia, Pain Management and Perioperative Medicine, Halifax, Nova Scotia, Canada; ³ Nova Scotia Health, Dalhousie University, Department of Anesthesia, Pain Management and Perioperative Medicine, Halifax, Nova Scotia, Canada

Introduction/Aim: Chronic back pain (CBP) and fibromyalgia (FM) are common chronic pain (CP) conditions. It has been shown that different CP conditions have clinical distinctions and similarities in terms of patient experiences. In order to explore data-driven differences between CBP, FM, and healthy controls (HC), we compared these groups in three domains: CP characteristics, affect, and pain sensitivity.

Methods: CBP (n=59), FM (n=15) and HC (n=45) participants were compared for 1. clinical pain characteristics as revealed using the Neuropathic Pain Scale, Brief pain Inventory, Oswestry Disability Questionnaire; 2. affect, as revealed using the Pain Catastrophising Scale, State & Trait Anxiety Inventory, and Beck’s depression inventory; and 3. pain sensitivity, as revealed via three readings of heat pain threshold and heat pain tolerance tested using QST Lab.

Results: There were no significant differences in clinical pain characteristics between the groups. Anxiety and depression scores were significantly higher in the two CP groups than HC and were significantly higher in FM relative to CBP. Pain catastrophizing was lower in HC compared to both CP groups. Pain sensitivity showed significantly higher values for pain threshold and pain tolerance in CBP relative to both FM and HC.

Discussion/Conclusions: This exploratory study found that FM is similar to CBP in pain characteristics, but showed higher affect. Pain sensitivity was not different between FM and HC, but was significantly higher in CBP.
Comparison of Nebulized Ketamine at Three Different Dosing Regimens for Treating Acute and Chronic Painful Conditions in the Emergency Department: A Prospective, Randomized, Double-Blind Clinical Trial

Daniel Dove¹, Catsim Fassassi², Ashley Davis³, Jefferson Drapkin⁴, Mahlaqa Butt⁵, Rukhsana Hossain⁶, Sarah Kabariti⁷, Antonios Likourezos⁸, Ankit Gohel⁹, Patrizia Favale¹⁰, Michael Silver¹¹, John Marshall¹², Sergey Motov¹³

¹ Maimonides Medical Center, Brooklyn, New York, United States; ² Maimonides Medical Center, Brooklyn, New York, United States; ³ Maimonides Medical Center, Brooklyn, New York, United States; ⁴ Maimonides Medical Center, Brooklyn, New York, United States; ⁵ Maimonides Medical Center, Brooklyn, New York, United States; ⁶ Maimonides Medical Center, Brooklyn, New York, United States; ⁷ Maimonides Medical Center, Brooklyn, New York, United States; ⁸ Maimonides Medical Center, Brooklyn, New York, United States; ⁹ Maimonides Medical Center, Brooklyn, New York, United States; ¹⁰ Maimonides Medical Center, Brooklyn, New York, United States; ¹¹ Maimonides Medical Center, Brooklyn, New York, United States; ¹² Maimonides Medical Center, Brooklyn, New York, United States; ¹³ Maimonides Medical Center, Brooklyn, New York, United States

Introduction/Aim: Assess and compare the analgesic efficacy and rates of adverse effects of ketamine administered via breath-actuated nebulizer at three different dosing regimens for Emergency Department patients presenting with acute and chronic painful conditions.

Methods: This was a prospective, randomized, double-blinded trial comparing three doses of nebulized ketamine (0.75mg/kg, 1 mg/kg and 1.5 mg/kg) administered via breath-actuated nebulizer, in adult Emergency Department patients aged 18 years and older with moderate to severe acute and chronic pain. Primary outcome included the difference in pain scores between all three groups at 30 minutes. Secondary outcomes included a need for a second or third dose of ketamine, need for rescue analgesia, and adverse events in each group at 30 and 60 minutes.

Results: We enrolled 120 subjects (40 per group). Difference in mean pain scores at 30 minutes between the 0.75 mg/kg and 1 mg/kg groups was 0.25 (95% confidence interval [CI]: -1.28 to 1.78), between the 1 mg/kg and 1.5 mg/kg groups was -0.225 (95% CI: -1.76 to 1.31), and between the 0.75 mg/kg and 1.5 mg/kg groups was 0.025 (95% CI: -1.51 to 1.56). No clinically concerning changes in vital signs were observed. No serious adverse events occurred in any of the groups.

Discussion/Conclusions: Nebulized ketamine administered at the 1.5 mg/kg dose via breath-actuated nebulizer did not provide superior analgesia to nebulized ketamine at the 0.75 mg/kg and the 1 mg/kg for short-term treatment of moderate to severe pain in the Emergency Department and resulted in slightly higher rates of dizziness and fatigue.
Effectiveness of Cannabinoid-Based Medicines on chronic non-cancer pain: an analysis of pain mechanism and cannabinoid formulation

Michael Dworkind¹, Maria Fernanda Arboleda², Erin Prosk³, Lucile Rapin⁴, Charles Sun⁵, Alain Watier⁶

¹ Santé Cannabis, Montreal, Quebec, Canada; ² Santé Cannabis, Montreal, Quebec, Canada; ³ Santé Cannabis, Montreal, Quebec, Canada; ⁴ Santé Cannabis, Montreal, Quebec, Canada; ⁵ Santé Cannabis, Montreal, Quebec, Canada; ⁶ Santé Cannabis, Montreal, Quebec, Canada

Introduction/Aim: Chronic non-cancer pain (CNCP) is the most cited reason for using cannabinoid-based medicines (CBMs). Evidence remains low-quality and is limited primarily to inhaled delta-9-tetrahydrocannabinol (THC) for neuropathic pain; nevertheless, use of THC and other cannabinoids for nociceptive and mixed pain is increasing. This prospective study assessed the effectiveness of CBMs by pain mechanism and cannabinoid profile over a three-month period.

Methods: Participants were consenting adults with CNCP authorized to receive CBMs. Data was collected between July 2020 and July 2021. The Brief Pain Inventory - Short Form (BPI-SF) was used to measure effectiveness between baseline and 3-month follow up (FUP3M). Study approved by the McGill University Ethics Committee.

Results: 495 patients had complete data (mean = 56 years old; 67% women). Chronic pain syndromes were the most prevalent medical conditions followed by chronic spine and rheumatic disorders. 43.6% of patients had neuropathic, 41% nociceptive, 11.7% mixed and 3.6% undefined pain. Patients with nociceptive pain reported lower pain severity scores than neuropathic and mixed pain. Pain severity improved between baseline and FUP3M independent of pain mechanism or initial treatment cannabinoid profile. THC-dominant oral extracts were more frequently recommended for neuropathic and severe pain.

Discussion/Conclusions: This study provides novel contribution that CBMs are effective not only for neuropathic pain but also for nociceptive and mixed pain, in contrast with previous studies that cite insufficient evidence to recommend CBMs for other types of chronic pain. Future research on the role of cannabinoids in pain management must account for pain mechanism and must include detailed CBM composition.
Functional brain changes associated with improvements in functioning and mental health following intensive pain rehabilitation in youth.

Spencer Epp¹, Nivez Rasic², Melanie Noel³, Elodie Boudes⁴, Signe Bray⁵, Jillian Vinall Miller⁶

¹ University of Calgary, Anesthesiology, Perioperative & Pain Medicine, Calgary, Alberta, Canada; ² University of Calgary, Anesthesiology, Perioperative & Pain Medicine, Calgary, Alberta, Canada; ³ University of Calgary, Psychology, Calgary, Alberta, Canada; ⁴ University of Calgary, Pediatrics, Calgary, Alberta, Canada; ⁵ University of Calgary, Radiology, Calgary, Alberta, Canada; ⁶ University of Calgary, Anesthesiology, Perioperative & Pain Medicine, Calgary, Alberta, Canada

Introduction/Aim: The Intensive Pain Rehabilitation Program (IPRP) at the Alberta Children’s Hospital is a multidisciplinary, three-week, day-treatment program, which aims to improve function in youth with severe chronic pain. Little is known about how the brain changes following IPRP. We investigated brain responses to emotional stimuli from pre- to post-IPRP, and whether these changes were associated with improvements in functioning and mental health.

Methods: Twenty youth aged 14-18 years were scanned using fMRI, pre- and post-IPRP. During the fMRI, patients were presented with emotional stimuli (i.e., faces expressing happiness and fear) and neutral (i.e., scrambled) images. Patients also filled out questionnaires pre- and post-IPRP regarding their pain type, intensity, interference, catastrophizing, and post-traumatic stress symptoms (PTSS). Paired t-test were used to examine mean differences in brain activity in response to emotional versus neutral stimuli, pre- and post-IPRP. Data from significant brain regions were entered into linear mixed models to examine the relationships between brain activity and behavior pre- and post-IPRP, accounting for age, gender, pain type, pain intensity and time between scans.

Results: Patients demonstrated a decrease in middle frontal gyrus (MFG) activity in response to emotional versus neutral stimuli, between pre- and post-IPRP (P<0.05). Lower MFG activity was associated with lower pain interference, and PTSS pre- and post IPRP (P<0.05).

Discussion/Conclusions: IPRP was associated with decreases in MFG hyperactivation, in response to emotional stimuli. Decreases in MFG activity, a key area involved in attentional selection, were associated with improvements in functioning and mental health in youth with severe chronic pain.
Patient safety, tolerability, and perceptions of brain stimulation therapy in the treatment of severe pediatric chronic pain

Salma Farag¹, Elias Abou-Assaly², Spencer Epp¹, Nivez Rasic³, Frank P MacMaster⁴, Adam Kirton⁶, Catherine Lebel⁷, Laura Rayner⁸, Melanie Noel⁹, Jillian V Miller¹⁰

¹ University of Calgary, Neuroscience, Calgary, Alberta, Canada; ² University of Calgary, Calgary, Alberta, Canada; ³ University of Calgary, Calgary, Alberta, Canada; ⁴ University of Calgary, Calgary, Alberta, Canada; ⁵ University of Calgary, Calgary, Alberta, Canada; ⁶ University of Calgary, Calgary, Alberta, Canada; ⁷ University of Calgary, Calgary, Alberta, Canada; ⁸ University of Calgary, Calgary, Alberta, Canada; ⁹ University of Calgary, Calgary, Alberta, Canada; ¹⁰ University of Calgary, Calgary, Alberta, Canada

Introduction/Aim: Severe chronic pain (pain ≥3 months) impedes daily functioning. Alberta Children’s Hospital’s Intensive Pain Rehabilitation Program (IPRP) strives to restore affected youth’s normal functioning through interdisciplinary day-treatment. In October 2020, the IPRP added open-label repetitive transcranial magnetic stimulation (rTMS). We examined youth and parent perceptions of rTMS relative to other interventions, and recorded patient tolerability and adverse events. We hypothesized youth with severe chronic pain would consider rTMS tolerable, and families would perceive it as helpful, when combined with the standard IPRP.

Methods: Youth (n=6) aged 12-18 years (83% female) with severe chronic pain were included. rTMS was applied every weekday for three weeks to the left dorsolateral prefrontal cortex. Adverse events and tolerability were monitored using the Pediatric TMS Safety and Tolerability Measure on days 1, 6, and 11. Youth and parents ranked the three most and least helpful IPRP interventions pre- and post-IPRP and at 3-month follow-up.

Results: At baseline, youth predicted rTMS would be the most helpful IPRP intervention. At follow-up, youth and parents ranked rTMS 4th and 3rd most helpful, respectively. Pre- and post-rTMS, 33-50% of patients reported mild to moderate headaches and neck pain, compared to 17-33% by week three. One person experienced severe nausea and neck pain on day one, post-rTMS. Youth considered tolerability as favorable.

Discussion/Conclusions: Preliminary data revealed that despite high expectations, youth viewed rTMS less favorably, post-treatment. Similar to previous studies, symptoms decreased between treatment weeks one and three. More research is needed to elucidate rTMS’ safety and tolerability for severe pediatric chronic pain.
An improved conflict avoidance assay to investigate modality-specific nociception in freely moving mice.

Samuel Ferland¹, Francesco Ferrini², Yves De Koninck³

¹ Université Laval, Québec, Quebec, Canada; ² University of Torino, Torino, Italy; ³ Université Laval, Québec, Quebec, Canada

Introduction/Aim: Reflex-based approaches dominate preclinical pain research; however, these measures are far from describing the experience of pain patients and may explain the failure to translate preclinical findings into treatments. This has sparked efforts to develop operant assays relying on decision-making in rodents. To date, few of these methods can evaluate and compare sensitivity across nociceptive modalities. Our aim is to improve an existing operant assay (conflict avoidance) to evaluate and compare modality-specific sensitivity in mice.

Methods: The apparatus is composed of a lit and a dark chamber linked by a corridor where stimuli are presented. Mice naturally avoid light, but they must cross the nociceptive stimulus to escape it and move to the dark chamber. The testing protocol consisted of five days: acclimatation, training and three testing days where mice were presented over five trials with mechanical, cold and heat stimuli of ascending intensity. The latency to escape from the lit chamber, the time spent in the dark chamber and the crossing speed were measured from videos of each trial.

Results: We improved the existing assay by validating the aversiveness of the lit chamber and its effect on training performances in mice of both sexes. We found that, in these conditions, time spent in the dark chamber scales with stimulus intensity for all modalities tested (n=16).

Discussion/Conclusions: Our results show that the conflict avoidance assay is a promising new method to evaluate modality-specific sensitivity. This method will be used to compare how neuropathy alters modality-specific pain and to compare how different analgesics perform.
Connectome Alterations in Individuals with Widespread Chronic Pain: A Graph Theoretical Approach

Matt Fillingim\(^1\), Christophe Tanguay-Sabourin\(^2\), Gianluca Guglietti\(^3\), Azin Zare\(^4\), Etienne Vachon-Presseau\(^5\)

\(^1\)Mcgill, Neuroscience, Montreal, Quebec, Canada; \(^2\)Mcgill, Montreal, Quebec, Canada; \(^3\)Mcgill, Dentistry, Montreal, Quebec, Canada; \(^4\)Mcgill, Dentistry, Montreal, Quebec, Canada; \(^5\)Mcgill, Montreal, Quebec, Canada

**Introduction/Aim:** This study applied graph theoretical analysis and multivariate machine learning on resting-state functional connectivity data from the UKBiobank (UKBB, n=452) data set to reveal alterations in brain network integrity among individuals reporting widespread chronic pain and train a machine learning model to distinguish people without pain from people reporting widespread chronic pain.

**Methods:** A widespread chronic pain group (WCP) was derived from a UKBB sample (n=20,000) by selecting only individuals reporting 5 or more pain sites for > 3 months. Various graph theoretical metrics were extracted from subject’s rsfMRI connectome and analyzed. Machine learning pipelines were applied to graph theoretical and neurophysiological brain features of WCP (n=226) and healthy controls (n=226).

**Results:** The WCP group displayed a Degree Disruption Index (k\(_D\)) of \(r=-0.23, p=0.007\), HC group \(r=0.04, p=NS\), with nodes of the default mode network and ventral attention network especially disrupted. The WCP group also exhibited an altered rich-club organization compared to the HC group. A gradient boosting decision tree classifier trained on graph theory and functional connectivity metrics was able to discriminate between the groups (AUC=0.63).

**Discussion/Conclusions:** The graph theory findings indicate that individuals with WCP have altered network integrity, most likely seen as maladaptive integration among pain-related brain networks. The classifier reports well-above chance ability to discriminate healthy controls from individuals with multiple sites of chronic pain. The derived classifier will next be tested in an independent dataset, OpenPain, to assess its generalizability as a biomarker.
A gender inclusive exploration of the relationships between disease activity and sexual wellbeing among individuals with inflammatory bowel disease

Katherine Fretz\textsuperscript{1}, Dean Tripp\textsuperscript{2}

\textsuperscript{1} Queen's University, Psychology, Kingston, Ontario, Canada; \textsuperscript{2} Queen's University, Psychology, Anesthesiology, & Urology, Kingston, Ontario, Canada

**Introduction/Aim:** Inflammatory bowel disease (IBD) is a chronic health condition that often impairs individuals’ wellbeing. Sexuality is an area of wellbeing in IBD that is not well understood. The limited research suggests that sexual functioning is related to biopsychosocial sequelae of IBD such as disease activity (e.g., pain, gastrointestinal symptoms). Current research lacks the use of inclusive measures of sexual functioning. In the present study, we aimed to test the utility of an adapted, inclusive measure of sexual functioning in IBD patients. Second, we aimed to examine the relationships among this adapted tool, other measures sexual wellbeing, and IBD disease activity.

**Methods:** Data were collected online from \( n = 542 \) participants. Disease activity was assessed using the IBD Symptom Inventory-Short Form. To assess sexual difficulties, the male and female versions of the IBD-Sexual Dysfunction Scale were collapsed into one measure in order to create an inclusive measure for all participants to complete, regardless of their gender or sex. Single items of sexual satisfaction and distress were also administered.

**Results:** As expected, the inclusive IBD sexual functioning measure was positively correlated with sexual distress (\( r = 0.69, p < .001 \)) and negatively correlated with sexual satisfaction (\( r = -0.41, p < .001 \)). Level of sexual dysfunction was also positively correlated with IBD disease activity (\( r = 0.51, p < .001 \)).

**Discussion/Conclusions:** The promising utility of this inclusive measure of sexual functioning in IBD indicates that future research and clinical practice should consider adapting existing tools and designing new measures that are accessible to all patients.
**XyloFUNS: Xylocaine to Freeze during Unpleasant Nasopharyngeal Swabs in Children - A Randomized Controlled Trial**

Francois Gagnon¹, Jocelyn Gravel², Camille Duranceau³, Maala Bhatt⁴, Stuart Harman⁵, Émilie Vallières⁶, Évelyne Doyon Trottier⁷

¹ Children Hospital of Eastern Ontario, Pediatric Emergency Medicine, Ottawa, Ontario, Canada; ² CHU Sainte-Justine, Pediatric Emergency Medicine, Montreal, Quebec, Canada; ³ CHU Sainte-Justine, Pediatric Emergency Medicine, Montreal, Quebec, Canada; ⁴ Children Hospital of Eastern Ontario, Pediatric Emergency Medicine, Ottawa, Ontario, Canada; ⁵ Children Hospital of Eastern Ontario, Pediatric Emergency Medicine, Ottawa, Ontario, Canada; ⁶ CHU Sainte-Justine, Pediatric Emergency Medicine, Montreal, Quebec, Canada; ⁷ CHU Sainte-Justine, Pediatric Emergency Medicine, Montreal, Quebec, Canada

**Introduction/Aim:** Background: Nasopharyngeal (NP) swabs have been recommended to detect SARS-CoV-2 since the beginning of the COVID-19 pandemic, but are reported to be at least moderately painful. Objective: To evaluate the efficacy of intranasal vaporized lidocaine compared to a sham treatment in reducing pain in children undergoing a NP swab in the Emergency Department (ED).

**Methods:** A randomized double-blinded clinical trial was conducted in a pediatric ED. Both Participants and the researcher evaluating the primary outcome were blinded. Children 6 to 17 years old requiring a NP swab were eligible. Participants were randomly allocated to receive intranasal lidocaine or a sham treatment prior to their NP swab. The primary outcome measure was pain during the swab as assessed by the visual analog scale. Secondary outcome measures were pain using the verbal numeric rating scale, fear using the children fear scale, and side effects of the intervention.

**Results:** Eighty-eight participants were enrolled: Forty-five to the lidocaine group and 43 to the control group. The mean visual analog scale scores for pain were 46 mm in the lidocaine group and 53 mm in the control group (mean difference 7 mm; 95%CI -5 to 19 mm). The numeric rating scale and children fear scale were not statistically different between groups. No serious adverse events were observed. Fear prior to the test and younger age were associated with higher pain scores.

**Discussion/Conclusions:** Intranasal lidocaine administered prior to NP swabs in the ED did not lower pain scores for school-aged children and youth.
The role of adverse childhood experiences on pain among older adults: A rapid review

Natasha Gallant¹

¹ University of Regina, Psychology, Regina, Saskatchewan, Canada;

Introduction/Aim: A rapid review was carried out to quickly map the role of adverse childhood experiences (ACEs) on pain-related outcomes among older adults.

Methods: Using MEDLINE (Ovid), this search identified 68 studies that were screened and reviewed for eligibility. The following inclusion criteria were used: (1) peer-reviewed journal articles with original quantitative research, (2) at least 50% of the sample were at least 60 years old or the mean age of the sample was at least 60 years, (3) studies including at least one ACE-related predictor (e.g., abuse, neglect, household dysfunction), and (4) studies including at least one pain-related outcome (e.g., chronic pain, pain threshold, pain intensity/severity, pain-related disability).

Results: After excluding articles following titles/abstracts screening (N = 34) and full text reviewing (N = 31), a total of 3 articles were included in this rapid review. Eligible studies included cross-sectional observational studies conducted in the United States (N = 2) or Ireland (N = 1). In each of these eligible studies, childhood sexual abuse was predictive of pain-related outcomes, including pain during sexual intercourse, chronic pain, and increased bodily pain.

Discussion/Conclusions: Based on the findings of this rapid review, future original studies on ACEs and pain among older adults should focus on (1) examining ACEs beyond childhood sexual abuse; (2) investigating pain-related outcomes using laboratory-induced pain paradigms; and (3) recruiting diverse samples of older adults with and without chronic pain. Reviews using more comprehensive search and evaluation methodologies that include studies published in languages other than English and French are also warranted.
Opioid Monitoring Documentation in Acute Care and Opioid-Induced Respiratory Depression (OIRD): An alarming gap to address

Céline Gélinas¹, Oxana Kapoustina², Jessica Emed³
¹ McGill University, Ingram School of Nursing, Montreal, Quebec, Canada; ² McGill University, Ingram School of Nursing, Montreal, Quebec, Canada; ³ Jewish General Hospital - CIUSSS West-Central-Montreal, Department of Nursing, Montreal, Quebec, Canada

Introduction/Aim: Opioid-induced respiratory depression (OIRD) occurs with an incidence of 0.04%-0.5%. Despite existing guidelines, opioid monitoring remains a challenge in clinical practice. This study aimed to describe opioid monitoring documentation practices of patients in acute care with and without OIRD.

Methods: A case–control design using retrospective data collection was used. Potential cases and controls were screened from medical records (2009-2018). Included cases were ≥ 18 years old and received opioids within 24h of naloxone administration for OIRD. Controls were selected for each case and matched based on sex, hospital unit, opioid molecule, and presence/absence of medication error. Frequency and timing of opioid monitoring parameters were extracted via a chart review tool. Descriptive statistics were calculated.

Results: The sample included 133 cases and 133 controls of which 62% were female. Cases and controls received similar oral morphine equivalent doses over 24 hours (median=50 mg; p=0.741). Morphine, hydromorphone and fentanyl were the most common opioids. Missed opportunities in opioid monitoring documentation were frequent with missing pain scores in a high proportion of medical records pre (cases: 81%; controls: 74%) and post-opioid administration (cases:90%; controls: 93%). Sedation scores were also frequently missing pre (cases:70%; controls:78%) and post-opioid administration (cases:79%; controls:91%). Vital signs were recorded infrequently. Oxygen saturation was the vital sign documented most frequently pre (cases:44%; controls:47%) and post-opioid administration (cases:37%; controls:20%).

Discussion/Conclusions: An alarming trend of missed monitoring documentation opportunities in patients receiving opioids in acute care was discovered. Robust interventions to educate nurses and facilitate documentation are needed.
What are the most frequent and distressful side effects related to postoperative pain management as reported by hospitalized patients?

Céline Gélinas¹, Melissa Richard-Lalonde², Catherine E. Ferland³, Mélanie Bérubé⁴

¹ McGill University, Ingram School of Nursing, Laval, Quebec, Canada; ² McGill University, Ingram School of Nursing, Montreal, Quebec, Canada; ³ McGill University, Anesthesia, Montreal, Quebec, Canada; ⁴ Université Laval, Faculty of Nursing, Quebec City, Quebec, Canada

Introduction/Aim: Adequate acute pain management is important for recovery especially in surgical patients who are also at high risk of persistent pain. However, opioids and other analgesics can lead to distressful side effects. This study described the patient’s perceptions of pain and analgesics’ side effects during the postoperative phase.

Methods: A descriptive design was used. Adult patients who underwent surgery and were at risk of persistent pain with reported pain intensity scores >4/10 upon movement within 24 hours post-surgery were eligible to participate. Participants completed the Brief Pain Inventory (4-item pain intensity and 10-item pain interference subscales; all items rated from 0-10) and the 18-item side effects checklist (0-3 frequency and distress rating scales) within 48 hours prior to hospital discharge.

Results: Participants (n=28) were mostly male (57%) with a mean age of 52 years (SD=15). More than half had abdominal surgery (n=15) and were hospitalized for a median of 12 days (interquartile range or IQR=5-18). All patients received opioid and/or non-opioid analgesics. Before hospital discharge, both pain intensity (median=5; interquartile range or IQR=4-7) and pain interference (median=6; IQR=4-8) were moderate. The most frequent side effects reported by participants were dizziness, drowsiness, dry mouth, constipation, and fatigue with medians from 1 to 1.5 (sometimes to often). Itching, abdominal discomfort, constipation, slowing of urine and fatigue were rated as the most distressful with medians from 1 to 2 (mild to moderate distress).

Discussion/Conclusions: Strategies must be implemented to better support patients with postoperative pain management and analgesics’; side effects before hospital discharge.
The concurrent and predictive relationships between child emotion regulation behaviours and pain during vaccination at 12- and 18 months

Hannah Gennis¹, Lucas Norton², Tatiana Espinosa-Merlano³, David Flora⁴, C Meghan McMurtry⁵, Ameer Zaghi⁶, Rebecca Pillai Riddell⁷
¹ York University, Psychology, Toronto, Ontario, Canada; ² York University, Psychology, Toronto, Ontario, Canada; ³ York University, Kinesiology and Health Sciences, Toronto, Ontario, Canada; ⁴ York University, Psychology, Toronto, Ontario, Canada; ⁵ University of Guelph, Psychology, Guelph, Ontario, Canada; ⁶ York University, Psychology, Toronto, Ontario, Canada; ⁷ York University, Psychology, Toronto, Ontario, Canada

Introduction/Aim: To analyze the concurrent and predictive relationship between child-led emotion regulation (ER) behaviours (i.e., strategies) and pain throughout vaccination at 12- and 18 months.

Methods: Children were videotaped at their 12- (N = 163) and 18-month (N = 149) vaccinations. Videos were coded for three clusters of ER behaviours (Disengagement of Attention, Parent-Focused (e.g., orienting to parent), and Self-Soothing (e.g., thumb sucking; Goldsmith & Rothbart, 1999), and pain (FLACC; Merkel et al., 1997) at 1-, 2-, and 3-minutes post-needle. Analyses included 6 auto-regressive cross-lagged models.

Results: Disengagement of Attention: At 18 months, a concurrent relationship was found at 1-minute (r = -.17), and more pain at 1-minute predicted less disengagement of attention at 2-minutes (B = -.23). Parent-Focused: At 12 months, more parent-focused behaviours at 1-minute predicted more pain at 2-minutes (B = .14). A concurrent relationship was found at 3-minutes (r = .20). At 18 months, concurrent relationships were found at 1- (r = .38) and 2-minutes (r = .16). Self-Soothing: At 12 months, concurrent relationships were found at 1- (r = -.28) and 3-minutes (r = -.19). At 18 months, a concurrent relationship was found at 1-minute (r = -.20).

Discussion/Conclusions: Across both ages, disengagement of attention and self-soothing were related to less pain, whereas parent-focused behaviours were related to more pain. Besides self-soothing, relationships were strongest at 18 months. Disengagement of attention and self-soothing show a regulatory function (reducing pain). Parent-focused behaviours may positively relate to pain expression as they serve the function of gaining parent support for regulation.
Barriers to the implementation of a biopsychosocial approach into physiotherapists' practice: a review of systematic reviews.

Jonathan Gervais-Hupé¹, Arthur Filleul², Kadija Perreault³, Anne Hudon⁴

¹ University of Montreal, School of rehabilitation, Faculty of medicine, Montreal, Quebec, Canada; ² University Grenoble Alpes, Grenoble, France; ³ Université Laval, Department of rehabilitation, Faculty of medicine, Quebec, Quebec, Canada; ⁴ University of Montreal, School of rehabilitation, Faculty of medicine, Montreal, Quebec, Canada

**Introduction/Aim:** The use of a biopsychosocial approach is strongly recommended for the management of persons experiencing chronic musculoskeletal pain. Although most physiotherapists recognize the importance of using such an approach, its implementation remains arduous. Several studies have looked at the barriers encountered by physiotherapists when using a biopsychosocial approach, but none of these studies analyzed these barriers from a behavior change perspective and using a theoretical framework. Our objective was to map barriers encountered by physiotherapists regarding the implementation of a biopsychosocial approach into their practice within the Theoretical Domains Framework (TDF), a behavior change oriented framework.

**Methods:** We conducted a review of systematic reviews to identify systematic reviews presenting the barriers reported by physiotherapists when trying to implement a biopsychosocial approach. We then analysed and mapped the barriers mentioned in the included reviews using a deductive coding analysis based on the 14 TDF domains.

**Results:** Four systematic reviews (54 studies) were included. The barriers encountered by physiotherapists were mapped into 10 TDF domains: knowledge; skills; professional role; beliefs about capabilities; beliefs about consequences; intentions; memory, attention and decision processes; environmental context; social influences; and emotion. Among these, knowledge, skills and professional role were the domains most often involved.

**Discussion/Conclusions:** The wide scope of identified domains highlights the complexity of implementing a biopsychosocial approach into physiotherapists’ practice. Mapping the barriers within the TDF and looking at this implementation issue from a behavior change perspective could lead to novel and theoretically informed initiatives to successfully change physiotherapists’ practices towards greater use of a biopsychosocial approach.
Capsaicin-induced secondary hyperalgesia but not capsaicin pain is inhibited by segmental spinal manipulation.

Carlos Gevers-Montoro¹, Benjamin Provencher², Stéphane Northon³, João Paulo Stedile-Lovatel⁴, Arantxa Ortega de Mues⁵, Mathieu Piché⁶

¹ Université du Québec à Trois-Rivières, Anatomy, Trois-Rivières, Quebec, Canada; ² Université du Québec à Trois-Rivières, Anatomy, Trois-Rivières, Quebec, Canada; ³ Université du Québec à Trois-Rivières, Anatomy, Trois-Rivières, Quebec, Canada; ⁴ Real Centro Universitario María Cristina, Chiropractic, San Lorenzo de El Escorial, Spain; ⁵ Real Centro Universitario María Cristina, Chiropractic, San Lorenzo de El Escorial, Spain; ⁶ Université du Québec à Trois-Rivières, Anatomy, Trois-Rivières, Quebec, Canada

Introduction/Aim: It has been proposed that central sensitization contributes to the development and persistence of chronic pain. Besides, it has been suggested that spinal manipulation (SM) may reduce central sensitization through segmental mechanisms. Thus, the aim of the present study was to determine whether segmental SM can modulate behavioral and electrophysiological measures associated with central sensitization induced by capsaicin.

Methods: Topical capsaicin was applied over the T5 vertebral segment in 73 healthy volunteers. Participants were randomly assigned to one of the four groups, receiving no intervention, segmental SM, heterosegmental SM, and placebo SM. Interventions were performed 20 minutes after applying capsaicin. To examine secondary hyperalgesia, pressure pain thresholds (PPTs) were assessed at 0 and 40 min outside the area of capsaicin application. Capsaicin pain and cerebral gamma-band oscillations were measured continuously for 40 min.

Results: Forty minutes after capsaicin application, PPTs were significantly decreased in the placebo and control groups (p<0.01), indicating secondary hyperalgesia. By contrast, SM prevented the development of secondary hyperalgesia (p=1.0). This effect was greater than placebo for segmental (p<0.01) but not heterosegmental (p=1.0) SM and was not associated with expectations of pain relief. As for capsaicin pain ratings and gamma-band oscillations, they were not different between groups over time (p>0.5).

Discussion/Conclusions: These findings indicate that segmental SM prevents capsaicin-induced secondary hyperalgesia, but not capsaicin pain and the associated brain activity. Pain relief by SM may partly rely on the inhibition of central sensitization. These results are relevant for the management of chronic back pain.
Hypersensitivity to noxious stimuli in early and late visually deprived mice is independent of anxiety

Masoumeh Ghaemi Jandabi1, Sara Touj2, Hatef Khosravi3, Nasim Eskandari4, Gilles Bronchti5, Hugues Leblond6, Mathieu Piché7

1 Université du Québec a Trois-Rivières, Anatomy, TROIS-RIVIÈRES, Quebec, Canada; 2 Université du Québec a Trois-Rivières, Anatomy, TROIS-RIVIÈRES, Quebec, Canada; 3 Université du Québec a Trois-Rivières, Anatomy, TROIS-RIVIÈRES, Quebec, Canada; 4 Université du Québec a Trois-Rivières, Anatomy, TROIS-RIVIÈRES, Quebec, Canada; 5 Université du Québec a Trois-Rivières, Anatomy, TROIS-RIVIÈRES, Quebec, Canada; 6 Université du Québec a Trois-Rivières, Anatomy, TROIS-RIVIÈRES, Quebec, Canada; 7 Université du Québec a Trois-Rivières, Anatomy, TROIS-RIVIÈRES, Quebec, Canada

Introduction/Aim: Visual deprivation leads to behavioral adaptation. Although this has been well studied for most sensory modalities, the impact of visual deprivation on the nociceptive system is still unclear. In humans, pain sensitivity is increased in early, but not late-onset blindness. In animals, sensitivity to noxious stimulation is increased in anophthalmic, dark-reared normally sighted, and late visually deprived mice. The aim of the present study was to clarify whether hypersensitivity in these mice is caused by anxiety, which is known to increase pain sensitivity.

Methods: Mechanical and thermal sensitivity were examined using the Von Frey and tail-flick tests. Anxiety-like behaviors were assessed using the elevated plus maze test.

Results: Anophthalmic and dark-reared mice showed higher mechanical and thermal sensitivity, and lower anxiety-like behaviors compared with controls (p<0.05). The late visual deprivation produced mechanical and thermal hypersensitivity (p<0.05), but no change in anxiety-like behaviors (p=0.4) compared with controls.

Discussion/Conclusions: Visual deprivation induces hypersensitivity to noxious stimuli in early and late visually deprived mice independently of anxiety. These findings suggest that hypersensitivity in visually deprived animals may rely on cross-modal plasticity between the nociceptive and visual systems.
Identification of the intraoperative antinociceptive effect of intravenous fentanyl using the Nociception Level (NOL) index versus clinical parameters in patients undergoing gynecological laparoscopic surgery

Marzieh Ghiyasinasab¹, Louis Morisson², Pascal Lafferière-Langlois³, Marc-André Geraldo-Demers⁴, Céline gélinas⁵, Mathieu Nadeau-Vallée⁶, Olivier Verdonck⁷, Nadia Lahrichi⁸, Philippe Richebé⁹

¹ Polytechnique Montréal, Mathematical and Industrial Engineering, Montréal, Quebec, Canada; ² Maisonneuve-Rosemont Hospital, CIUSSS de l'Est de l'Île de Montréal, Anesthesiology and Pain Medicine, Montréal, Quebec, Canada; ³ Maisonneuve-Rosemont Hospital, Anesthesiology and Pain Medicine, Montréal, Quebec, Canada; ⁴ Polytechnique Montréal, Mathematical and Industrial Engineering, Montréal, Quebec, Canada; ⁵ Ingram School of Nursing, McGill University, Montréal, Quebec, Canada; ⁶ Maisonneuve-Rosemont Hospital, CIUSSS de l'Est de l'Île de Montréal, Anesthesiology and Pain Medicine, Montréal, Quebec, Canada; ⁷ Maisonneuve-Rosemont Hospital, CIUSSS de l'Est de l'Île de Montréal, Anesthesiology and Pain Medicine, Montréal, Quebec, Canada; ⁸ Polytechnique Montréal, Mathematical and Industrial Engineering, Montréal, Quebec, Canada; ⁹ Polytechnique Montréal, Mathematical and Industrial Engineering, Montréal, Quebec, Canada

Introduction/Aim: While we typically assess nociception balance during general anesthesia through clinical parameters such as heart rate (HR) and mean arterial pressure (MAP) variation, these parameters are not specific to nociception. We hypothesized that using the Nociception Level (NOL) index to assess the analgesic effect of a fentanyl bolus would be superior to standard clinical parameters.

Methods: Design: Ancillary study of the NOLGYN study, a randomized controlled trial comparing intraoperative NOL-guided administration of fentanyl (NOL group) versus standardized care (SC group). Setting: University hospital in Montréal, Canada between November 2018, and December 2019. Patients: Women undergoing gynecological laparoscopic surgery. Intervention: In our evaluation of intraoperative nociception, we analyzed the analgesic effect of fentanyl using three parameters: MAP, HR, and the Nociception Level (NOL) index. All fentanyl injection events were extracted from the database. Main outcome measure: The primary endpoint was the difference between values before and after each injection.

Results: The median of the NOL index before fentanyl injection was 30.5 (IQR 19.4 to 40.7) versus 18.9 (IQR 11.5 to 27.4) after \( P < 0.001 \). The median of MAP was 106.4 mmHg (IQR 99.9 to 113.4) before injection versus 103.2 mmHg (IQR 97.5 to 110.7) after \( P < 0.001 \). The median of HR before injection was 74.2 (IQR 64.2 to 83.8) versus 72.4 (IQR 63.4 to 81.3) after \( P < 0.001 \).

Discussion/Conclusions: The NOL index, HR, and MAP all statistically discriminated the analgesic effect of fentanyl but only the NOL index proved clinically relevant to identify the analgesic effect of one fentanyl injection.
Stress variability and its association with pain intensity: Preliminary results from an ecological momentary assessment study

Karen Ghoussoub1, Lise Dassieu2, Élise Develay3, Sonia Lupien4, Pierre Rainville5, Mathieu Roy6, Étienne Vachon-Presseau7, Marianne Lemieux8, Célina Chumbi Flores9, Mael Gagnon Mailhot10, M Gabrielle Pagé11

1 Université de Montréal, Psychology, Montreal, Quebec, Canada; 2 Centre de recherche du centre hospitalier de l'université de Montréal, Montreal, Quebec, Canada; 3 Centre de recherche du centre hospitalier de l'université de Montréal, Montreal, Quebec, Canada; 4 Université de Montréal, Montreal, Quebec, Canada; 5 Université de Montréal, Montreal, Quebec, Canada; 6 McGill University, Montreal, Quebec, Canada; 7 McGill University, Montreal, Quebec, Canada; 8 Université de Montréal, Psychology, Montreal, Quebec, Canada; 9 Université de Montréal, Psychology, Montreal, Quebec, Canada; 10 Université de Montréal, Psychology, Montreal, Quebec, Canada; 11 Université de Montréal, Montreal, Quebec, Canada

Introduction/Aim: Four characteristics of situations have been identified as triggers of the physiological stress response: Sense of low control, Threat to ego, Unpredictability, Novelty (STUN). While some of these characteristics have been examined individually in relation to pain, there is a lack of integration of this framework that could help better understand the effects of stress on pain. This study aimed to examine daily associations between stress characteristics and pain intensity.

Methods: In this prospective longitudinal study, participants (n = 74) living with chronic low back pain completed electronic diaries three times per day for seven consecutive days to document pain intensity and stress characteristics. Mixed effects model was used to examine the association between time (across and within days), age, sex, variations in stress intensity, STUN characteristics (VAS-100) and stress attribution (pain, pandemic, others), and pain intensity (NRS-11).

Results: Results showed that higher pain intensity was significantly (p < .05) associated with pain-related stress, stress related to other factors, higher unpredictability, and threat to the ego, as well as time of day (pain increased from morning to evening), and younger age. Other factors examined were not significantly associated with pain intensity.

Discussion/Conclusions: Results provide an innovative target of intervention in the field of chronic pain, namely situational characteristics that contribute to stress. If the sources of stress cannot be directly eliminated (e.g., unpredictable pain flare), we could help individuals to understand and evaluate their response to stressful characteristics and therefore manage them better.
Physical exercise for chronic pain management: Is there gender identity and gender roles differences?

Marimée Godbout-Parent1, Nancy Julien2, Hermine Lore Nguena Nguefack3, Gabrielle M. Pagé4, Line Guénette5, Lucie Blais6, Anaïs Lacasse7

1 Université du Québec en Abitibi-Témiscamingue, Département des Sciences de la santé, Rouyn-Noranda, Quebec, Canada; 2 Université du Québec en Abitibi-Témiscamingue, Département des Sciences de la santé, Rouyn-Noranda, Quebec, Canada; 3 Université du Québec en Abitibi-Témiscamingue, Département des Sciences de la santé, Rouyn-Noranda, Quebec, Canada; 4 Université de Montréal, Département d’anesthésiologie et de médecine de la douleur, Montréal, Quebec, Canada; 5 Université Laval, Faculté de pharmacie, Québec, Quebec, Canada; 6 Université de Montréal, Faculté de pharmacie, lucie.blais@umontreal.ca, Quebec, Canada; 7 Université du Québec en Abitibi-Témiscamingue, Département des Sciences de la santé, Rouyn-Noranda, Quebec, Canada

Introduction/Aim: Physical exercise should be an integral part of the multimodal treatment plan for people living with chronic pain (CP). Considering that the choice of various types of treatments and the response to those treatments can be influenced by biopsychosocial factors such as gender identity and gender roles, this study aimed to explore the association between these two factors and physical exercise as a treatment for CP.

Methods: This study was conducted using the COPE Cohort, a self-reported data infrastructure resulting from a web-based recruitment of 1935 people living with CP across Quebec (Canada). Gender identity was defined as female, male, and non-binary. Gender roles were measured using the Bem Sex-Role Inventory (BSRI) and categorized into four subgroups (feminine, masculine, androgynous, undifferentiated). A checklist of 31 types of physical/psychological treatments for CP was presented to participants (yes/no).

Results: 1272 participants completed the questionnaire section about gender identity/roles (women: 84.2%, mean age: 49.3) and 41.9% reported using exercise as a treatment for CP. Although exercise was the most commonly used physical/psychological treatment for CP among men (as opposed to heat/cold treatment among women), the prevalence of exercise use was higher in women (43.3% vs. 34.2% in men and 75.0% in non-binary participants; p=.015). The prevalence of use also varied across gender role subgroups (masculine: 53.0%, feminine: 33.9%, androgynous: 46.0%, undifferentiated: 39.0%; p=.001).

Discussion/Conclusions: Gender identity and gender roles should be considered as relevant social factors for a more personalized and tailored promotion of physical exercise among people living with CP.
Long duration, low-concentration topical capsaicin diminishes central sensitization in young healthy adults

Hannah Goodings¹, Lukas Linde², Jan Rosner³, John Kramer⁴

¹ University of British Columbia, International Collaboration on Repair Discoveries (ICORD), Vancouver, British Columbia, Canada; ² University of British Columbia, International Collaboration on Repair Discoveries (ICORD), Vancouver, British Columbia, Canada; ³ University of Zurich, Balgrist University Hospital, Zurich, Switzerland; ⁴ University of British Columbia, International Collaboration on Repair Discoveries (ICORD), Vancouver, British Columbia, Canada

Introduction/Aim: The development of chronic pain is predicated by neuroplastic changes within the spinal cord in response to persistent noxious stimuli, termed central sensitization. TRPV1 receptors, found throughout the spinal cord and periphery, are key contributors to the development of sensitization. Defunctionalization of TRPV1 receptors, via high concentration capsaicin treatments (>5%), diminishes primary sensitization, however, mechanisms of low concentration (<1%) capsaicin defunctionalization are less understood. Our purpose was to explore the effects of prolonged, low-concentration capsaicin defunctionalization on central sensitization development.

Methods: Thirteen (13) healthy participants applied 0.1% capsaicin cream three times daily for 20 days within a 50cm² region on the forearm. Contact heat evoked potentials (CHEP), cold evoked potentials (CEP), and hot/cold detection and pain thresholds were collected in the area of application and an adjacent control region. Mechanical pain sensitivity (MPS) was assessed within the capsaicin and control regions prior to, and following, repeated suprathreshold heat stimuli applied between the two regions, which induced a temporary state of sensitization.

Results: CHEPs, but not CEPs, amplitudes in the capsaicin treatment region were significantly decreased compared to the control region (CHEPs; N2 amplitude: r=-1.23, p=0.001, CEPs; N2 amplitude: r=0.313, p=0.3), evidence of TRPV1 receptor defunctionalization. Mechanical pain sensitivity following suprathreshold heat sensitization increased in the control region, but not the capsaicin region (Control region: 64mN: r=0.742m p<0.05; Capsaicin region: 64mN: r= 0.238, p=0.427), evidence of diminished sensitization development.

Discussion/Conclusions: Prolonged, low-concentration capsaicin application defunctionalized TRPV1 receptors and diminished secondary hyperalgesia development, via mechanical pinprick testing, following suprathreshold heat stimuli.
THE DouleurCIRCAPain STUDY: EXAMINING CIRCADIAN CONTROL OF CHRONIC PAIN THROUGH A NATIONAL CROSS-SECTIONAL SURVEY.

Hailey G M Gowdy1, Mitra Knezic2, Lesley Norris Singer3, Mary Brachaniec4, Jennifer Daly-Cyr5, Ian Gilron6, M. Gabrielle Page7, Zihang Lu8, Manon Choinière9, Etienne J Bisson10, Nader Ghasemlou11

1 Queen's University, Department of Biomedical and Molecular Sciences, Kingston, Ontario, Canada; 2 Queen's University, Department of Biomedical and Molecular Sciences, Kingston, Ontario, Canada; 3 Chronic Pain Network, Hamilton, Ontario, Canada; 4 Chronic Pain Network, Hamilton, Ontario, Canada; 5 Chronic Pain Network, Hamilton, Ontario, Canada; 6 Queen's University, Department of Anesthesiology and Perioperative Medicine, Kingston, Ontario, Canada; 7 University of Montréal, Department of Anesthesiology and Pain Medicine, Montréal, Quebec, Canada; 8 Queen's University, Department of Public Health Sciences, Kingston, Ontario, Canada; 9 University of Montréal, Department of Anesthesiology and Pain Medicine, Montréal, Quebec, Canada; 10 Queen's University, Department of Anesthesiology and Perioperative Medicine, Centre for Neuroscience Studies, Kingston, Ontario, Canada; 11 Queen's University, Department of Biomedical and Molecular Sciences, Department of Anesthesiology and Perioperative Medicine, Centre for Neuroscience Studies, Kingston, Ontario, Canada

Introduction/Aim: 1 in 5 Canadians lives with some form of chronic pain, though not all of these people experience it the same way: pain intensity can fluctuate throughout the day in some individuals and remain constant in others. 24-hour circadian rhythms have been found to regulate the function of our nervous and immune systems, and therefore may impact our experience of pain. We previously studied the circadian control of chronic low-back pain in a cohort from Kingston (ON) and have now expanded this work nationally with an online study, for which all adults in Canada with any form of chronic pain are eligible. This work will serve to (a) define patterns of pain fluctuation and (b) determine potential predictors of these patterns.

Methods: Following a baseline questionnaire, participants will complete a series of electronic symptom-tracking diaries in which they rate their pain, negative affect, and fatigue on a 0-10 scale at 3 timepoints (8:00AM, 2:00PM, 8:00PM) each day for one week.

Results: Using this data, patterns of pain fluctuation will be identified as either constant, increasing, or decreasing throughout the day. Further analysis of associations between specific fluctuation patterns and factors such as chronic pain conditions, latitude, and sleep habits will be completed.

Discussion/Conclusions: This work will deepen our understanding of pain fluctuations, which may provide insight into how different chronic pain conditions can be more effectively managed. After completing this national study, we hope to broaden this work to an international study to further explore pain fluctuation patterns and their associated factors.
Who are the Quebecers who consult in chiropractic or physiotherapy in Quebec? : a secondary analysis of the CCHS

Lisanne Guérin¹, Marc-André Blanchette²
¹ Université du Québec à Trois-Rivières, Chiropractic, Trois-Rivières, Quebec, Canada; ² Université du Québec à Trois-Rivières, chiropractic, Trois-Rivières, Quebec, Canada

Introduction/Aim: Physiotherapists and chiropractors have overlapping scopes of practice. Emerging studies suggest that the use of these paramedical services in Quebec may differ from the rest of Canada. The objective of this study is to compare the characteristics of patients who consult physiotherapist with those of those who consult chiropractors.

Methods: A secondary analysis of Quebec data from the 2017–2018 Canadian Community Health Survey was conducted. The characteristics of respondents having consulted a physiotherapist were compared with those of respondents having consulted a chiropractor using T-test and Khi-square tests.

Results: It is estimated that the 292,700 Quebecers consulting physiotherapists report poorer health, living in urban areas, being minors or very old, studying and suffering from repetitive movement injuries, more than the 312,300 consulting chiropractors. Quebec chiropractic consultants were more likely to report a spinal injury and being employed. There were no significant differences in gender, level of education, smoking, and identification of a regular source of medical care.

Discussion/Conclusions: The use of chiropractic and physiotherapy services in Quebec varies according to perceived health status, type of injury, age, and administrative regions. Although there are differences between chiropractors and physiotherapist patients, there is also many similitudes and further studies would be required to better define their respective field of practice as well inter-professional collaborative opportunities.
Evaluation of a National Pain Management and Substance Use Curriculum for Undergraduate Medical Education

Lisa Graves¹, Jennifer Turnnidge², Amber Hastings-Truelove³, Nancy Dalgarno⁴, Britney Lester⁵, Fran Kirby⁶, Richard van Wylick⁷

¹ Western Michigan University, Homer Stryker M.D. School of Medicine, Family and Community Medicine, Kalamazoo, Michigan, United States; ² Queen's University, Office of Professional Development and Educational Scholarship, Kingston, Ontario, Canada; ³ Queen's University, Office of Professional Development and Educational Scholarship, Kingston, Ontario, Canada; ⁴ Queen's University, Office of Professional Development and Educational Scholarship, Kingston, Ontario, Canada; ⁵ Queen's University, Office of Professional Development and Educational Scholarship, Kingston, Ontario, Canada; ⁶ Association of Faculties of Medicine of Canada, Ottawa, Ontario, Canada; ⁷ Queen's University, Office of Professional Development and Educational Scholarship, Kingston, Ontario, Canada

Introduction/Aim: In January 2021, the Association of Faculties of Medicine of Canada (AFMC) launched an online national, comprehensive, competency-based curriculum for undergraduate medical students in pain management and opioid/substance use disorder. These modules are easily accessed and integrated into existing undergraduate medical education. This initiative closes educational gaps and empowers medical students with the knowledge, skills, and resources needed to diagnose, treat, and manage pain and substance use.

Methods: Medical students (n=187) across Canada participated in the bilingual pilot program for this curriculum. The pilot ran from September to November 2020. Participants were asked to complete online pre- and post-program surveys, and 10 post-module surveys to assess the value, usability, feasibility, strengths, and weaknesses of this curriculum, and self-reported changes in confidence and knowledge.

Results: Participants’ confidence significantly increased for learning outcomes across all 10 modules. Participants perceived a statistically significant (t=17.68, p=0.000) increase in their ability to identify the global burden of chronic pain and its epidemiology. Participants’ ability to explain and provide examples of dosing equivalencies significantly (t=17.104, p=0.000) improved by 74%. Participants’ ability to utilize a trauma-informed approach when communicating with patients with opioid use disorder also improved significantly (t=18.58, p=0.000).

Discussion/Conclusions: This online curriculum is an effective way to teach pain management and substance use disorder. Feedback from the pilot was used to further adapt the curriculum to meet the needs of medical students. An online competency based bilingual curriculum is presently being developed for postgraduate medical education and continuing professional development that scaffolds this work.
Patients' Experiences of Waitlisted Pain Care in Canada: Perspectives from Rural and Urban Settings

Nina Gregoire¹, Kimberley Kaseweter², Tejas Phaterpekar³, Mark Nazemi⁴, W. Francois Louw⁵, Paul G. Davies⁶

¹ University of British Columbia, Psychology, Kelowna, British Columbia, Canada; ² University of British Columbia, Psychology, Kelowna, British Columbia, Canada; ³ University of British Columbia, Vancouver, British Columbia, Canada; ⁴ Thrive Health, Vancouver, British Columbia, Canada; ⁵ University of British Columbia, Family Medicine, Vancouver, British Columbia, Canada; ⁶ University of British Columbia, Psychology, Kelowna, British Columbia, Canada

Introduction/Aim: Multidisciplinary pain clinics are scarce in Canada, with median wait times of up to four years. These long delays in obtaining specialty pain care have been associated with considerable patient deterioration. Importantly, with most pain clinics centered in urban areas, patients in remote communities may be at an elevated risk for referral delays and deleterious effects. As such, the present study sought to compare waitlist experiences of patients with chronic pain (CP) in rural and urban settings.

Methods: The sample comprised 200 CP patients (Rural = 40%; Urban = 60%) who had been waitlisted at a pain clinic in British Columbia. Participants completed an online survey where they were asked to recall various aspects of their waitlist experiences.

Results: Urban and rural patients reported living with CP for similar lengths of time before referral (Rural = 6.62 years; Urban = 5.52 years, p = .39). Moreover, most reported their overall condition worsened while waitlisted (Rural = 60%; Urban = 58%), recalling similarly high levels of pain intensity (Rural = 6.7/10; Urban = 7.1/10) and interference (Rural = 23/30; Urban = 23/30), and similarly low levels of control over their pain (Rural = 2.6/10; Urban = 3.1/10), all ps > .05.

Discussion/Conclusions: In the present study, urban and rural patients faced equally long wait times before pain specialist referral and reported similar declines and pain symptomatology once on the waitlist. These findings suggest that delayed pain care and subsequent deterioration remain important issues in Canada, even for patients located in urban settings.
Implementation of pain management strategies and adverse effects of analgesics after orthopedic trauma: A Mixed-Methods Study With A View To Optimizing Practices

Sonia Grzelak¹, Mélanie Bérubé², Marc-Aurèle Gagnon³, Caroline Côté⁴, Valérie Turcotte⁵, Stéphane Pelet⁶, Étienne Belzile⁷

¹ Laval University Research Center (Hôpital de l’Enfant-Jésus)
Faculty of Nursing, Laval University, Population Health and Optimal Practices Research Unit (Trauma - Emergency - Critical Care Medicine), Québec, Quebec, Canada; ² Laval University Research Center (Hôpital de l’Enfant-Jésus)
Faculty of Nursing, Laval University, Population Health and Optimal Practices Research Unit (Trauma - Emergency - Critical Care Medicine), Québec, Quebec, Canada; ³ Laval University Research Center (Hôpital de l’Enfant-Jésus), Population Health and Optimal Practices Research Unit (Trauma - Emergency - Critical Care Medicine), Québec, Quebec, Canada; ⁴ Laval University Research Center (Hôpital de l’Enfant-Jésus)
Faculty of Nursing, Laval University, Population Health and Optimal Practices Research Unit (Trauma - Emergency - Critical Care Medicine), Québec, Quebec, Canada; ⁵ CIUSSS du Nord-de-l’Île-de-Montréal, Hôpital du Sacré-Coeur de Montréal, Nursing Department, Montréal, Quebec, Canada; ⁶ CHU de Québec-Université Laval (Hôpital de l’Enfant-Jésus), Department of Orthopedic Surgery, Québec, Quebec, Canada; ⁷ CHU de Québec-Université Laval (Hôpital de l’Enfant-Jésus), Department of Orthopedic Surgery, Québec, Quebec, Canada

Introduction/Aim: Guidelines recommend many strategies for safe and effective pain management following orthopaedic trauma, but little is known about their use in practice. We examined: 1) strategies applied in this population and their perceived effectiveness, 2) adverse effects (AEs) associated with pharmacological treatments, particularly opioids and cannabis, and 3) patients’ perceptions of strategies that should be used to optimize pain management.

Methods: This mixed-methods study was conducted at a Level 1 trauma center. Data were collected from 71 self-administered questionnaires and 30 individual interviews at hospital (T1) and 3 months after injury (T2). Descriptive statistics and thematic analyses were performed.

Results: Pharmacological strategies used at T1 and T2 were mainly opioids (95.8%; 20.8%) and acetaminophen (91.5%; 37.5%). Most applied non-pharmacological strategies were sleep (95.6%) and physical positioning (89.7%) at T1 and massage (46.3%) and relaxation (32.5%) at T2. Quantitative and qualitative analyses highlighted that non-pharmacological strategies, such as comfort, massage and physical therapy, were perceived as the most effective. Most common opioid-related AEs were dry mouth (78.8%) and fatigue (66.1%) at T1, and insomnia (30.0%) and fatigue (20.0%) at T2. Dry mouth (28.6%) and drowsiness (14.3%) were the most reported AEs for cannabis use. An important need for information and personalized follow-up was identified during interviews.
Discussion/Conclusions: Despite its AEs, opioids are still the leading pain management strategy after an orthopaedic trauma and more efforts are needed to implement non-pharmacological strategies. Cannabis was taken for recreational purposes but also for pain relief. Health professionals support is needed to promote adequate use of these strategies.
Exploring opportunities for integration of the CARD (C-comfort, A-ask, R-relax, D-distract) system for COVID-19 vaccinations in long term care facilities

Victoria Gudzak¹, Anna Taddio², Adrian de Boer³, Charlotte Logeman⁴, Lucie Bucci⁵, Meghan McMurtry⁶, Noni MacDonald⁷

¹ University of Toronto, Leslie Dan Faculty of Pharmacy, Toronto, Ontario, Canada; ² University of Toronto, Leslie Dan Faculty of Pharmacy, Toronto, Ontario, Canada; ³ University of Toronto, Leslie Dan Faculty of Pharmacy, Toronto, Ontario, Canada; ⁴ SickKids Hospital, Child Health Evaluative Sciences, Toronto, Ontario, Canada; ⁵ Immunize Canada, Ottawa, Ontario, Canada; ⁶ University of Guelph, Department of Psychology, Guelph, Ontario, Canada; ⁷ Dalhousie University, Department of Pediatrics, Halifax, Nova Scotia, Canada

Introduction/Aim: CARD is a vaccine delivery framework designed to minimize immunization stress-related responses and improve the patient experience. To date, there are no studies examining implementation in geriatric populations. We partnered with long term care (LTC) facilities in rural Ontario to explore how CARD could be incorporated into COVID-19 vaccinations in older adults.

Methods: Within a larger project, 6 care managers from three LTC facilities responsible for coordinating COVID-19 vaccinations with public health were provided with CARD resources to assist with vaccination planning and delivery activities. Four interviews were conducted post-vaccinations and analyzed using deductive and inductive coding. The Consolidated Framework for Implementation Research (CFIR) was used for deductive content analysis.

Results: Two domains of the CFIR model described the data: inner setting and outer setting. For inner setting, supportive inter-team relationships were identified as important to successful implementation. The availability of resources (e.g., planning time) and facility buy-in within the inner setting impacted implementation which led to facilities prioritizing different aspects of CARD. One facility focused on eliminating alcohol swabs prior to injection and applying topical anesthetics; one prioritized minimizing fear cues and using distractions; and the other provided vaccinating staff with CARD pamphlets. For the outer setting, challenges integrating with public health included poor communication regarding vaccine receipt, unclear role expectations and ineffective delivery for residents with cognitive impairments.

Discussion/Conclusions: Supportive inter-team relationships and effective collaboration with external stakeholders were important to CARD implementation. The perspectives of residents and essential caregivers will be critical to inform future implementation.
Sex Hormones and Gender Roles Explain Independent Aspects of Sex Differences in Chronic Pain

Gianluca Guglietti¹, Christophe Tanguay-Sabourin², Matthew Fillingim³, Azin Zare⁴, Jacqueline Norman⁵, Luda Diatchenko⁶, Etienne Vachon-Presseau⁷

¹ McGill University, Montreal, Quebec, Canada; ² McGill University, Montreal, Quebec, Canada; ³ McGill University, Montreal, Quebec, Canada; ⁴ McGill University, Montreal, Quebec, Canada; ⁵ McGill University, Montreal, Quebec, Canada; ⁶ McGill University, Montreal, Quebec, Canada; ⁷ McGill University, Montreal, Quebec, Canada

Introduction/Aim: Sex differences in pain remain an important yet poorly understood issue within the field of chronic pain. It is clear that women experience greater levels of chronic pain with more severe, and at times, treatment resistant symptoms. One obstacle to understanding the mechanisms behind sex differences in chronic pain is separating the role played by psychosocial gender from biological sex. Here we delineate and investigate the distinct roles of these two domains.

Methods: For this study we utilized the UKBB population, a diverse cohort of half a million individuals between the ages of 45 and 70. We developed an index of gender using a logistic regression model predicting sex from psychosocial variables, with an individual’s level of femininity being proportional to their likelihood of being a woman. This gender index and sex hormones were compared to rates of chronic pain after stratifying by sex.

Results: The gender index was able to accurately discriminate sex (AUC=0.83) and was independent of sex hormones after stratifying by sex. We found that, in women, femininity was associated with rates of chronic pain across all body sites (OR: 1.2-1.6, p < 0.05) and for men gender was associated only with pain at a few sites (abdominal, headache, knee: OR: 1.2, 1.1, 0.9; p < 0.05). Moreover, testosterone had a consistent association with pain across both sexes and across sites (OR: 0.6-0.9, p < 0.05).

Discussion/Conclusions: This research could help us understand the etiology of sex differences in chronic pain and point toward sex specific personalized treatments.
Psychometric Properties of the Evaluation of Program Benefit Scales (EPB)

Eleni Hapidou¹, Laura Katz², Hayle Noh³

¹ McMaster University Medical Centre, Michael G. DeGroote Pain Clinic, Hamilton, Ontario, Canada; ² McMaster University Medical Centre, Michael G. DeGroote Pain Clinic, Hamilton, Ontario, Canada; ³ McMaster University, Hamilton, Ontario, Canada

Introduction/Aim: The purpose of this study was to establish psychometric properties of a new measure on evaluating program benefit in physical, emotional / mental and social domains.

Methods: Admission-discharge data from self-report questionnaires were obtained from interdisciplinary pain management program attendees including 325 patients from a third-party funded program and 325 patients from a publically-funded program. Measures included the Evaluation of Program Benefit (EPB), Pain Program Satisfaction Questionnaire (PPSQ), Self-Evaluation Scale (SES), Tampa Scale of Kinesiophobia (TSK), Pain Disability Index (PDI), and Pain Catastrophizing Scale (PCS). Internal consistency and predictive validity of the EPB were demonstrated using Cronbach’s alpha and linear regressions.

Results: Cronbach’s alpha for the EPB on physical, emotional/ mental, and social benefits at discharge was 0.82. The physical domain was significantly predicted (F=22.78, p<0.01) by the PDI (β=-0.26, p<0.01), but not the TSK or PCS. The mental domain was significantly predicted (F=19.87, p<0.01) by the PDI (β=-0.23, p<0.01) and PCS (β =-0.18), p<0.01), but not the TSK. The social domain was significantly predicted (F=5.40, p<0.01) by the PDI (β=-0.13, p=0.02), but not TSK or PCS. Differences between change scores and the programs will be further presented on the poster.

Discussion/Conclusions: The EBP demonstrates excellent internal consistency and good criterion validity with the PDI being the most consistent predictor. Even though data are sourced from two distinct program groups with differing strength of change from admission to discharge, the measure continues to be highly internally consistent and reliable and thus can be used to assess program benefit overall.
**Differential effects of cannabinoids on Cav2.2 and Cav3.2 voltage-gated calcium channels**

Erika K Harding¹, Maria A Gandini², Sun Huang³, Tuan Trang⁴, Gerald W Zamponi⁵

¹ University of Calgary, Hotchkiss Brain Institute, Calgary, Alberta, Canada; ² University of Calgary, Hotchkiss Brain Institute, Calgary, Alberta, Canada; ³ University of Calgary, Hotchkiss Brain Institute, Calgary, Alberta, Canada; ⁴ University of Calgary, Hotchkiss Brain Institute, Calgary, Alberta, Canada; ⁵ University of Calgary, Hotchkiss Brain Institute, Calgary, Alberta, Canada

**Introduction/Aim:** Cannabinoids represent a promising therapeutic avenue for chronic pain treatment, however mixed clinical and preclinical trial results indicate more work is needed to define the precise mechanism of action of cannabinoids in reducing pain symptoms. In rodents, presynaptic terminals of primary afferent neurons that contribute to nociceptive processing contain a unique complement of Cav2.2 and Cav3.2 calcium channels. The cannabinoid receptor 1 (CB1R) is known to inhibit Cav2.2, but little is known about CB1R modulation of Cav3.2. Here, we determined whether CB1R activation leads to inhibition of Cav3.2 channels.

**Methods:** We recorded calcium currents from tsA-201 cells expressing pcDNA for Cav3.2 or Cav2.2 alone, or in combination with CB1R.

**Results:** A time course of peak current amplitude was acquired during perfusion of the synthetic cannabinoid agonist, HU-210. HU-210 had no effect on Cav3.2 peak current alone, or in cultures co-expressing CB1R. However, peak current in cells co-expressing Cav2.2 and CB1R showed inhibition by HU-210, confirming CB1R modulation of Cav2.2. Next, cannabidiol was perfused during recordings, given that it has shown analgesic potential, but limited activity at CB1R. CBD produced direct inhibition of Cav3.2 channels, but no additional effect was observed in cells that co-expressed Cav3.2 and CB1R.

**Discussion/Conclusions:** Altogether, our data indicate that Cav2.2 channels are indirectly inhibited via CB1R activation, whereas Cav3.2 channels are inhibited directly by cannabinoids with no significant action of CB1R on Cav3.2. Therefore, an ideal candidate cannabinoid for treatment of chronic pain would be one that can both activate the CB1R, but also produce direct inhibition of Cav3.2.
Neural predictors of habituation and sensitisation to repetitive pain stimulation over multiple days

Richard Harrison¹, Greig Adams², Tim Salomons³, Carien van Reekum⁴

¹ University of Reading, UK, Reading, United Kingdom; ² University of Reading, Reading, United Kingdom; ³ Queens University, Kingston, Ontario, Canada; ⁴ University of Reading, Reading, United Kingdom

Introduction/Aim: Chronic pain is defined as pain which persists for longer than 3 months. However, little is known about individual differences in the mechanisms associated with repetitive nociceptive stimulation. Sensitisation to pain may represent a vulnerability to developing persistent pain. We aimed to identify neural mechanisms underlying habituation/sensitisation to repetitive painful stimuli.

Methods: 65 healthy volunteers (M age = 23.3y) completed four sessions; Firstly, an MRI wherein they received 44 painful stimuli (5/10 NRS), providing an intensity rating at intervals of 11 stimuli. A regression slope was calculated for these four ratings. We investigated regions associated with habituation over the task, and the relationship with the rating slope. Following this, participants completed 3 behavioural sessions with the same pain task and session slopes were calculated and then averaged.

Results: Most participants sensitised during the sessions (n=44) and, on average, rated the pain as 4.49 (s.d.=1.97). Habituation was associated with increasing activity over the course of the MRI task in the right hippocampus and amygdala (Z max =4.31). Neural activation was extracted for each participant, masked by anatomical Juelich probabilistic boundaries (>70%) and a regression slope was calculated for neural activity change over time. Activation change in the hippocampus during the task predicted behavioural pain rating slopes completed at a later point (R=.25, p=.04), while activation change in the amygdala was not significantly correlated (R=.19, p=.11).

Discussion/Conclusions: Habituation to repetitive painful stimuli is associated with an increase in activity in the hippocampus and amygdala. An increase in activity in these regions can be used to predict habituation to painful stimuli outside of the scanner in the future.
Trait Resilience has a sex-specific association with cortical gray matter of the antinociceptive pathway in people with chronic pain

Melinda Hector¹, Joshua Cheng², Kasey Hemington³, Anton Rogachov⁴, Andrew Kim⁵, Natalie Osborne⁶, Rachael Bosma⁷, Camille Fauchon⁸, Lizbeth Ayoub⁹, Robert Inman¹⁰, Jiwon Oh¹¹, Dimitri Anastakis¹², Karen Davis¹³

¹ Krembil Brain Institute (UHN) and University of Toronto, Toronto, Ontario, Canada; ² Krembil Brain Institute (UHN) and University of Toronto, Toronto, Ontario, Canada; ³ Krembil Brain Institute (UHN) and University of Toronto, Toronto, Ontario, Canada; ⁴ Krembil Brain Institute (UHN) and University of Toronto, Toronto, Ontario, Canada; ⁵ Krembil Brain Institute (UHN) and University of Toronto, Toronto, Ontario, Canada; ⁶ Krembil Brain Institute (UHN) and University of Toronto, Toronto, Ontario, Canada; ⁷ Krembil Brain Institute (UHN), Toronto, Ontario, Canada; ⁸ Krembil Brain Institute (UHN), Toronto, Ontario, Canada; ⁹ Krembil Brain Institute (UHN) and University of Toronto, Toronto, Ontario, Canada; ¹⁰ Krembil Research Institute (UHN), Toronto, Ontario, Canada; ¹¹ Unity Health Toronto, Toronto, Ontario, Canada; ¹² Krembil Research Institute (UHN) and University of Toronto, Toronto, Ontario, Canada; ¹³ Krembil Brain Institute (UHN) and University of Toronto, Toronto, Ontario, Canada

Introduction/Aim: Resilience is an important personal characteristic that influences health and recovery and is inversely related with pain intensity, emotional distress, and functional impairment. Chronic pain is associated with gray matter abnormalities in brain areas related to pain modulation. We suggest that highly resilient individuals may be better able to modulate their chronic pain. Thus, the aim of our study was to determine the relationship between trait resilience and cortical gray matter in the antinociceptive pathway.

Methods: FreeSurfer 7.1.0 was used to extract gray matter thickness (GMT) and volume (GMV, corrected for intracranial volume) of the rACC, sgACC, aINS, and dlPFC from 3T MRIs of 88 people (half male/female) with chronic pain (CP) and 86 age-/sex-matched healthy controls (HCs). Participants rated their chronic pain and completed Wagnild-Young’s resilience scale. Statistical significance was set at p<0.05.

Results: The mean resilience scores were lower in the CP group than in HCs. Resilience was positively correlated with age in healthy females but not in males or the CP group. In the CP group, resilience was negatively correlated with pain ratings and positively correlated with left dlPFC GMV, with males driving the significance. Additionally, resilience was positively correlated with GMT in the left sgACC of CP males. Resilience was not correlated with GM in the rACC or aINS in either group.

Discussion/Conclusions: Our findings of sex-specific associations between resilience and gray matter in the antinociceptive system of people with chronic pain could reflect inherent individual differences or pain-driven plasticity. Brain-resilience-pain relationships could inform sex-specific chronic pain management strategies.
Modulating the Subjective Experience of Pain Using Decoded Functional Magnetic Resonance Imaging Neurofeedback

Ruqayya Hirji1, Mathieu Roy2, Vincent Taschereau-Dumouchel3

1 McGill University, Psychology, Montreal, Quebec, Canada; 2 McGill University, Psychology, Montreal, Quebec, Canada; 3 Université de Montréal; Centre de Recherche de l'Institut Universitaire en Santé Mentale de Montréal, Psychiatry and Addictology, Montreal, Quebec, Canada

Introduction/Aim: Pain is a complex and debilitating affective experience, yet the brain mechanisms that generate the subjective experience of pain are incompletely understood. The primary aim of the study was to examine whether decoded neurofeedback could modulate the subjective experience of pain by training participants to manipulate their own neurological pain signature. The study also investigated whether group membership could modulate the induction of this pain signature.

Methods: Using a double-blind placebo controlled decoded neurofeedback protocol, community participants (N=16) were trained to either up- (N=7) or downregulate (N=9) the stimulus intensity independent pain signature (SIIPS) by pairing a monetary reward with the predicted pain value. This experiment was conducted on five functional magnetic resonance imaging (fMRI) sessions and painful thermal stimulations were delivered before and after training, on which we collected subjective pain reports.

Results: Preliminary results indicate that group membership affected SIIPS induction on day 5: t(14) = 2.35; p < 0.05. Additionally, an indirect association was determined between group membership and pain ratings on the first trials of each block through SIIPS induction success on day 5 (b = 10.74; CI 95% [0.52; 25.575]).

Discussion/Conclusions: These findings suggest that training participants to manipulate their pain signature (i.e. SIIPS) may affect subjective pain ratings. More specifically, participants in the up-regulation group perceived stimulations of the same intensity as more painful after training whereas participants in the down-regulation group perceived these stimulations as less painful. These insights will help us better understand the brain mechanisms involved in modulating affective experiences.
Experiences of Yoga in Chronic Pain Treatment: A Qualitative Exploration

Ting Qi (Amy) Huang¹, Jennifer Anthonypillai², Eleni G Hapidou³

¹ McMaster University, Health Sciences, Hamilton, Ontario, Canada; ² McMaster University Medical Centre, Hamilton Health Sciences, Michael G DeGroote Pain Clinic, Hamilton, Ontario, Canada; ³ McMaster University Medical Centre, Hamilton Health Sciences, Michael G DeGroote Pain Clinic, Hamilton, Ontario, Canada

Introduction/Aim: Yoga integrates all aspects of the self, with biological, mental, intellectual, and spiritual elements. The practice of Yoga aligns with holistic principles of the Biopsychosocial perspective, and as such, it can be instrumental in the treatment of chronic pain. The purpose of this qualitative study is to explore the impact of Yoga therapy on chronic pain, through thematic content analysis of patient feedback.

Methods: The patient survey responses are studied following the completion of four-hours of weekly Yoga classes at the Intensive Chronic Pain Management Program of the Michael G. DeGroote Pain Clinic. The feedback is thematically analyzed by three reviewers, separately, and key conclusions are discussed.

Results: Twenty (N=20) patients (70% male, 75% Veteran) of average (SD) age of 51.40 (8.11) years shared their experiences. Ten themes emerged: 1) mind and body are one through Yoga practices, 2) meaningful practice of Yoga basics is productive, 3) enjoyable process of learning, 4) routine practices lead to improvements, 5) Yoga sessions improve range of motion or movement, tension in joints, and chronic pain, 6) improved upon strategies for chronic pain, 7) Yoga reminds patients of their physical capabilities, 8) adaptability of Yoga, 9) mindset changes to incorporate positive thinking, focus, and willingness to try new things, and 10) suggestions for improvements for the current Yoga program.

Discussion/Conclusions: Overall, key benefits of utilizing Yoga in chronic pain management have been highlighted in this qualitative research study. Further research is necessary to uncover the logistics of large-scale implementation of Yoga therapy in chronic pain programs.
**Pain catastrophizing and guarded movement during a lifting task in people with chronic low back pain.**

Patrick Ippersiel¹, Richard Preuss², Timothy Wideman³, Shawn Robbins⁴

¹ McGill University, School of Physical and Occupational Therapy, Montreal, Quebec, Canada; ² McGill, School of Physical and Occupational Therapy, Montreal, Quebec, Canada; ³ McGill, School of Physical and Occupational Therapy, Montreal, Quebec, Canada; ⁴ McGill, School of Physical and Occupational Therapy, Montreal, Quebec, Canada

**Introduction/Aim:** Pain may change movement towards guarding of a region that is perceived to be injured or threatened. Tighter inter-joint coupling/coordination and reduced movement variability reflect guarded movement in people with low back pain (LBP). While these behaviors are thought to increase tissue loading and complicate recovery, it is unclear why these behaviors persist. We aimed to determine if pain catastrophizing was related to guarded movement during a lifting task in people with LBP.

**Methods:** 46 adults with chronic non-specific LBP (>3 months) were recruited (25F, mean age=44.3, SD=11.0). Baseline demographics, pain (brief pain inventory), and pain catastrophizing (pain catastrophizing scale) were measured. Participants performed a crate lifting task (partitioned into lifting and replacing phases), while a motion capture system collected spinal kinematics. Hip and lower lumbar (LowLx) joint angles were extracted, and continuous relative phase analysis quantified (i) coordination amplitude and (ii) coordinative variability for the Hip-LowLx joint pair. Linear regression analyses tested the hypothesis that pain catastrophizing was associated with Hip-LowLx coordination and coordinative variability, after accounting for other factors.

**Results:** For Hip-LowLx coordination amplitude, the base model (age, sex, BMI, pain severity) was not statistically significant for crate lifting (R²=0.169, p=0.108), or crate replacing (R²=0.202, P=0.056) phases. Adding pain catastrophizing significantly improved our model for both lifting (R²=0.285, p=0.019; b=−1.37, R²change=0.116, p=0.016) and replacing (R²=0.299, p=0.013; b=−1.34, R²change=0.098, p=0.025) phases. For Hip-LowLx variability, no models were statistically significant.

**Discussion/Conclusions:** Pain catastrophizing is related to tighter Hip-LowLx coordination during a lifting task, suggesting that psychological factors and movement behaviors are intertwined.
Community-Generated Change Strategies for Improving Pain in Saskatchewan

Jessica Jack¹, Cassie Jones², Megan Hewson³, Ross McCreery⁴, Sharon Okeeweehow⁵, Erin Beckwell⁶, Jeannie Coe⁷, Krista Baerg⁸, Karen Lawson⁹, Colleen Dell¹⁰, Pamela J. Downe¹¹, Cristina Ugolini¹², Susan Tupper¹³, Karen Juckes¹⁴

¹ University of Saskatchewan, Department of Archaeology and Anthropology, Saskatoon, Saskatchewan, Canada; ² University of Saskatchewan, Yorkton, Saskatchewan, Canada; ³ University of Saskatchewan, Regina, Saskatchewan, Canada; ⁴ Patient Partner/No Affiliation, Regina, Saskatchewan, Canada; ⁵ Patient Partner/No Affiliation, Saskatoon, Saskatchewan, Canada; ⁶ University of Regina, Saskatoon, Saskatchewan, Canada; ⁷ Saskatchewan Health Authority, Saskatoon, Saskatchewan, Canada; ⁸ University of Saskatchewan, Saskatoon, Saskatchewan, Canada; ⁹ University of Saskatchewan, Saskatoon, Saskatchewan, Canada; ¹⁰ University of Saskatchewan, Saskatoon, Saskatchewan, Canada; ¹¹ University of Saskatchewan, Saskatoon, Saskatchewan, Canada; ¹² Saskatchewan Health Authority, Saskatoon, Saskatchewan, Canada; ¹³ University of Saskatchewan, Saskatoon, Saskatchewan, Canada; ¹⁴ University of Saskatchewan, Regina, Saskatchewan, Canada

Introduction/Aim: One in five Canadians live with chronic pain. Integration and coordination of pain services is necessary to meet the needs of people living with pain. To identify gaps and provide a patient-oriented foundation for a provincial pain strategy for Saskatchewan, we collected input from people with lived experience (PwLE), healthcare providers (HCPs), community-based organization representatives (CBOs), and healthcare services decision-makers (HSDMs). The results of this needs assessment are presented.

Methods: We conducted semi-structured in-depth interviews (n=152), ranging from 20-120 minutes in length, which were conducted remotely or in person. Participants were from Saskatoon’s downtown core neighborhoods, Yorkton and surrounding rural area, and Regina’s pediatric services including 72 PwLE, 70 HCPs, 5 CBOs, and 5 HSDMs. Thematic analysis was conducted and verified by participants to identify key themes and recommended change strategies.

Results: A total of 61 change strategies were extracted from interview data, divided into two categories. Service program elements, or what services need to be delivered, included new or modified health services, care navigation and coordination, support programs, education, and raising awareness. Service delivery elements, or how services should be delivered, included care values, delivery approaches, assessments, and communication. Four cross-category themes emerged as important points of focus in all improvement strategies: reducing stigma, facilitating access, supporting engagement, and fostering wellness.

Discussion/Conclusions: Participants identified a wide range of changes to improve pain management in Saskatchewan. Ongoing work has involved formation of working groups to select and co-design strategies that fit their community’s needs, creating homegrown solutions to local problems for pain management.
Investigating the anterior choroidal artery trajectory through the hippocampus and its sub-fields with time-of-flight MRI in chronic low back pain patients.

Félix Janelle¹, Monica Sean², Kevin Whittingstall³, Pascal Tétreault⁴

¹ Université de Sherbrooke, Médecine nucléaire et radiobiologie, Sherbrooke, Quebec, Canada; ² Université de Sherbrooke, Anesthésiologie, Sherbrooke, Quebec, Canada; ³ Université de Sherbrooke, Médecine nucléaire et radiobiologie, Sherbrooke, Quebec, Canada; ⁴ Université de Sherbrooke, Anesthésiologie, Sherbrooke, Quebec, Canada

Introduction/Aim: The limbic system is known to be involved in the development and maintenance of chronic pain. Using magnetic resonance imaging (MRI) approaches, studies have shown that the function and structure of regions such as the nucleus accumbens, amygdala and hippocampus are compromised in chronic pain conditions. The underlying causes of these structural and functional impairments are unknown, but inevitably, neuronal populations present in these regions needs blood supply.

Methods: In this study, we investigated structural properties of one of the main arteries irrigating the hippocampus, known as the anterior choroidal artery (AChA). To design an AChA automatic segmentation tool, we added the AChA to a convolutional neural network segmentation tool developed by our team. Additionally, T1 weighted and time-of-flight (TOF) images were collected from 10 participants with chronic low back pain and from 11 healthy participants. T1 images were processed with FastSurfer and VolBrain to segment and compute the volume of the hippocampus and three of its sub-regions. AChA segmentations were predicted from TOF images. Next, all these data were used to calculate the volume of AChA as well as the minimum distances between this artery and the hippocampus and its sub-regions.

Results: AChA average volume was 35% higher in the chronic pain group (p = 0.02). Moreover, we found that AChA was 41% closer to subfield Cornu Ammonis 4/Dentate Gyrus in the chronic pain group (p = 0.01).

Discussion/Conclusions: We believe that by understanding how these regions becomes impaired, we could develop targeted therapeutic approaches to block or reverse hippocampus malfunction.
Increases in white matter microstructure with the chronification of pain in youth at risk for internalizing mental health conditions

Jenna Jessa¹, Jillian Vinall Miller², Neta Bar Am³, Signe Bray⁴, Catherine Lebel⁵, Melanie Noel⁶, Daniel Kopala-Sibley⁷

¹ University of Calgary, Calgary, Alberta, Canada; ² University of Calgary, Calgary, Alberta, Canada; ³ University of Calgary, Calgary, Alberta, Canada; ⁴ University of Calgary, Calgary, Alberta, Canada; ⁵ University of Calgary, Calgary, Alberta, Canada; ⁶ University of Calgary, Calgary, Alberta, Canada; ⁷ University of Calgary, Calgary, Alberta, Canada

Introduction/Aim: Chronic pain (pain > 3 months) is a prevalent childhood health issue. Anxiety, depression, and PTSD symptoms (PTSS) are highly comorbid with chronic pain. We examined whether increased white matter microstructure across tracts involved in pain and emotional processing were associated with the occurrence of pain in youth at familial risk for anxiety and depression.

Methods: Youth (11-18 years) at risk for anxiety and depression underwent a 3T MRI scan. Diffusion tensor images were obtained and mean fractional anisotropy (FA, a measure of white matter microstructure) values were extracted from the corpus callosum (genu, body, splenium), inferior fronto-occipital, superior longitudinal, and uncinate fasciculi. Pain interference, internalizing symptoms (anxious/depressive behaviors), and PTSS were reported using validated measures. Youth reported pain frequency and were categorized into chronic pain (n=21), or no pain groups (n=15). ANOVA was used to compare pain interference, internalizing symptoms and PTSS between youth with versus without chronic pain. ANCOVA was used to compare mean FA values between chronic pain and no pain groups, accounting for age, gender, pain interference, internalizing symptoms and PTSS.

Results: Internalizing symptoms and pain interference were greater in youth with chronic pain versus no pain (P<0.05). Mean FA values of the splenium, inferior fronto-occipital and uncinate fasciculi were higher in youth with versus without chronic pain (P<0.05).

Discussion/Conclusions: Chronic pain status may be associated with significant structural brain differences as compared to youth without chronic pain and may contribute to increased risk of developing anxiety and depression in youth who have familial risk of developing these conditions.
The moderating role of perceived stress in the relationship between pain, depressive symptoms and disability in inflammatory bowel disease

Krista Jones¹, Katherine Fretz², Julia Moreau³, Dean Tripp⁴

¹ Queen's University, Psychology, Kingston, Ontario, Canada; ² Queen's University, Psychology, Kingston, Ontario, Canada; ³ Queen's University, Psychology, Kingston, Ontario, Canada; ⁴ Queen's University, Psychology, Anesthesiology & Urology, Kingston, Ontario, Canada

Introduction/Aim: Inflammatory bowel disease (IBD) is a chronic and often painful condition. Perceived stress is associated with mood disorders and pain in IBD, and depressive symptoms mediate the relationship between pain and pain-related disability. The current study extends previous research to examine how perceived stress may influence the relationship between pain, depressive symptoms, and disability in IBD.

Methods: A total of 332 adults with IBD completed an online, self-report survey assessing perceived stress, pain, depressive symptoms, and pain-related disability. Moderated mediation models examined how perceived stress moderated the mediation pathways between pain and depressive symptoms and depressive symptoms and pain-related disability.

Results: The indirect effect of depressive symptoms was significant when perceived stress was 1SD below the mean (7.51), at the mean (15.76), and 1SD above the mean (24.01), 95% CI [.04, .27; .05, .25; .01, .24], suggesting that perceived stress moderates the indirect effect of pain on pain-related disability through depressive symptoms.

Discussion/Conclusions: Overall, perceived stress exacerbates the relationship between pain and depressive symptoms and depressive symptoms and disability. The relationship between pain and depressive symptoms becomes stronger with greater perceived stress. Conversely, the positive relationship between depressive symptoms and disability becomes weaker with greater perceived stress. These results suggest that although perceived stress interacts with pain to increase the likelihood of depressive symptoms, depressive symptoms have a greater impact on disability when perceived stress is low. The presence of greater perceived stress may suggest other, potentially stronger predictors of disability.
Introduction/Aim: Most patients in the intensive care unit (ICU) experience pain, but the influence of sex on pain is poorly documented. This study aimed to describe and compare pain between female and male patients at ICU discharge.

Methods: A cross-sectional, multicenter study was conducted in 5 Quebec ICU settings in adult patients able to self-report (English/French) at ICU discharge following a length of stay (LOS) ≥36h. Participants completed the Brief Pain Inventory (BPI) questionnaire (4 pain intensity and 10 pain interference items). Association between sex and pain was examined using non-parametric tests.

Results: Of the participants (n=275), 30% was female. More female patients were admitted for medical reasons (46%) and less for surgical (25%) and trauma (29%) than male patients (24%, 40%, 35%, respectively) (p=0.002). ICU LOS (median=3 days; IQR=2-5) and ventilation duration (median=9 hours; IQR=0-33.75) were similar between sex. At ICU discharge, 50% of patients had average BPI pain intensity ≥4, and distributions across sex were similar (p=0.801). Pain interference did not differ between sex (female: median=6; IQR=3.6-12.5, male: median=6.5; IQR=3.6-13.4; p=0.732). Chart documentation 24h after ICU admission showed a tendency towards a lower maximum numeric pain score in female (median=5; IQR=0-8) versus male patients (median=6; IQR=5-8) (p=0.071). A lower morphine equivalent dose consumption (mg) was found in female (median=70; IQR=18.6-197.8) versus male patients (median=73.6; IQR=30-114.4) (p=0.004).

Discussion/Conclusions: Similar pain perception was found between sex in this sample. Other pain and patient-related characteristics should be further explored to better capture the pain experience of ICU survivors.
**Effectiveness and Tolerability of Dronabinol use in Patients with Chronic Pain - A Retrospective Analysis of 12-week Open Label Real-World Data Provided by the German Pain E-Registry**

Maja Kalaba¹, Michael Ueberall², Johannes Horlemann³, Norbert Schuermann⁴, Mark Ware⁵

¹ Canopy Growth Corporation, Smiths Falls, Ontario, Canada; ² Center of Excellence in Health Care Research of the German Pain Association, Institute of Neurological Sciences, Nuernberg, Germany; ³ German Pain Association, Berlin, Germany; ⁴ St. Josef Hospital Moers, Department for Pain and Palliative Care Medicine, Moers, Germany; ⁵ Canopy Growth Corporation, Smiths Falls, Ontario, Canada

**Introduction/Aim:** To evaluate the effectiveness and tolerability of D9-tetrahydrocannabinol (dronabinol, DRO), as an add-on treatment in chronic pain (CP) patients.

**Methods:** An exploratory retrospective analysis of 12-week data provided by the German Pain e-Registry (GPeR) on CP patients who initiated DRO as part of routine care was conducted. Demographics, DRO dosing patterns, concomitant medication use, safety, and self-reported outcomes were collected.

**Results:** Between March 10, 2017 and June 30, 2019 the GPeR collected information on 89,095 pain patients of whom 1,145 (1.3%; 53.8% female, mean ± SD age: 56.9 ± 10.6 years) received DRO, and 70.0% documented use for the entire 12-week evaluation period. Average DRO daily dose was 15.8±7.5mg, typically administered three times (average DRO dose 5.3±2.1mg). Average 24-hr. pain intensity decreased from 46.3±16.1 to 26.8±18.7 mm VAS, (absolute VAS difference -19.5 ± 17.3; p<0.001). The following patients reported a ≥50% improvement from baseline for outcomes of pain (n= 532; 46.0%), activities of daily living (n=446; 39.0%), sleep (n=404; 35.5%), and quality-of-life (n=360; 31.4%). Over the 12-week period, 51.2% of patients reported stopping at least one pain medication (e.g., opioid analgesics, NSAIDs). An additional 7.8% of patients reported complete cessation of all pain medications reported at baseline. A total of 1617 drug related adverse events were reported across 536 patients (46.8%), none of which were serious.

**Discussion/Conclusions:** Preliminary evidence of add-on treatment with DRO in CP patients was well tolerated and associated with a significant improvement in pain and other outcome measures. Decreases in concomitant medications was also observed.
Global Registry for the Use of Spectrum Therapeutics Cannabis Products in Subjects with Chronic Pain: Preliminary Analysis

Maja Kalaba¹, Justin Pare², Marcel Bonn-Miller³, Mark Ware⁴, Matthew Feldner⁵

¹ Canopy Growth Corporation, Smiths Falls, Ontario, Canada; ² Canopy Growth Corporation, Smiths Falls, Ontario, Canada; ³ Canopy Growth Corporation, Smiths Falls, Ontario, Canada; ⁴ Canopy Growth Corporation, Smiths Falls, Ontario, Canada; ⁵ Canopy Growth Corporation, Smiths Falls, Ontario, Canada

Introduction/Aim: Research suggests cannabinoids can improve pain outcomes, quality of life, and have an opioid-sparing effect. However, most studies are cross-sectional or small clinical trials. A global registry is underway to assemble prospective real-world data on the use of Spectrum Therapeutics (ST) cannabis products among individuals with chronic pain (CP) from Canada, Germany, and Australia.

Methods: The study aims to enroll 1000 adults across 50 sites who have been prescribed an ST product for CP. Five physician-verified visits and four subject-verified follow-ups will be completed across 12 months. Data will be collected on demographics, chronic pain classification, treatment goals, concomitant medication(s), ST treatment regimen, reason(s) for discontinuation, safety, and patient-reported outcomes using well-established, validated outcome measures.

Results: Sixty-five subjects with at least 3 physician-verified visits were included in these preliminary analyses. Mean age was 58 years, 77% were female, and 26% were on long-term disability. The most common starting dose was 0.2mgs THC and 5mgs CBD. By month 4, 71% had increased their dose, 2% decreased, and 27% remained stable. The most common dose at month 4 was 4.1mgs THC and 40.5mgs CBD and was accompanied by a 35% reduction in NSAID use, 9% reduction in antidepressant use, and 31% reduction in opioid use. After 2-months, 47% of subjects experienced minimal improvement and 31% experienced much improvement. No serious adverse events have been reported.

Discussion/Conclusions: Patient registries will be important for addressing limitations of prior work (cross-sectional, small samples) and pointing toward optimally effective cannabinoid use for managing CP.
Patient Perspectives on the Use of Virtual Care Exercise Interventions in Multidisciplinary Chronic Pain Care: An Interpretive Description Qualitative Study

Kiren Kaloty¹, Julia Rudecki², Vanessa Craine³, Alexander Moyes⁴, Robert Armstrong⁵, Megan Baxter⁶, Gillian Grant⁷, Judith Hunter⁸, Nida Mustafa⁹, Kyle Vader¹⁰, Rachael Bosma¹¹

¹ University of Toronto, Department of Physical Therapy, Toronto, Ontario, Canada; ² University of Toronto, Department of Physical Therapy, Toronto, Ontario, Canada; ³ University of Toronto, Department of Physical Therapy, Toronto, Ontario, Canada; ⁴ University of Toronto, Department of Physical Therapy, Toronto, Ontario, Canada; ⁵ University of Toronto, Department of Physical Therapy, Toronto, Ontario, Canada; ⁶ University of Toronto, Department of Physical Therapy, Toronto, Ontario, Canada; ⁷ Women's College Hospital, Toronto Academic Pain Medicine Institute, Toronto, Ontario, Canada; ⁸ University of Toronto, Department of Physical Therapy, Kingston, Ontario, Canada; ⁹ Women's College Hospital, Toronto Academic Pain Medicine Institute, Toronto, Ontario, Canada; ¹⁰ Queen's University, School of Rehabilitation Therapy, Kingston, Ontario, Canada; ¹¹ Women's College Hospital, Toronto Academic Pain Medicine Institute, Toronto, Ontario, Canada

Introduction/Aim: Chronic pain affects 1 in 4 Canadians, contributes to high healthcare costs, and is a leading contributor to years lived with disability. Although virtual care has become more common, it is unclear how patients perceive that exercise interventions should be implemented when delivered virtually within multidisciplinary chronic pain care. This study sought to explore perspectives, perceived barriers and facilitators, and recommendations when implementing virtual care exercise interventions within multidisciplinary chronic pain clinics (MCPCs), from the perspective of adults living with chronic pain.

Methods: We conducted an interpretive description qualitative study based on semi-structured interviews with adults (age ≥ 18 years) living with chronic pain who received physiotherapy care within a publicly funded MCPC in Toronto, Ontario, Canada. Interview data were analyzed using thematic analysis.

Results: Fifteen adults living with chronic pain were interviewed. We constructed eight themes related to perspectives, perceived barriers and facilitators, and recommendations when implementing virtual care interventions within MCPCs, including: virtual care supplements (but does not replace) in-person care, virtual care improves accessibility, impact of technology on participation, navigating the home environment, impact of fluctuations in pain on participation, impact of supervision and feedback, the need for tailored care, and the need for preparation and additional support.

Discussion/Conclusions: Our results reveal that adults living with chronic pain view virtual care positively and that multiple factors should be considered when implementing virtual care exercise interventions within MCPCs. Ultimately, our results provide a foundation to develop future patient-oriented virtual care exercise interventions with multidisciplinary chronic pain care.
Healthcare professionals' perspectives on family-centred pain care in a tertiary pediatric hospital

Elise Kammerer¹, Lexyn Iliscupidez², Samina Ali³
¹ University of Alberta, Department of Pediatrics, Edmonton, Alberta, Canada; ² University of Alberta, , Edmonton, Alberta, Canada; ³ University of Alberta, Department of Pediatrics, Edmonton, Alberta, Canada

Introduction/Aim: Pain affects all children. In order to improve pain care, it is necessary to understand healthcare professionals’ (HCP) perceptions of how pain is currently managed and how families can be better involved in their own care plans.

Methods: This is a sub-study of a larger qualitative study to understand pain management in a hospital setting. Interviews were conducted with 18 HCPs from Stollery Children’s Hospital (Edmonton, Alberta) in Fall 2020. Interested members of the hospital’s pain committee were first recruited; snowball sampling was then employed until saturation was reached. Participants worked in: administration/leadership (n=4), nursing (n=8), psychology (n=1), child life (n=2), and medicine/surgery (n=3). A thematic analysis was conducted. This quality improvement initiative received ethics exemption from the Research Ethics Board (University of Alberta).

Results: The four main themes that define HCP needs in family-centred pain care include: 1. better knowledge translation tools for patients and families; 2. better education on pain management for children and families; 3. HCPs to better acknowledge children and family’s pain experiences; and 4. to help patients and families advocate for better pain care. Participants universally recognized the importance of patient- and family-centred pain care but simultaneously acknowledged that this area needs significant improvements across the hospital.

Discussion/Conclusions: Participants identified an urgent need for knowledge translation tools and educational resources for both families and HCPs, in order to help improve family-centred pain care. The results of this study will be used to inform quality improvement initiatives to better children’s pain management at the hospital.
Barriers to Better Chronic Pain Care in Canada: Physician Perspectives from Rural and Urban Settings

Kimberley Kaseweter¹, Nina Gregoire², Mark Nazemi³, W. Francois Louw⁴, Susan Holtzman⁵

¹ University British Columbia Okanagan, Psychology, Kelowna, British Columbia, Canada; ² University of British Columbia Okanagan, Psychology, Kelowna, British Columbia, Canada; ³ Thrive Health, Clinical and Wellbeing Solutions, Vancouver, British Columbia, Canada; ⁴ University of British Columbia, Family Practice, Vancouver, British Columbia, Canada; ⁵ University of British Columbia Okanagan, Psychology, Kelowna, British Columbia, Canada

Introduction/Aim: In Canada, the responsibility of chronic pain care falls heavily on publicly funded primary care providers and a limited number of pain specialists. The resulting demand places an undue burden on physicians. Moreover, those in rural and remote communities may experience additional barriers due to limited access to community and specialty services for pain. Therefore, the present study sought to understand better the barriers physicians face delivering chronic pain care in rural and urban settings.

Methods: One hundred physicians in British Columbia (BC) completed a brief online survey. Most participants worked in primary care (82%), followed by medical specialty (9%), surgical specialty (5%), and mental health specialty (4%). The diverse sample included physicians from all 5 health authorities practicing in rural and urban settings (rural = 48%; urban = 42%; both = 10%).

Results: The top barriers experienced were difficulty identifying community resources for pain management (94%), lack of interdisciplinary team support (94%), and difficulty managing co-occurring mental health conditions (93%). Chi-square analyses revealed that the frequency of these reported barriers did not differ significantly between rural and urban physicians, all ps > .25.

Discussion/Conclusions: The present findings suggest that access to community resources and interdisciplinary support for pain and comorbid mental health problems is a pervasive problem that is not unique to rural settings in Canada. Further research is needed to understand the unique and common barriers hindering access in the two settings. By elucidating physicians’ current needs, findings may facilitate the development of more targeted solutions for improved pain care.
Delineation of Central Amygdala and the Trigeminal Motor Nucleus Connectivity in Humans: An Ultra-High Field Diffusion MRI Study

Batu Kaya1, Paul Geha2, Ivan de Araujo3, Iacopo Cioffi4, Massieh Moayedi5

1 University of Toronto, Faculty of Dentistry, Toronto, Ontario, Canada; 2 University of Rochester Medical Center, Rochester, New York, United States; 3 Icahn School of Medicine at Mount Sinai, New York, New York, United States; 4 University of Toronto, Faculty of Dentistry, Toronto, Ontario, Canada; 5 University of Toronto, Faculty of Dentistry, Toronto, Ontario, Canada

Introduction/Aim: Awake bruxism—a stress-related oral behavior characterized by repetitive or sustained tooth clenching—is strongly associated with temporomandibular disorders (TMD), the most common chronic orofacial pain condition. Yet, the brain circuits underlying this behavior remain elusive. A recent rodent study revealed a novel circuit between the trigeminal motor nucleus (5M) and the central amygdala (CeA), which controls biting attacks. We aim to resolve the 5M-CeA circuit in humans using ultra-high field (7T) and high field (3T) diffusion-weighted imaging (DWI).

Methods: In 30 healthy adults from the Human Connectome Project, we delineated the 5M bilaterally. The basolateral amygdala (BLAT) was used as a negative control, given that we do not anticipate strong 5M-BLAT connectivity based on the rodent study. The CeA and the BLAT seeds were imported from the Tyszka-Pauli atlas. Data were preprocessed and tractography was performed in FSL. Bidirectional probabilistic tractography was performed between each amygdalar nucleus (CeA and BLAT) and 5M to construct putative white matter pathways with 10,000 samples per voxel for each seed, and hemisphere. Connectivity strength was based on the number of tracts between each region of interest, corrected for seed size, and compared using paired t-tests. Significance was set at a Bonferroni-corrected p<0.0125 (Left vs. Right, BLAT-5M vs. CeA-5M).

Results: The CeA-5M circuit had significantly higher connectivity strength than the BLAT-5M circuit, in each hemisphere at both 7T and 3T.

Discussion/Conclusions: This study—the first delineating the CeA-5M circuit in humans—provides a neuroanatomical substrate to investigate mechanisms of awake bruxism and TMD.
Standardized assessment of back mechanical sensitivity in the rat

Hatef Khosravi, Benjamin Provencher, Thierry Paquette, Hugues Leblond, Mathieu Piché

1 University of Quebec at Trois-Rivières, Anatomy, Trois-Rivières, Quebec, Canada; 2 University of Quebec at Trois-Rivières, Anatomy, Trois-Rivières, Quebec, Canada; 3 University of Quebec at Trois-Rivières, Anatomy, Trois-Rivières, Quebec, Canada; 4 University of Quebec at Trois-Rivières, Anatomy, Trois-Rivières, Quebec, Canada; 5 University of Quebec at Trois-Rivières, Anatomy, Trois-Rivières, Quebec, Canada

Introduction/Aim: Low back pain is the leading cause of disability worldwide. Several animal models of back pain are used currently. However, mechanical sensitivity in the back is rarely assessed and no standardized test has been developed specifically for back pain models. This is essential to confirm that animal models of back pain show local hypersensitivity to noxious stimuli and to examine improvement in sensitivity after therapeutic intervention. The aim of this study is to provide a simple method to examine mechanical sensitivity in the back of rats.

Methods: A cage was built specifically for developing this test. Dimensions are as follows: Length x Width x Height: 50 x 20 x 7 cm, with a stainless-steel mesh on the top. The mechanical threshold is assessed with Von Frey filaments applied to paraspinal muscles on each side of the spine, using the up-down method.

Results: Positive responses included muscle twitching, arching, rotation of the neck to look at the stimulated area, licking or scratching the stimulated area, and escaping.

Discussion/Conclusions: This behavioral test - The back Mechanical Sensitivity (BMS) test - is essential to complement mechanistic research with animal models of back pain, as well as the development of pharmacological and non-pharmacological interventions for the prevention and management of back pain. Future research is needed to evaluate the sensitivity of the BMS test to discriminate animals with chronic back pain and controls.
Pediatric Pain Care delivery during the COVID-19 Pandemic: A Qualitative Analysis of healthcare professional experiences

Tieghan Killackey¹, Krista Baer², Bruce D Dick³, Kathryn A Birnie⁴, Manon Choinière⁵, Gabrielle Page⁶, Lise Dassieu⁷, Anaïs Lacasse⁸, Chitra Laloo⁹, Patricia Poulín¹⁰, Pablo Ingelmo¹¹, Samina Ali¹², Marco Battaglia¹³, Fiona Campbell¹⁴, Andrew Smith¹⁵, Lauren Harris¹⁶, Vina Mohabir¹⁷, Fareha Nishat¹⁸, Myles Benayon¹⁹, Isabel Jordan²⁰, Justina Marianayagam²¹, Melanie Noel²², Jennifer Stinson²³

¹ The Hospital for Sick Children, Child Health Evaluative Sciences, Toronto, Ontario, Canada; ² University of Saskatchewan, Department of Pediatrics, Saskatoon, Saskatchewan, Canada; ³ University of Alberta, Department of Anesthesiology and Pain Medicine, Edmonton, Alberta, Canada; ⁴ University of Calgary, Department of Anesthesiology, Perioperative, and Pain Medicine, Calgary, Alberta, Canada; ⁵ Université de Montréal, Department of Anesthesiology and Pain Medicine, Montreal, Quebec, Canada; ⁶ Université de Montréal, Department of Anesthesiology and Pain Medicine, Montreal, Quebec, Canada; ⁷ Université de Montréal, Department of Biomedical Sciences, Montreal, Quebec, Canada; ⁸ Université du Québec en Abitibi-Témiscamingue, Department of Health Sciences, Rouyn-Noranda, Quebec, Canada; ⁹ The Hospital for Sick Children, Child Health Evaluative Sciences, Toronto, Ontario, Canada; ¹⁰ University of Ottawa, Department of Anesthesiology & Pain Medicine, Ottawa, Ontario, Canada; ¹¹ Montreal Childrens Hospital, Anesthesia and Chronic Pain Management, Montreal, Quebec, Canada; ¹² University of Alberta, Medicine & Dentistry - Pediatrics, Edmonton, Alberta, Canada; ¹³ CAMH, Division of Child and Youth Psychiatry, Toronto, Ontario, Canada; ¹⁴ The Hospital for Sick Children, Anesthesia and Pain Medicine, Toronto, Ontario, Canada; ¹⁵ CAMH, Toronto, Ontario, Canada; ¹⁶ The Hospital for Sick Children, Child Health Evaluative Sciences, Toronto, Ontario, Canada; ¹⁷ The Hospital for Sick Children, Child Health Evaluative Sciences, Toronto, Ontario, Canada; ¹⁸ The Hospital for Sick Children, Child Health Evaluative Sciences, Toronto, Ontario, Canada; ¹⁹ McMaster University, McMaster University, Hamilton, Ontario, Canada; ²⁰ NA, Squamish, British Columbia, Canada; ²¹ Northern Ontario School of Medicine,Sudbury, Ontario, Canada; ²² University of Calgary, Department of Psychology, Calgary, Alberta, Canada; ²³ The Hospital for Sick Children, Child Health Evaluative Sciences, Toronto, Ontario, Canada

Introduction/Aim: Pediatric chronic pain is a significant problem in Canada and many youth manage their pain using a biopsychosocial approach. The COVID-19 pandemic affected pain care delivery and access across Canada. This qualitative study describes the impact of the pandemic and related restrictions on the experiences of multi-disciplinary pediatric pain professionals.

Methods: A qualitative descriptive design was employed and in-depth semi-structured interviews were completed with healthcare professionals (HCP) across Canada. Interviews were transcribed verbatim and analyzed using a reflexive thematic analysis approach.

Results: Interviews were completed with n=21 HCP who represented a range of professional roles, diverse clinical settings and worked in various provinces. Three themes were developed: 1) the duality of impact for youth with chronic pain (e.g., how COVID-19 has impacted how
patients manage their mental health and stress, within existing socio-economic inequalities); 2) changes to the healthcare system and clinical practices (e.g., related to triage and access to care); and 3) shift to virtual care (e.g., benefits and limitations, and potential use of hybrid models moving forward).

**Discussion/Conclusions:** HCP reported that the COVID-19 pandemic affected youth with chronic pain in a variety of ways, and pandemic-related restrictions heavily impacted how HCP were able to deliver multi-disciplinary pain care. Future research should focus on exploring perspectives of youth with chronic pain and their families, and examine how virtual care can best support both HCP and youth with pain through this pandemic and beyond.
Exploring Canadian Veteran's Priorities Regarding Chronic Pain Research: A Qualitative Study

Natasha Kithulegoda¹, Patricia Strachan², Ramesh Zacharias³, Norman Buckley⁴, Jason Busse⁵

¹ a. Women's College Hospital Institute for Health Systems Solutions and Virtual Care, Women's College Hospital, Toronto, ON, Canada; b. Institute of Health Policy, Management, and Evaluation, Dalla Lana School of Public Health, University of Toronto, Toronto, Ontario, Canada; ² School of Nursing, McMaster University, Hamilton, ON, Canada; ³ The Chronic Pain Centre of Excellence for Canadian Veterans, Hamilton, ON, Canada; ⁴ a. The Chronic Pain Centre of Excellence for Canadian Veterans, Hamilton, ON, Canada; b. Department of Anesthesia, McMaster University, Hamilton, Ontario, Canada; ⁵ a. The Chronic Pain Centre of Excellence for Canadian Veterans, Hamilton, ON, Canada; b. Department of Anesthesia, McMaster University, Hamilton, ON, Canada; c. The Michael G. DeGroote Centre for Medicinal Cannabis Research, McMaster University, Hamilton, ON, Hamilton, Ontario, Canada

Introduction/Aim: Chronic pain is a complex and prevalent issue among Canadian veterans, with rates over twice as high as the general population. This pain often co-occurs with other chronic conditions, such as mental health challenges and/or mobility issues. In recognition of this, the Federal Government launched the Chronic Pain Centre of Excellence for Canadian Veterans in 2020. To inform the priorities of the new Centre, we conducted a qualitative study with Canadian veterans, to learn about their perspectives on what types of research priorities the Centre should address.

Methods: Semi-structured interviews were conducted one-on-one by a trained qualitative researcher with eleven Canadian Veterans from 5 provinces across Canada. The interview guide was informed by key findings from a previous priority-setting study. Data were analyzed using thematic analysis.

Results: This study identified eight research priorities: (1) Improving pain care in the military; (2) Optimizing post-operative care in the military; (3) Improving Veterans Affairs Canada’s transition and coordination services; (4) Ensuring continuity of care during military to civilian transition; (5) Ensuring primary care provider access outside of the military; (6) Improving knowledge of military life among civilian healthcare providers; (7) Exploring ways for Veterans to become partners in their care; and (8) Developing and ensuring access to effective strategies for chronic pain management.

Discussion/Conclusions: This is the first study to explore the research priorities of Canadian Veterans living with chronic pain and reveals important findings that researchers should consider in their endeavors to promote evidence-based prevention and management of chronic pain in Canadian Veterans.
Potential Role of Blood Biomarkers in Fibromyalgia Patients: A Systematic Review with Meta-analysis

Dinesh Kumbhare¹, Samah Hassan², Dion Diep³, Felipe C K Duarte⁴, Jasper Hung⁵, Sreekant Damodara⁶, Daniel W D West⁷, P Ravi Selvaganapathy⁸

¹ a. Toronto Rehabilitation Institute, University Health Network, Toronto, Ontario, Canada; b. Department of Medicine, Division of Physical Medicine and Rehabilitation, University of Toronto, Toronto, Ontario, Canada; c. Department of Mechanical Engineering, McMaster School of Biomedical Engineering, McMaster University, Hamilton, Ontario, Canada; ² Toronto Rehabilitation Institute, University Health Network, Toronto, Ontario, Canada; ³ MD Program, University of Toronto, Toronto, Ontario, Canada; ⁴ Division of Research and Innovation, Canadian Memorial Chiropractic College, Toronto, Ontario, Canada; ⁵ Faculty of Kinesiology and Physical Education, University of Toronto, Toronto, Ontario, Canada; ⁶ Department of Mechanical Engineering, McMaster School of Biomedical Engineering, McMaster University, Hamilton, Ontario, Canada; ⁷ a. Toronto Rehabilitation Institute, University Health Network, Toronto, Ontario, Canada; b. Faculty of Kinesiology and Physical Education, University of Toronto, Toronto, Ontario, Canada; ⁸ a. Department of Mechanical Engineering, McMaster School of Biomedical Engineering, McMaster University, Hamilton, Ontario, Canada; b. School of Biomedical Engineering, McMaster University, Hamilton, Ontario, Canada

Introduction/Aim: Fibromyalgia (FM) is a complex chronic pain condition. Its symptoms are non-specific, and to date, no objective test exists to confirm FM diagnosis. Potential objective measures include the circulating levels of blood biomarkers. This systematic review and meta-analysis aim to review studies assessing blood biomarkers’ levels in patients with FM compared to healthy controls (HC).

Methods: We systematically searched the PubMed, MEDLINE, EMBASE, and PsycINFO databases. Fifty-four studies reporting the levels of biomarkers in blood in patients with FM were included. Data were extracted and the methodological quality was assessed independently by two authors.

Results: The methodological quality of 9 (17%) studies was low. The results of most studies were not directly comparable given differences in methods and investigated target immune mediators. Thus, data from forty studies only were meta-analyzed using a random-effects model. The meta-analysis showed that FM patients had significantly lower levels of interleukin (IL) -1 β, and higher levels of IL-6, IL-8, tumor necrosis factor-alpha (TNF-α), Interferon-gamma (IFN-γ), C-reactive protein (CRP), and Brain-derived neurotrophic factor (BDNF) compared to HC.

Discussion/Conclusions: Nevertheless, this systematic literature review and meta-analysis could not support the notion that these blood biomarkers are specific biomarkers of FM. Our literature review, however, revealed that these same individual biomarkers may have the potential role of identifying underlying pathologies or other conditions that often co-exist with FM. Future research is needed to evaluate the potential clinical value for these biomarkers while controlling for the various confounding variables.
Interleukin-1 beta is a potent mediator of chronic pain in a mouse model of multiple sclerosis

Maxime Kusik¹, Camille Illiano², Benoit Mailhot³, Reza Sharif-Naeini⁴, Steve Lacroix⁵
¹ Neurosciences Axis, CHU deQuébec-Université Laval (CHUQ-UL) Research Center, CHUL Hospital, Department of Molecular Medicine of Université Laval, Lévis, Quebec, Canada; ² Neurosciences Axis, CHU deQuébec-Université Laval (CHUQ-UL) Research Center, CHUL Hospital, Department of Molecular Medicine of Université Laval, Québec, Quebec, Canada; ³ Neurosciences Axis, CHU deQuébec-Université Laval (CHUQ-UL) Research Center, CHUL Hospital, Department of Molecular Medicine of Université Laval, Québec, Quebec, Canada; ⁴ McGill University, Department of Physiology and Cell Information Systems Group, Montréal, Quebec, Canada; ⁵ Neurosciences Axis, CHU deQuébec-Université Laval (CHUQ-UL) Research Center, CHUL Hospital, Department of Molecular Medicine of Université Laval, Québec, Quebec, Canada

Introduction/Aim: Multiple sclerosis (MS) is a neurodegenerative disease characterized by an autoimmune response against the myelin sheaths surrounding axons in the central nervous system (CNS). The neuronal damage resulting from these attacks causes cognitive and motor deficits, but also chronic pain. Interleukin (IL)-1β is an essential component of this abnormal immune response. It interacts with various cell types involved in neuroinflammation, notably myeloid and endothelial cells. Furthermore, our laboratory has characterized a specific subset of TRPV1⁺ nociceptors expressing the type 1 IL-1 receptor (IL-1R1) in both the mouse and human dorsal root ganglion (DRG). We hypothesize that these IL-1R1⁺ nociceptors are involved in pain signaling during neuroinflammation.

Methods: Immunofluorescence staining was performed on mouse DRG to characterize the expression of IL-1R1 in TRPV1⁺ neurons. Then, WT and Trpv1Cre::Il1r1fl/fl mice were induced for experimental autoimmune encephalomyelitis (EAE), which mimics MS pathophysiology. Mechanical allodynia was assessed in both groups using the von Frey test.

Results: We have shown that 20% of TRPV1⁺ neurons express the IL-1R1 receptor. Notably, all IL-1R1⁺ neurons also express the TRPV1 nociceptor ion channel. This allowed us to remove IL-1R1 expression in DRG neurons using Trpv1Cre::Il1r1fl/fl mice. We then demonstrated that WT mice develop pain behaviors during EAE, but that Trpv1Cre::Il1r1fl/fl mice are protected from this pain sensitivity.

Discussion/Conclusions: Our data suggest that IL-1β drives chronic pain in EAE and potentially MS by activating its IL-1R1 receptor on nociceptive neurons. Blocking IL-1β or its associated signaling mechanisms may represent a promising therapeutic strategy to reduce chronic pain in people living with MS.
Introduction/Aim: Studying patients’ journey through the healthcare continuum is useful for developing possible solutions to avoid unfavourable care trajectories (CTs). This study aimed to describe CTs among people living with arthritis and to evaluate their association with health outcomes.

Methods: The TorSaDe Cohort (n=102,148) was analyzed, which links the 2007 to 2016 Canadian Community Health Survey (CCHS) cycles with Quebec administrative databases (longitudinal health insurance data). State sequence analysis based on optimal matching was conducted among participants reporting arthritis in the CCHS (n=16,631) and allowed to cluster individuals with similar patterns of healthcare visits over time. CTs in the two years before CCHS completion were modelled (time unit: months) and put in association with different outcomes measured in the survey (pain interference, self-perceived general and mental health).

Results: The analysis revealed five distinct CTs characterized by relatively frequent: 1) arthritis-related ambulatory medical visits with various types of specialists (n=2,756;16.6%), 2) arthritis-related emergency department visits (n=2,928;17.6%), 3) non-arthritis healthcare utilization (n=1,570;9.4%), 4) arthritis-related medical visits to either general practitioners or specialists (n=2,708;16.3%), 5) low all-cause healthcare utilization (n=6,669;40.1%). Bivariable comparisons revealed that the 3rd CT was associated with the worst outcomes in terms of pain interference (30.9% of participants with some/most activities prevented) and self-perceived health (50.6% and 12.4% reporting fair/poor general and mental health). Multivariable results adjusting for sociodemographic and comorbidity confounders will also be presented.
Discussion/Conclusions: State sequence analysis is an innovative approach to study CTs and is useful for evidence decision-making.
Morphine aggravates disc inflammation in the SPARC-null mouse model of disc degeneration-associated low back pain

Seunghwan Lee¹, Khalid Elhadi², Matthew Mannarino³, Magali Millecamps⁴, Jean Ouellet⁵, Lisbet Haglund⁶, Laura Stone⁷

¹ University of Minnesota, Anesthesiology, Minneapolis, Minnesota, United States; ² University of IOWA, Human Physiology, Iowa, Iowa, United States; ³ McGill University, Experimental Surgery, Montreal, Quebec, Canada; ⁴ McGill University, Alan Edwards Centre for Research on Pain, Montreal, Quebec, Canada; ⁵ McGill University Health Center, Pediatric Surgery, Montreal, Quebec, Canada; ⁶ McGill University, Experimental Surgery, Montreal, Quebec, Canada; ⁷ University of Minnesota, Anesthesiology, Minneapolis, Minnesota, United States

Introduction/Aim: Low back pain (LBP) is a leading cause of global disability. Opioids are prescribed to back pain patients; however, their long-term efficacy is unclear and associated with undesired side effects. The morphine metabolite, M3G, exacerbates pain through activation of microglial TLR4 receptors in the spinal cord. TLR4 activation has also been linked to intervertebral disc (IVD) degeneration, therefore, we hypothesize that M3G aggravates IVD degeneration through TLR4 signaling.

Methods: Lumbar IVDs from male and female 9-13 month-old WT and SPARC-null mice were cultured in: i) vehicle, ii) M3G (20uM) or ii) M3G + TAK242 (TLR4 inhibitor, 3uM). Inflammatory molecules (IL-6, IL-1b, IL-8, TNF-a, VEGF-a, NGF) were measured in conditioned media by multiplex and/or ELISA. Human IVD cells from surgical samples and healthy donors were cultured with the same treatment, then IL-6, IL-8 and VEGF were measured in conditioned media.

Results: Inflammatory mediators tended to be upregulated in rodent and human degenerated IVDs. M3G treatment resulted in further increases in IL-6 and CXCL5 (mouse IL-8 homolog) in female SPARC-null IVDs, but not in male SPARC-null IVDs nor in human IVD cells. TLR4 inhibition resulted in decreased IL-6, TNF-a, CXCL5 and VEGF in females compared to the M3G treated group. TLR4 inhibition resulted in decreased IL-6 and IL-8 in human IVD cells.

Discussion/Conclusions: Female SPARC-null IVDs displayed more prominent inflammatory responses than males to TLR activation and inhibition. These data suggest that morphine might exacerbate IVD inflammation in females and that mechanisms regulating disc inflammation may differ between males and females.
Virtual and in-person groups for caregivers of youth with chronic pain: A thematic analysis of feedback following intervention.

Soeun Lee¹, Bruce Dick², Abbie Jordan³, Meghan McMurtry⁴

¹ University of Guelph, Guelph, Ontario, Canada; ² University of Alberta & Stollery Children's Hospital, Edmonton, Alberta, Canada; ³ University of Bath, Bath, United Kingdom; ⁴ University of Guelph & McMaster Children's Hospital, Guelph, Ontario, Canada

Introduction/Aim: Recognition of the importance of caregiver interventions for pediatric chronic pain management is increasing. However, little research examines caregiver-targeted group interventions, and there is a need for an in-depth qualitative exploration of caregiver perceptions of the feasibility, acceptability, effectiveness, and important treatment components of the intervention. No study to date has reported qualitative data comparing caregiver perceptions of in-person vs. virtual groups.

Methods: Participants were caregivers of youth 9-17 years who engaged in a CBT-based group intervention at McMaster Children’s Hospital between May 2019-March 2020 for in-person, September 2020-May 2021 for virtual. Caregivers were invited to participate in a post-group interview/focus group to answer open-ended questions about their experiences in the group. Data were analyzed using a reflexive thematic analysis approach.

Results: Thirty two caregivers participated (n=11 in-person, n=21 virtual). Data analyses are ongoing. Preliminary analyses suggest three overarching themes and subthemes: 1) the power and potential of knowledge (subthemes: “long journey”, “pain, but a normal life”, and “it takes time”), 2) connection and hope building with each other (subthemes: “learning from the experts” and “I’m not the only one”), and 3) finding multiple ways to help their youth in pain. Themes were similar across groups, although the virtual format made it challenging to deepen the connections they made with others in the virtual group.

Discussion/Conclusions: Knowledge and education about pediatric chronic pain is potentially a powerful intervention, and caregivers felt they would have benefited from it sooner. The group format appears to be helpful in facilitating important learning, connection, and hope building.
Retrospective pharmacogenetic analysis of longitudinal post-traumatic MSK pain and recovery

Joshua Lee¹, Mohamad Fakhereddin², Ben Pinder³, David Walton⁴

¹ Western University, London, Ontario, Canada; ² Western University, London, Ontario, Canada; ³ Inagene Diagnostics, Toronto, Ontario, Canada; ⁴ Western University, London, Ontario, Canada

Introduction/Aim: Pharmacogenetics represents a promising new tool in personalized medicine. The objective of this study is to perform correlational analyses of gene variants against known clinical phenotypes in a sample of acute, non-catastrophic musculoskeletal injury.

Methods: This collaborative research study occurred between Western University and Inagene Diagnostics. Blood samples were retrospectively drawn from the longitudinal SYMBIOME databanking study (clinicaltrials.gov ID no. NCT02711085). Eligible participants were identified by emergency or acute-care clinicians and after being discharged, two vials of antecubital blood were drawn and follow-up occurred at 3, 6, and 12 months. Pain was measured using the Brief Pain Inventory. Samples were put through mass spectrometry on the Agena MassARRAY platform that scanned for Inagene’s proprietary pharmacogenetic panel.

Results: For pain interference, minor allele carriers (T/T) of CNR1 rs806368 reported significantly higher scores at 6 months compared to major allele carriers (C/C and T/C) ($F = 5.54, p=0.02$). For pain severity, minor allele carriers (C/C) of CNR2 rs2501432 reported significantly higher scores at 3 months compared to major allele carriers (T/T and T/C) ($F = 9.29, p<0.01$). A secondary analysis conducted on 38 participants compared reported medications against pharmacogenetics recommendations. Participants on “recommended” medications had significantly less pain interference at 12 months compared to those who were on “cautionary” or “incompatible” medications ($F = 5.54, p=0.03$).

Discussion/Conclusions: Specific genetic polymorphisms linked to cannabinoid receptor genes may have an association with pain severity and interference at 3 and 6 months post-trauma, respectively. Pharmacogenetics guidance may be associated with decreased pain interference at 12 months post-trauma.
DNA methylation in Degenerating Human Intervertebral Discs

Seunghwan Lee¹, Yuya Kawarai², Jean Ouellet³, Lisbet Haglund⁴, Moshe Szyf⁵, Laura Stone⁶

¹ University of Minnesota, Anesthesiology, Minneapolis, Minnesota, United States; ² Chiba University, Orthopedic Surgery, Chiba, Japan; ³ McGill University Health Centre, Pediatric Surgery, Montreal, Quebec, Canada; ⁴ McGill University, Experimental Surgery, Montreal, Quebec, Canada; ⁵ McGill University, Pharmacology and Therapeutics, Montreal, Quebec, Canada; ⁶ University of Minnesota, Anesthesiology, Minneapolis, Minnesota, United States

Introduction/Aim: Intervertebral disc (IVD) degeneration is a major cause of low back pain (LBP) and is associated with extracellular matrix (ECM), inflammation and innervation. Epigenetic modifications, including DNA methylation, can drive changes in gene expression without modifying DNA sequences. To date, little is known about epigenetic dysregulation in degenerated IVDs. The aim of this study was to investigate changes in DNA methylation in degenerating human IVDs from chronic LBP patients.

Methods: Human lumbar IVD segments at L4/5 level including control (n=4) and degenerating (n=6) were homogenized in liquid nitrogen with a mortar and pestle and genomic DNA was extracted using the Qiagen DNeasy Blood and Tissue kit. Epigenome-wide 5mC mapping was performed following bisulfite sequencing using the Infinium MethylationEPIC BeadChip 850k Arrays. All analysis was performed in the R package RnBeads 2.0.

Results: Principle component analysis and clustering analysis revealed groupings within the degenerating and control discs. Pathway analysis revealed enrichment in pathways related to ECM organization, signaling by receptor tyrosine kinases and signaling by interleukins. Further analysis at the single gene promoter level showed hypomethylation in cytokines (il-1b, il-10, il-8), TLR pathways (tlr4, myd88) and t cells (cd3d, cd3e) and hypermethylation in ECM related genes including sparc, col2a1, PRG4, s100a2, aspn.

Discussion/Conclusions: Persistent reprogramming of gene expression by DNA methylation could drive IVD degeneration and inflammation. Understanding the role of DNA methylation in IVD pathology will be likely to provide a strong scientific framework for the development of new therapeutic approaches.
The Opioid-Sparing Effects of Ibuprofen/Acetaminophen Fixed-Dose Combinations in Acute Pain

Lingxi Li\textsuperscript{1}, Ahsia Iqbal\textsuperscript{2}, Samer Kullab\textsuperscript{3}, Fabian Cretu\textsuperscript{4}, Richard Petruschke\textsuperscript{5}

\textsuperscript{1}GSK Consumer Health, Canada; Leslie Dan Faculty of Pharmacy, University of Toronto, Mississauga, Ontario, Canada; \textsuperscript{2}GSK Consumer Health, USA; PharmD Fellow with Rutgers University, Warren, New Jersey, United States; \textsuperscript{3}Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, Ontario, Canada; \textsuperscript{4}Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, Ontario, Canada; \textsuperscript{5}GSK Consumer Health, USA, Warren, New Jersey, United States

**Introduction/Aim:** The fixed-dose combination (FDC) of ibuprofen/acetaminophen provides pain relief benefitting from their complementary mechanisms of action. The FDC has demonstrated similar or greater pain relief with lower daily dosing exposure than with the two active ingredients used alone. The purposes of this review were to evaluate if a FDC of ibuprofen/acetaminophen is an effective alternative to opioids or if it decreases the need for rescue opioid medication in acute pain management; thereby providing an opioid-sparing effect.

**Methods:** Using OVID, EMBASE, and PubMed databases, screened for clinical studies that analyzed FDCs of ibuprofen/acetaminophen in comparison to opioids in acute pain models.

**Results:** Fourteen randomized clinical trials and two retrospective cohort analyses were included in this review. All evaluated the use of a FDC of ibuprofen/acetaminophen in acute pain relief and, either measured the need of opioids as rescue therapy or directly compared their efficacy with that of opioids. Findings consistently demonstrated that the FDC of ibuprofen/acetaminophen reduced the need for rescue opioid medication and that similar pain relief was obtained compared to opioids, and this, with fewer adverse events. Doses of a FDC of ibuprofen/acetaminophen as low as 200mg ibuprofen/500mg acetaminophen demonstrated an opioid-sparing effect.

**Discussion/Conclusions:** FDCs of ibuprofen/acetaminophen demonstrated an opioid-sparing effect in patients with acute pain by decreasing rescue opioid medication use and providing similar efficacy and better tolerability when compared directly to opioids. These benefits were demonstrated across low and high doses of a FDC of ibuprofen/acetaminophen and support their use as an effective alternative to opioids.
Spinal cell-type- specific translational control mechanisms in development and maintenance of chronic pain.

Kevin Lister¹, Arkady Khoutorsky²

¹ McGill University, Neuroscience, Montreal, Quebec, Canada; ² McGill University, Anesthesia, Montreal, Quebec, Canada

Introduction/Aim: Tissue damage causes sensitization of the pain pathway. Sensitization requires protein synthesis; however, the mechanisms controlling the production of new proteins contributing to pain phenotypes have not been identified. Chronic pain is associated with aberrant mRNA translation leading to an abnormal cellular proteome and aberrant neuronal activity, altogether resulting in sensitization of pain pathway. We hypothesise that aberrant translation in specific cell types in the spinal cord strongly contributes to long-lasting sensitization.

Methods: I will employ an imaging technique to visualize de novo protein synthesis in the spinal cord after peripheral nerve injury. Along with different cell type markers, this will allow us to determine in which cell type and spinal cord areas proteins are preferentially synthesised. Then I’ll bidirectionally manipulate translation (activate/inhibit) in specific spinal cord cell types. These manipulations, which will be performed using inducible systems, will reveal in which cell types and temporal phases of pain development protein synthesis is required. To identify the newly synthesises proteins in specific cell types and study their contribution to pain hypersensitivity, we will employ Translational Ribosome Affinity Purification. We will follow up on selected targets to study the function of newly generated proteins in regulation of spinal nociceptive networks and pain.

Results: To date, we have visualized de novo protein synthesis in microglia and inhibitory neurons after nerve injury.

Discussion/Conclusions: The proposed project focuses on elucidating mRNA translation in the sensitization of nociceptive circuits with the goal to better understand the pathophysiology of chronic pain and facilitate the development of mechanism-based pain therapeutics.
Optimizing Management of Low Back Pain through the Pain and Disability Drivers Management Model: a feasibility trial

Christian Longtin¹, Simon Décary², Chad Cook³, Marc O. Martel⁴, Sylvie Lafrenaye⁵, Lisa C. Carlesso⁶, Florian Naye⁷, Yannick Tousignant-Laflamme⁸

¹ Université de Sherbrooke, Sherbrooke, Quebec, Canada; ² Université de Sherbrooke, Sherbrooke, Quebec, Canada; ³ Duke University, Department of Orthopaedics, Durham, North Carolina, United States; ⁴ McGill University, Faculty of Dentistry and Department of Anesthesia, Montreal, Quebec, Canada; ⁵ Université de Sherbrooke, Sherbrooke, Quebec, Canada; ⁶ McMaster University, Hamilton, Ontario, Canada; ⁷ Université de Sherbrooke, Sherbrooke, Quebec, Canada; ⁸ Université de Sherbrooke, Sherbrooke, Quebec, Canada

Introduction/Aim: Self-reported levels of disability in individuals with low back pain (LBP) have not improved in the last decade. A more comprehensive management framework may improve outcomes. We recently developed and validated the Low Back Pain and Disability Drivers Management (PDDM) model, which aims to identify the domains driving pain and disability to guide clinical decisions. The objectives were to determine the applicability of the PDDM model and the feasibility of conducting a pragmatic trial, and to explore clinicians’ acceptability of the PDDM model’s use in clinical settings.

Methods: A prospective feasibility 1-arm trial. Participants included physiotherapists and their patients presenting with LBP. Clinicians participated in a workshop on the integration of the PDDM model into their practice. Relevant LBP-related outcomes (i.e., pain and physical function) were reported at baseline and 6-week follow-up. Acceptability of the PDDM model was assessed via semi-structured interviews.

Results: Applicability of the PDDM model was confirmed since it successfully established the profile of patients according to each domain. Feasibility of the conducting such trial was confirmed as our predefined success criteria were met. Clinicians’ acceptability of the use of the model in clinical settings and their appreciation of the training were positive. Recommendations to improve the model’s integration in clinical practice were identified for future studies. A positive effect for all patients’ reported outcome measures were observed.

Discussion/Conclusions: These findings provide preliminary evidence of the potential of the PDDM model to optimize LBP management as well as conducting a future larger pragmatic trial to determine its effectiveness.
A Narrative Analysis of Parent and Youth Storytelling of Youths' Pain Journeys

Tatiana Lund¹, Alexandra Neville², Abbie Jordan³, Bernie Carter⁴, Kathryn A Birnie⁵, Janice Sumpton⁶, Melanie Noel⁷

¹ University of Calgary, Psychology, Calgary, Alberta, Canada; ² University of Calgary, Psychology, Calgary, Alberta, Canada; ³ University of Bath, Psychology, Bath, United Kingdom; ⁴ Edge Hill University, Ormskirk, United Kingdom; ⁵ University of Calgary, Anesthesiology, Perioperative and Pain Medicine, Calgary, Alberta, Canada; ⁶ London Health Sciences Centre, London, Ontario, Canada; ⁷ University of Calgary, Psychology, Calgary, Alberta, Canada

Introduction/Aim: Chronic headache is highly prevalent and persistent from childhood into adulthood. Parental social learning factors may exert a powerful influence on children who also have chronic pain. Storytelling about children’s pain occurs intergenerationally between children and their parents, an avenue of social learning not previous explored. This study examined narratives of parent-child dyads where both members had chronic pain.

Methods: Twenty-six youth and parents with chronic headaches recruited from a tertiary level pediatric pain clinic separately completed in-depth interviews about children’s pain journey narratives. Pain journeys were elicited through three open-ended questions to capture the temporality and plotline of narratives. Narrative analysis incorporated elements of soci-narratology to compare between and within dyads.

Results: Five narrative types were generated from the interviews: 1) Mistreated by the Medical System: neglect, harm and broken promises resulted in either learned hopelessness or reliance on the family system, 2) Washed Away by the Pain: families unable to overcome insurmountable challenges and letting the pain take over, 3) The Invalidated: invalidation of pain permeated youth’s lives, with mothers as empathic buffers, 4) The Trauma Origin Story: parents, but not youth, posited traumatic events as the causal link to children’s pain, and 5) Taking the Power Back from Pain: children’s ability to live life and accomplish goals in spite of pain.

Discussion/Conclusions: Findings support the clinical utility of narrative in pediatric pain, and including both parents’ and children’s narrative accounts to improve clinical encounters and broader social implications of chronic pain.
Role of Dynorphin in Memory Deficits Associated with Chronic Pain

Emma Mannan¹, Loren Martin²

¹ University of Toronto Mississauga, Cell and Systems Biology, Toronto, Ontario, Canada; ² University of Toronto Mississauga, Cell and Systems Biology, Psychology, Mississauga, Ontario, Canada

**Introduction/Aim:** Clinical studies have indicated that up to 44% of the population experiences pain regularly, one-quarter of them being chronic. More strikingly, two-thirds of people with chronic pain also suffer from memory loss. However, the mechanism that connects chronic pain to its associated memory deficits remains unknown. The opioid system consisting of enkephalins, endorphins, and dynorphins is activated to overcome pain. Interestingly, unlike enkephalins or endorphins, dynorphin produces little or no pain-relief. Rather, dynorphin increases in the spinal cord to maintain chronic pain in mice. Dynorphin also plays a role in memory such that injecting dynorphin into the brain impairs spatial memory in rats. Thus, the main objective of this research is to understand the role of dynorphin in chronic pain-related memory loss.

**Methods:** We used the spared nerve injury model of chronic neuropathic pain in mice to investigate memory deficits with the 8-armed radial maze task and the novel object recognition test. Since dynorphins primarily bind to kappa-opioid receptors (KOR), we will use KOR inhibitors and immunohistochemistry techniques to assess the contribution of dynorphin-KOR system in the observed memory deficits.

**Results:** We found that short-term memory is impaired in mice with chronic pain while long-term memory remains intact. We also found that this short-term memory impairment correlates with a significantly higher level of dynorphin in the hippocampus of mice with chronic pain compared to control mice.

**Discussion/Conclusions:** This reveals the potential of commercially available drugs that inhibit KOR (and hence dynorphin) to be used for the treatment of chronic pain-related memory deficits.
"Agir pour moi": a self-management program for chronic pain building on patient partners' experience

Pascale Marier-Deschenes¹, Anne Marie Pinard², Annie LeBlanc³
¹ Université Laval, VITAM Center for Sustainable Health Research, Saint-Augustin-de-Desmaures, Quebec, Canada; ² Université Laval, CIRRIS, Anesthesiology and Critical Care, Québec, Quebec, Canada; ³ VITAM Center for Sustainable Health Research, Université Laval, Québec, Quebec, Canada

Introduction/Aim: There are several English self-management programs for chronic pain on the web. Yet, no equivalent is available for free in French. In a context of limited resources, following an online program could significantly improve pain interference, depression, anxiety, stress, and catastrophizing in individuals with chronic pain who cannot access specialized services.

Methods: The first phase of the project is the co-development of “Agir pour moi”, an online evidence-based self-management program for chronic pain. We established a close partnership between a PhD candidate, three patient partners, four health professionals, a medical student, and a graphic designer. We adopted the principles of patient-oriented and design-based research. We mostly based the program’s components and self-management strategies on a systematic review of the literature and a previous needs assessment.

Results: “Agir pour moi” consists of eight weekly modules including topics such as pain education, goal setting, stress management, pacing, physical activity, and sleep hygiene. We shaped the program’s content with patient partners so that future learners would feel understood and supported in initiating and maintaining lifestyle changes. We also filmed and integrated their positive testimonials about applying self-management strategies. We provided the program’s content in written and audio formats to support individuals with low literacy or attention and concentration difficulties.

Discussion/Conclusions: Building on our patient partners’ experiential expertise and strengths enhanced the team’s work to adapt the program’s form and content to the end users’ needs. We expect that “Agir pour moi” will be seen as acceptable by the participants to the following mixed-methods feasibility study.
Managing Chronic Pain during Working Hours

Valentina Mihajlovic¹, Margret Lo², Julia Moreau³, Dean Tripp⁴

¹ Queen's University, Psychology, Kingston, Ontario, Canada; ² Queen's University, Psychology, Kingston, Ontario, Canada; ³ Queen's University, Psychology, Kingston, Ontario, Canada; ⁴ Queen's University, Psychology, Anesthesiology, Urology, Kingston, Ontario, Canada

Introduction/Aim: Conservative estimates indicate that upwards of 23 million North Americans with chronic pain are actively employed. Medical management of chronic pain is common, yet it remains largely unexplored in an occupational context. We aim to provide a novel overview of prescription and non-prescription substance use for managing pain during working hours in 200 employed individuals with chronic pain.

Methods: To date, 20 employed adults with chronic pain completed a cross-sectional online survey that assessed pain and the use of prescription and non-prescription substances during working hours.

Results: Preliminary results indicate that 50% of the sample endorsed multiple types of pain, including musculoskeletal (80%), neuropathic (45%), orofacial (40%), and visceral (1%) pain. Average pain severity was rated 3.71±1.13/10 and average pain interference was rated 3.80±1.95/10. Participants endorsed prescription and/or non-prescription substance use during working hours for 63% of the days over the past month. Sixty percent of the sample reported using multiple substances either two hours before work or any time during the workday: acetaminophen (45%), aspirin (40%), ibuprofen (40%), naproxen (25%), cannabis-related products (e.g., vapes; 10%), other prescription (5%) and non-prescription (e.g., supplements; 5%) substances, and alcohol (15%). Five percent of the sample did not endorse any substance use.

Discussion/Conclusions: Preliminary data suggest that over-the-counter substances are commonly used to manage pain during working hours, possibly due to low pain ratings in the sample thus far and/or accessibility to these substances. Other aspects relevant to work, such as occupational stress, may also influence prescription and non-prescription substance use in this population.
A Qualitative Study of the Impact of the COVID-19 Pandemic on a Sample of Patients With Chronic Pain

Ola Mohamed Ali¹, Victoria Borg Debono², Jennifer Anthontypillai³, Eleni G. Hapidou⁴

¹ Western University, Psychology, London, Ontario, Canada; ² McMaster University, Anesthesia, Hamilton, Ontario, Canada; ³ McMaster University Medical Centre, Hamilton, Ontario, Canada; ⁴ McMaster University, Psychiatry and Behavioral Neurosciences, Hamilton, Ontario, Canada

Introduction/Aim: The objective of this study was to examine the impact of the COVID-19 pandemic on the psychosocial adjustment of patients living with chronic pain through a qualitative analysis of comments provided by patients referred to an intensive interdisciplinary pain management program in Ontario, Canada.

Methods: We used a qualitative phenomenological approach. Patients referred to the intensive interdisciplinary pain management program at the Michael G. DeGroote Pain Clinic between June 2020 to June 2021 were asked, “How did the COVID-19 pandemic affect your life?” as part of their assessment. Ninety patients (50 Veterans, 40 civilians) provided comments to this question, which were independently organized into themes using an inductive approach by four researchers.

Results: Nine main themes emerged: (1) changed psychological state, (2) minimal to no effect, (3) affected personal life activities, (4) changes in accessing care, (5) changes in work/education situation, (6) changes in family dynamics, (7) experiencing more annoyances, (8) COVID-19 pandemic is a barrier to making positive changes, (9) got COVID-19.

Discussion/Conclusions: Emerging themes are consistent with topics of interest in light of this ongoing, global stressor. Common themes included changes in psychological well-being and changes in access to care, highlighting similarities between life with chronic pain and life under the pandemic for this group.
The Relationship Between Pain Catastrophizing and Quality of Life Changes in Adults with Chronic Pain is Mediated by Depression and Moderated by Pain Self-Efficacy

Landon Montag¹, Tim Salomons², Rosemary Wilson³, Scott Duggan⁴, Etienne Bisson⁵

¹ Queen's University, Centre for Neuroscience Studies, Kingston, Ontario, Canada; ² Queen's University, Centre for Neuroscience Studies; Department of Psychology, Kingston, Ontario, Canada; ³ Queen's University; Kingston Health Sciences Centre, School of Nursing; Department of Anesthesiology and Perioperative Medicine; Chronic Pain Clinic, Kingston, Ontario, Canada; ⁴ Queen's University; Kingston Health Sciences Centre, Department of Anesthesiology and Perioperative Medicine; Chronic Pain Clinic, Kingston, Ontario, Canada; ⁵ Queen's University; Kingston Health Sciences Centre, Centre for Neuroscience Studies; Department of Anesthesiology and Perioperative Medicine; School of Rehabilitation Therapy; Chronic Pain Clinic, Kingston, Ontario, Canada

Introduction/Aim: Adults with chronic pain have lower quality of life (QOL) compared to the general population, thus QOL is a key target for pain treatments. This study examined adults with chronic pain after a year of specialized treatment to determine the role of pain catastrophizing, depression, and pain self-efficacy in predicting changes in QOL.

Methods: Patients from an interdisciplinary pain clinic who completed measures of pain catastrophizing, QOL, depression, and pain self-efficacy at baseline and one-year later were included in this study (N=197). A moderated mediation was performed, and correlations were completed to understand the relationships between the variables.

Results: Higher baseline pain catastrophizing was significantly associated with increased QOL (b=0.39, z=3.00, CI 95% [0.141; 0.648]) and decreased depression (b=-0.18, z=-2.75, CI 95% [-0.306; -0.052]) over a year. Decreased depression was significantly associated with increased QOL (b=-1.16, z=-10.61, CI 95% [-1.365; -0.931]) while controlling for baseline pain catastrophizing. Furthermore, the relationship between baseline pain catastrophizing and the change in depression was moderated by the change in pain self-efficacy over a year (b=-0.10, z=3.59, CI 95% [-0.145; -0.043]). Patients with higher baseline pain catastrophizing reported greater improvement in depression after a year of treatment and this effect was larger in those with improved pain self-efficacy, which led to greater improvements in QOL.

Discussion/Conclusions: Our findings highlight the roles of cognitive and affective factors and their impact on QOL in adults with chronic pain. Understanding the psychological factors that predict increased QOL is clinically useful, since medical teams may be able to specifically target these factors to improve QOL.
Illness Stigma and Depressive Symptoms Among Adolescents with Inflammatory Bowel Disease: Mediation by Thwarted Belongingness and Perceived Burdensomeness

Julia Moreau¹, Valentina Mihajlovic², Dean Tripp³

¹ Queen's University, Psychology, Kingston, Ontario, Canada; ² Queen's University, Psychology, Kingston, Ontario, Canada; ³ Queen's University, Psychology, Kingston, Ontario, Canada

Introduction/Aim: Inflammatory bowel disease (IBD) is a chronic, and reportedly painful and embarrassing medical condition. Roughly 25% of IBD cases are diagnosed during adolescence, highlighting a vulnerable population for poor psychosocial outcomes. The link between adolescent IBD and depression is burgeoning; however, theory-driven psychosocial predictors of depressive symptoms during adolescence require elucidation. By modeling aspects of the interpersonal psychological theory of suicide and replicating and extending findings, the current study explains the relationship between illness stigma and depressive symptoms in adolescents with IBD.

Methods: One hundred and forty-two eligible adolescents (M age = 19 years; 106 women, 32 men, 3 non-binary, 1 gender not listed) with IBD completed an online survey measuring stigma, thwarted belongingness, perceived burdensomeness, and depressive symptoms. A cross-sectional mediation model examined the relationship between illness stigma and depressive symptoms through two parallel mediators: thwarted belongingness and perceived burdensomeness.

Results: The direct effect from illness stigma to depressive symptoms was not significant. Findings confirmed thwarted belongingness as a significant mediator and further, provided evidence that both thwarted belongingness and perceived burdensomeness independently and cumulatively mediate the effects of illness stigma on depressive symptoms.

Discussion/Conclusions: Novel results highlight adolescents’ lack of sense of belonging and feelings of burdensomeness in social environments are essential beliefs to understand the relationship between illness stigma and depressive symptoms in the context of IBD. Providing psychosocial supports in tandem with biological treatment is important for promoting overall wellbeing of adolescents with IBD.
Prediction of acute postoperative pain based on intraoperative nociception level (NOL) index values: the impact of machine learning-based analysis

Louis Morisson¹, Mathieu Nadeau-Vallée², Espitalier Fabien³, Pascal Lafferrière-Langlois⁴, Olivier Verdonck⁵, Nadia Lahrichi⁶, Céline gélinas⁷, Philippe Richebé⁸
¹ Maisonneuve-Rosemont Hospital, CIUSSS de l'Est de l'Ile de Montréal, Anesthesiology and Pain Medicine, Montréal, Quebec, Canada; ² Maisonneuve-Rosemont Hospital, CIUSSS de l'Est de l'Ile de Montréal, Anesthesiology and Pain Medicine, Montréal, Quebec, Canada; ³ University Hospitals of Tours, Anesthesiology and Intensive Care, Tours, N/A, France; ⁴ Maisonneuve-Rosemont Hospital, Anesthesiology and Pain Medicine, Montréal, Quebec, Canada; ⁵ Maisonneuve-Rosemont Hospital, CIUSSS de l'Est de l'Ile de Montréal, Anesthesiology and Pain Medicine, Montréal, Quebec, Canada; ⁶ Polytechnique Montréal, Mathematical and Industrial Engineering, Montréal, Quebec, Canada; ⁷ Ingram School of Nursing, McGill University, Montréal, Quebec, Canada; ⁸ Maisonneuve-Rosemont Hospital, CIUSSS de l'Est de l'Ile de Montréal, Anesthesiology and Pain Medicine, Montréal, Quebec, Canada

Introduction/Aim: The relationship between intraoperative nociception and acute postoperative pain is still not clearly established. The Nociception Level (NOL) Index uses a multiparametric approach to provide a 0-100 nociception score. The objective was to evaluate the ability to acute postoperative pain based on intraoperative NOL values.

Methods: Our study uses the data of a RCT which evaluated the impact of NOL-guided intraoperative administration of fentanyl on overall fentanyl consumption. Seventy patients (ASA class I-III, aged 18-75 years) scheduled for gynecological laparoscopic surgery were enrolled. Variables included NOL time weighted average (TWA) above and under recommended thresholds (10-25), and percentage of surgical time spent with NOL >25 or <10. We developed a machine-learning algorithm to predict postoperative pain. Performance was assessed using cross-validated area under the ROC curve (CV-AUC).

Results: Of the sixty-six patients analyzed, 42 (63.6%) experienced moderate to severe pain. NOL post-intubation (42.8 [31.8-50.6] versus 34.8 [25.6-41.3], p = 0.05), median NOL during surgery (13 [11-15] versus 11 [8-13], p = 0.027), percentage of surgical time spent with NOL >25 (23% [18-18] versus 20% [15-24], p = 0.036), NOL TWA < 0 (2.54 [2.1-3.0] versus 2.86 [2.48-3.62], p = 0.044) and percentage of surgical time spent with NOL <10 (41% [36-47] versus 47% [40-55], p = 0.022) were associated with moderate to severe PACU pain. Logistic regression with elasticnet regularization achieved the best performance with a 0.71 (0.62-0.80) CV-AUC.

Discussion/Conclusions: Our results suggest that acute postoperative pain is better predicted by multivariate machine-learning algorithm rather than individual intraoperative nociception variables.
Identifying the Molecular Mechanism for the Pain Caused by Lionfish Venom

Stephanie Mouchbahani-Constance¹, Reza Sharif-Naeini²

¹ McGill University, Department of Physiology and Cell Information Systems, Alan Edwards Centre for Research in Pain, Montreal, Quebec, Canada; ² McGill University, Department of Physiology and Cell Information Systems, Alan Edwards Centre for Research in Pain, Montreal, Quebec, Canada

**Introduction/Aim:** The lionfish (Pterois volitans) is a venomous species endemic to the Indo-Pacific, but that has now invaded the Northwestern Atlantic as well as the Caribbean and Mediterranean Seas. It poses a growing health problem due to the increase in frequency of painful stings that it delivers, for which no treatment or antidote exists. We characterized the pain caused by this venom and identified the venom’s cellular target – nonpeptidergic nociceptors. The aim of this research project is to isolate the algogenic toxin in the venom and identify its receptor target to understand the molecular mechanism for the pain caused by lionfish venom.

**Methods:** The toxin will be isolated using High Pressure Liquid Chromatography (HPLC) to fractionate the venom, fractions will then be screened for their ability to elicit a rise in intracellular calcium in mouse DRG neurons using a high throughput screening system. Active fractions will be subject to mass spectrometry to identify the sequence of the algogenic toxin.

**Results:** Preliminary results point to the venom’s receptor target. We have cloned the venom’s target from Gymnothorax favagineus (Honeycomb moray eel), a predator of the lionfish, as well as from the lionfish itself to evaluate these targets’ sensitivity to lionfish venom using calcium imaging and electrophysiology.

**Discussion/Conclusions:** These results will 1) identify novel modulators of the pain pathway, 2) provide insights into the parallel evolution of the algogenic toxin in lionfish venom and its target in predators and 3) potentially produce novel analgesics by using low-dose toxin peptides in therapeutic agents to produce analgesic effects.
Characteristics of Veterans with Chronic Pain who are Doing Well: Life After Service Studies (LASS) 2019 Survey.

Goris Nazari¹, Julián Reyes², James Thompson³, Jordan Miller⁴, Jill Sweet⁵

¹ Queens University, Kingston, Ontario, Canada; ² Veterans Affair Canada, Charlottetown, Prince Edward Island, Canada; ³ Queens University, Kingston, Ontario, Canada; ⁴ Queens University, Kingston, Ontario, Canada; ⁵ Veterans Affair Canada, Charlottetown, Prince Edward Island, Canada

Introduction/Aim: Considerable variance exists between pain severity and activities limited by pain in Canadian Armed Forces (CAF) Veterans. It is possible that those who reported fewer activities with pain maybe doing better in certain well-being domains. We aimed to report the prevalence of chronic pain in CAF Veterans, describe their characteristics and identify well-being indicators associated with fewer activities limited by pain.

Methods: The LASS 2019 survey was a Statistics Canada cross-sectional, computer-assisted, telephone interview survey of the well-being of male and female CAF Regular Force Veterans who were released in 1998–2018. The data were analyzed using descriptive analysis and ordinal logistic regression modeling.

Results: Veterans (n=1222) reported living with chronic pain (prevalence of 50.7%). Those with moderate or severe pain who reported no or few activities limited by pain were more likely to be aged 50–59, female, and employed; and more likely to have had higher education, higher rank, longer length of service and higher income adequacy. They were also more likely to be satisfied with their family, main activity, and finances. Unadjusted odds ratios (UOR) in those with moderate to severe pain demonstrated that those with fewer activities limited by pain were less likely to have low mastery (UOR 18.5), or less likely to have dissatisfaction with family, weak group identity, mental health problems or physical health conditions (UOR 2.3 – 4.)

Discussion/Conclusions: The strong association with having a sense of mastery indicates the need for supports and research addressing multiple aspects of well-being beyond pain intensity and physical health alone.
The Impact of Work-related Psychosocial Factors on Work Outcomes in Chronic Pain Patients: A Systematic Review.

Adriano Nella¹, Ryan G L Koh², Monique A M Gignac³, Dinesh A Kumbhare⁴, Andrea D Furlan⁵

¹ University of Toronto, Toronto, Ontario, Canada; ² Toronto Rehabilitation Institute, Toronto, Ontario, Canada; ³ Institute for Work and Health, Toronto, Ontario, Canada; ⁴ Toronto Rehabilitation Institute, Toronto, Ontario, Canada; ⁵ Toronto Rehabilitation Institute, Toronto, Ontario, Canada

Introduction/Aim: Despite biological, psychological, and social factors showing a strong association with work outcomes in chronic pain patients, the influence of psychosocial work factors is unknown. The purpose of this study was to determine if work-related psychosocial factors are associated with work outcomes in chronic pain patients in peer-reviewed literature.

Methods: Electronic searches in OVID Medline, Embase, and PsycINFO were run from inception until March 16th, 2021. Studies that featured chronic pain participants, a work-related psychosocial factor (e.g., co-worker support, and organization justice), and a work outcome (e.g., employment status, and absenteeism) were included. The titles, abstracts, and full text articles were screened independently by two reviewers to determine eligibility. Risk of Bias In Non-randomized Studies of Interventions (ROBINS-I) was used to determine the quality of papers. A Synthesis Without Meta-analysis (SWiM) was conducted to report the results.

Results: A total of 1,118 articles were retrieved from the database searches and 784 articles remained after deduplication. After title and abstract screening 215 articles remained, of which 28 were included in the final analysis. Reduced work-related fear avoidance beliefs as well as supervisor and co-worker support at work showed a strong association with positive work outcomes in seven and eight studies respectively. No clear association was observed between physical workload, job control, job security, job strain, and role clarity with work outcomes in pain patients.

Discussion/Conclusions: Few articles have shown a significant association between work-related psychosocial factors on work outcomes in chronic pain patients. Most factors show mixed results and require further investigation.
"Maybe it's something else": how the clinical encounter shapes diagnostic uncertainty in pediatric chronic pain

Alexandra Neville¹, Ignasi Clemente², Lonnie Zeltzer³, Marcia Meldrum⁴, Abbie Jordan⁵, Katelyn Watson⁶, Melanie Noel⁷

¹ University of Calgary, Calgary, Alberta, Canada; ² Hunter College, City University of New York, New York, New York, United States; ³ David Geffen School of Medicine at University of California Los Angeles, Los Angeles, California, United States; ⁴ Center for Social Medicine and the Humanities, University of California Los Angeles, Los Angeles, California, United States; ⁵ University of Bath, Department of Psychology and Centre for Pain Research, Bath, United Kingdom; ⁶ Kwantlen Polytechnic University, Department of Psychology, Surrey, British Columbia, Canada; ⁷ University of Calgary, Calgary, Alberta, Canada

Introduction/Aim: While the cause of pain is clear for some, many youth experience ongoing pain without an obvious explanation or evidence of underlying pathology. Over one-third of youth with primary chronic pain and their parents experience diagnostic uncertainty, which is linked to greater youth pain, pain-related constructs, and health-related quality of life. A substantial minority of youth and parents experience diagnostic uncertainty despite reporting that they have received a clear diagnosis for their pain. This suggests that the diagnosis itself is not sufficient to allay youth’s and parents’ fears and beliefs that something unknown is causing the pain, which has important implications for clinical encounters when a chronic pain diagnosis is provided.

Methods: Participants included 26 youth and one of their caregivers who presented to a tertiary university-based pediatric clinic with a chronic pain problem. Videotaped clinical encounters when a chronic pain diagnosis was provided and pre- and post-encounter interviews with youth and their caregiver were analysed using interpretative phenomenological analysis.

Results: Analyses revealed that diagnostic uncertainty is a dynamic process, which unfolds over time in a social context, including interactions within the healthcare system. Differing explanations for pain across youth’s pain care journey, validation and invalidation from clinicians, and messages of certainty and uncertainty about the cause of youth’s pain influenced youth’s and parents’ experiences of diagnostic uncertainty, which had critical implications for youth’s engagement in pain treatment and trust in the healthcare system.

Discussion/Conclusions: These results illuminate critical ways the clinical encounter shapes uncertainty in pediatric chronic pain.
Developing a framework to assess technology use in chronic pain management

Emily Newton¹, Vanessa Tam², Shital Desai³, Arlene Astell⁴

¹ University of Toronto, Department of Occupational Science and Occupational Therapy, Toronto, Ontario, Canada; ² University of Toronto, Department of Occupational Science and Occupational Therapy, Toronto, Ontario, Canada; ³ York University, School of the Arts, Media, Performance & Design, Toronto, Ontario, Canada; ⁴ KITE Research Institute, Toronto, Ontario, Canada

Introduction/Aim: Technology is used by individuals with chronic pain (CP) and healthcare professionals (HCPs) for pain management. Research into non-pharmacological pain management strategies including technology is limited. This study is evaluating evidence of technology use in CP management to develop a framework to identify factors that impact use of technology in pain management.

Methods: Stage 1 involved semi-structured interviews with individuals with CP and occupational therapists to identify their experience and preferences in technology for CP management. Based on the technologies identified, Stage 2 involved conduct of a literature review to examine evidence supporting their use.

Results: Factors relating to usability of different technologies (i.e. cost, option for customization, accessibility) were identified. A score was determined based on factors impacting the usability of technology for pain management. Due to the wide range of technological resources identified for use in pain management, the framework includes (i) general criteria, and (ii) different technology domains including: app-based technology, alternative medicine technologies, heat/cold technologies, to facilitate comparison between technologies.

Discussion/Conclusions: Framework development allows for continuous evaluation of emerging technologies in the area of pain management, which will promote equitable access to reliable information for individuals with CP and HCPs. Next steps aim to utilize the framework to develop an accessible online resource for individuals with CP and HCPs to explore evidence-based technologies most applicable to their context and available resources.
Ontario family physicians' attitudes and opinions towards medical cannabis: A qualitative interview study

Jeremy Ng¹, Sana Usman², Kevin Gilotra³, Yaping Chang⁴, Jason Busse⁵

¹ McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; ² McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; ³ McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; ⁴ McMaster University, OrthoEvidence, Burlington, Ontario, Canada; ⁵ McMaster University, Department of Health Research Methods, Evidence, and Impact; Department of Anesthesia; The Chronic Pain Centre of Excellence for Canadian Veterans; The Michael G. DeGroote Centre for Medicinal Cannabis Research., Hamilton, Ontario, Canada

Introduction/Aim: Since 2001, medical cannabis has been permitted in Canada for a limited number of ailments. In 2021, 292,399 Canadians were approved to use medical cannabis; nevertheless, during their undergraduate or residency training, family physicians receive limited formal training in the therapeutic use of cannabis. We explored the perspectives of family physicians in Ontario, Canada toward medical cannabis.

Methods: Family physicians were recruited for participation in a semi-structured interview, directed by an interview guide, using the authors’ contacts and subsequent snowball sampling. All of the interviews were recorded, transcribed, and analyzed for themes. The Hamilton Integrated Research Ethics Board reviewed and approved this project.

Results: We interviewed eleven family physicians. Most of their patients who used cannabis did so for chronic pain; however, our study participants raised concerns about the limited evidence for benefit and acknowledged risks associated with cannabis usage. Many physicians felt that the recreational legalization of medical cannabis in 2018 would increase use for medical purposes. Most physicians desired additional education about medical cannabis’ benefits, risks, long-term impacts, and guidance regarding indications for use.

Discussion/Conclusions: Ontario family physicians attend to patients who use medical cannabis, primarily for chronic pain. They expressed concern about the potential for harm and whether use of cannabis for chronic pain was evidence-based. Primary care physicians may benefit from evidence-based guidelines for medical cannabis and chronic pain.
Pain Physician's Attitudes and Beliefs regarding Medical Cannabis for Chronic Non-Cancer Pain: A Qualitative Study

Jeremy Ng¹, Halton Quach², Mark Phillips³, Jason Busse⁴

¹ McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; ² McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; ³ McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; ⁴ McMaster University, Department of Health Research Methods, Evidence, and Impact; Department of Anesthesia; The Chronic Pain Centre of Excellence for Canadian Veterans; The Michael G. DeGroote Centre for Medicinal Cannabis Research., Hamilton, Ontario, Canada

Introduction/Aim: Medical cannabis is commonly and increasingly used by Canadians to manage chronic pain. As of March 2021, Health Canada reported approximately 300,000 Canadians who were authorized to access medical cannabis, more than a 1000% increase from the 24,000 registered in 2015. Physicians, however, receive limited information on therapeutic cannabis during their training, and their perceptions regarding this therapeutic option are uncertain.

Methods: This study utilized a focused ethnography approach. Pain management clinicians within the Greater Toronto and Hamilton Area were recruited through snowball sampling methods, and individually interviewed. We applied thematic analysis to interview transcripts and identified representative quotes. The Hamilton Integrated Research Ethics Board reviewed and approved this project.

Results: This study utilized a focused ethnography approach. Pain management clinicians within the Greater Toronto and Hamilton Area were recruited through snowball sampling methods, and individually interviewed. We applied thematic analysis to interview transcripts and identified representative quotes. The Hamilton Integrated Research Ethics Board reviewed and approved this project.

Discussion/Conclusions: Despite increasing use of medical cannabis for chronic pain among Canadians, pain physicians in our study expressed concerns regarding the evidence to support this therapy and acknowledged barriers to access.
Predictors of Long-Term Pain After Hip Arthroplasty in Patients With Femoral Neck Fractures: A Cohort Study

Atefeh Noori1, Sheila Sprague2, Sofia Bzovsky3, Emil H Schemitsch4, Rudolf Poolman5, Frede Frihagen6, Daniel Axelrod7, Diane Heels-Ansdell8, Mohit Bhandari9, Jason Busse10

1 McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; 2 McMaster University, Hamilton, Ontario, Canada; 3 McMaster University, Division of Orthopaedic Surgery, Department of Surgery, Hamilton, Ontario, Canada; 4 UWO University Hospital, London, Ontario, Canada; 5 Amsterdam and Leiden University Medical Center, Department of Orthopedic and Trauma Surgery, Leiden, Netherlands; 6 Oslo University Hospital, Division of Orthopaedic Surgery, Oslo, Norway; 7 McMaster University, Division of Orthopaedic Surgery, Department of Surgery, Hamilton, Ontario, Canada; 8 McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; 9 McMaster University, Division of Orthopaedic Surgery, Department of Surgery, Hamilton, Ontario, Canada; 10 McMaster University, Department of Health Research Methods, Evidence, and Impact; Department of Anesthesia; The Chronic Pain Centre of Excellence for Canadian Veterans; The Michael G. DeGroote Centre for Medicinal Cannabis Research, Hamilton, Ontario, Canada

Introduction/Aim: Hip fracture is a frequent event affecting a large number of older adults and associated with impaired mobility, loss of quality of life, and mortality after injury. We aimed to investigate which factors (modifiable and non-modifiable) are associated with moderate-to-severe pain at 12 and 24 months following hip arthroplasty in participants with a displaced femoral neck fracture

Methods: The main outcome measure was moderate-to-severe pain at 12-and 24-months after hip arthroplasty. To determine the predictors of the study outcome we used logistic regression analyses

Results: Of 840 and 726 patients with complete data at 1- and 2-year follow-up, 96 (11.4%) and 80 (11.0%) reported moderate-to-severe pain, respectively. Increased risk of pain at both 1 and 2 years after surgery was associated with moderate-to-severe hip-pain prior to fracture (absolute risk increase [ARI] 15.3%, 95%CI 6.44% to 24.35%; ARI 12.5%, 95%CI 2.85% to 22.12%, respectively), and pre-fracture opioid use (ARI 15.6%, 95%CI 5.41% to 25.89%; ARI 21.1%; 95%CI 8.23% to 34.02%, respectively). Female sex was associated with increased risk of persistent-pain at 1 year (ARI 6.2%, 95%CI 3.53% to 8.84%). Greater risk of persistent-pain at 2 years was associated with younger age (ARI 6.3%; 95%CI 2.67% to 9.91%), and higher pre-fracture functional status (ARI 10.7%; 95% CI 3.80% to 17.64%).

Discussion/Conclusions: Among hip fracture patients undergoing arthroplasty, approximately one in ten experienced moderate-to-severe pain up to 2 years after surgery. Younger age, female sex, higher functioning pre-fracture, living with hip pain pre-fracture, and use of prescription opioids were predictive of persistent-pain.
Opioid-Sparing effects of medical cannabis for chronic pain: A systematic review and meta-analysis of randomized and observational studies

Atefeh Noori1, Anna Miroshnychenko2, Yaadwinder Shergill3, Vahid Ashoorion4, Yasir Rehman5, Rachel Couban6, Norman Buckley7, Lehana Thabane8, Mohit Bhandari9, Gordon H Guyatt10, Thomas Agoritsas11, Jason Busse12

1 McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; 2 McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; 3 McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; 4 McMaster University, Hamilton, Ontario, Canada; 5 McMaster University, Hamilton, Ontario, Canada; 6 McMaster University, Michael G. DeGroote Institute for Pain Research and Care, Hamilton, Ontario, Canada; 7 McMaster University, Department of Anesthesia, Hamilton, Ontario, Canada; 8 McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; 9 McMaster University, Division of Orthopaedic Surgery, Department of Surgery, Hamilton, Ontario, Canada; 10 McMaster University, Hamilton, Ontario, Canada; 11 McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; 12 McMaster University, Department of Health Research Methods, Evidence, and Impact; Department of Anesthesia; The Chronic Pain Centre of Excellence for Canadian Veterans; The Michael G. DeGroote Centre for Medicinal Cannabis Research., Hamilton, Ontario, Canada

Introduction/Aim: Opioids are associated with dose-dependent harms such as overdose and death. As a result, there is interest in therapies that may allow patients with chronic-pain to reduce their opioid intake.

Methods: We included randomized trials and observational studies that enrolled patients with chronic-pain receiving prescription opioids and explored the impact of adding medical cannabis. Pairs of reviewers independently screened studies for eligibility, extracted data, and assessed risk of bias for each outcome. We performed random-effects meta-analyses.

Results: Very low certainty evidence suggests that adding cannabis has little or no impact on opioid use (weighted mean difference [WMD] -3.4 milligram morphine equivalent [MME]; 95% confidence interval [CI] -12.7 to 5.8). High-certainty evidence from 5 RCTs demonstrated that adding cannabis had little or no effect on pain relief (WMD -0.18cm; 95%CI -0.38 to 0.02; on a 10 cm visual analogue scale [VAS] for pain) or sleep disturbance (WMD -0.22 cm; 95%CI -0.4 to -0.06; on a 10 cm VAS for sleep disturbance; minimally important difference is 1 cm) among chronic cancer-pain patients. Addition of cannabis likely increases nausea (relative risk [RR] 1.43; 95%CI 1.04 to 1.96; risk difference [RD] 4%, 95%CI 0% to 7%) and vomiting (RR 1.5; 95%CI 1.01 to 2.24; RD 3%; 95%CI 0% to 6%) (both moderate certainty), and may have little or no effect on constipation (RR 0.85; 95%CI 0.54 to 1.35; RD -1%; 95%CI -4% to 2%) (low certainty).
Discussion/Conclusions: Opioid-sparing effects of medical cannabis for chronic pain remain uncertain due to very-low certainty evidence.
Comparative benefits and harms of individual opioids for chronic noncancer pain: A systematic review and network meta-analysis of randomized trials

Atefeh Noori1, Behnam Sadeghirad2, Li Wang3, Reed A Siemieniuk4, Mostafa Shokoohi5, Elena Kum6, Mark Jeddi7, Luis Montoya8, Patrick Jiho Hong9, Edward Zhou10, Rachel Couban11, David Juurlink12, Lehana Thabane13, Mohit Bhandari14, Gordon H Guyatt15, Jason Busse16

1 McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; 2 McMaster University, Hamilton, Ontario, Canada; 3 McMaster University, Department of Health Research Methods, Hamilton, Ontario, Canada; 4 McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; 5 University of Toronto, Dalla Lana School of Public Health, Toronto, Ontario, Canada; 6 McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; 7 McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; 8 University Health Network, Krembil Research Institute, Orthopedic Surgery Arthritis Program, Toronto, Ontario, Canada; 9 University of Toronto, Department of Anesthesiology and Pain Medicine, Toronto, Ontario, Canada; 10 McMaster University, Department of Family Medicine, Hamilton, Ontario, Canada; 11 McMaster University, Michael G. DeGroote Institute for Pain Research and Care, Hamilton, Ontario, Canada; 12 University of Toronto, Department of Medicine, Toronto, Ontario, Canada; 13 McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; 14 McMaster University, Division of Orthopaedic Surgery, Department of Surgery, Hamilton, Ontario, Canada; 15 McMaster University, Hamilton, Ontario, Canada; 16 McMaster University, Department of Health Research Methods, Evidence, and Impact; Department of Anesthesia; The Chronic Pain Centre of Excellence for Canadian Veterans; The Michael G. DeGroote Centre for Medicinal Cannabis Research., Hamilton, Ontario, Canada

Introduction/Aim: Systematic reviews of opioids for chronic pain have pooled individual opioids under the assumption they provide similar benefits and harms. We examined the comparative effects of individual opioids for chronic noncancer pain through a network meta-analysis of randomized controlled trials.

Methods: We searched MEDLINE, EMBASE, CINAHL, and Cochrane Central Register of controlled trials to March 2021 for studies that enrolled patients with chronic noncancer pain, randomized them to receive different opioids, or opioids vs. placebo, and followed them for at least 4 weeks.

Results: We identified 82 eligible trials (22,619 participants) that evaluated 14 opioids. Compared with placebo, several opioids showed superiority to others for analgesia and improvement in physical function; however, when restricted to pooled-effect estimates supported by moderate certainty evidence, no differences between opioids were evident. Among opioids with moderate-certainty evidence, all increased the risk of gastrointestinal (GI) adverse events compared to placebo, while no opioids were more harmful than others. Low to very-low
certainty evidence suggests that extended vs immediate release opioids may provide similar benefits for pain relief and physical functioning, and GI harms.

**Discussion/Conclusions:** Our findings support the pooling of effect estimates across different types of opioids to inform the effect on chronic noncancer pain and highlights the potential for the SUCRA approach to mislead readers vs. consideration of the certainty of the evidence when making inferences regarding the relative merit of interventions.
Breaking Down the Role of Allostatic Load in the Development of Chronic Pain

Jax Norman¹, Gianluca Guglietti², Christophe Tanguay Sabourin³, Azin Zare⁴, Matthew Fillingim⁵, Etienne Vachon-Presseau
¹ McGill University, Faculty of Dental Medicine and Oral Health Sciences, Montreal, Quebec, Canada; ² McGill University, Faculty of Dental Medicine and Oral Health Sciences, Montreal, Quebec, Canada; ³ McGill University, Integrated Program in Neuroscience, Montreal, Quebec, Canada; ⁴ McGill University, Faculty of Dental Medicine and Oral Health Sciences, Montreal, Quebec, Canada; ⁵ McGill University, Integrated Program in Neuroscience, Montreal, Quebec, Canada; ⁶ McGill University, Faculty of Dental Medicine and Oral Health Sciences, Montreal, Quebec, Canada

Introduction/Aim: Chronic pain is a prevalent and frequently incapacitating condition, affecting the daily functioning of nearly 1 in 5 Canadians. When combined with chronic stress, chronic pain can be especially difficult to manage. Chronic stress and chronic pain reinforce one another. For example, repeated exposure to pain represents a chronic stressor that may lead to allostatic overload. To date, little is known about the biological mechanisms underlying the association between chronic stress and chronic pain. In this study, our primary objective is to examine the relationship between chronic stress and chronic pain, using allostatic load to measure the long-term effects of stress. Our secondary objective is to determine which components of allostatic load are most strongly associated with chronic pain.

Methods: This study used anthropometric, metabolic, cardiovascular and immune system data from the UK Biobank cohort (n=502,413) to create an index of allostatic load. Chronic pain status was categorized as no chronic pain, single site chronic pain or multisite chronic pain using data obtained from pain questionnaires.

Results: Using an ANCOVA to control for age and sex, we found that allostatic load varied significantly between pain groups (F=1813.8, p < 0.0001). We will conduct a principal component analysis to determine which biological factors contribute to the relationship between allostatic load and chronic pain.

Discussion/Conclusions: If we find that specific components of allostatic load are closely associated with chronic pain, this could inform future inquiry into the biological pathways by which stress influences pain and suggest novel avenues for the treatment of chronic pain.
Often ignored: Brain-based developmental disabilities that are underrepresented in pediatric pain assessment research

Samantha Noyek¹, Jenna Jessa², Violeta Faulkner³, Katelynn Boerner⁴, Tammy Dewan⁵, Dacey Doyle⁶, Lara Genik⁷, Stacy Grainger-Schatz⁸, C. Meghan McMurtry⁹, Tim Oberlander¹⁰, Diane Lorenzetti¹¹, Kailyn Turner¹², Kathryn A. Birnie¹³

¹ University of Calgary, , Calgary, Alberta, Canada; ² University of Calgary, , Calgary, Alberta, Canada; ³ University of Calgary, , Calgary, Alberta, Canada; ⁴ University of British Columbia, , Vancouver, British Columbia, Canada; ⁵ University of Calgary, , Calgary, Alberta, Canada; ⁶ N/A, , Edmonton, Alberta, Canada; ⁷ University of Guelph, , Guelph, Ontario, Canada; ⁸ N/A, , Edmonton, Alberta, Canada; ⁹ University of Guelph, , Guelph, Ontario, Canada; ¹⁰ University of British Columbia, , Vancouver, British Columbia, Canada; ¹¹ University of Calgary, , Calgary, Alberta, Canada; ¹² University of Calgary, , Calgary, Alberta, Canada; ¹³ University of Calgary, , Calgary, Alberta, Canada

Introduction/Aim: Youth with brain-based developmental disabilities are more likely to experience acute and chronic pain than their typically developing peers. We recently conducted a systematic review to identify and map the scope of pain assessment measures used with youth with brain-based developmental disabilities. While some brain-based developmental disabilities were commonly studied (e.g., cerebral palsy), others were rarely considered (e.g., Noonan syndrome). For this work, we aimed to understand pain assessment of these lesser studied diagnostic groups.

Methods: CINAHL, Medline, Web of Science, CENTRAL, PsycINFO, and EMBASE were searched in April 2021. Eligible studies were English peer-reviewed articles assessing pain in youth 3-to-24 years old with any brain-based developmental disability. We analysed a subgroup of articles from our broader systematic review that included brain-based developmental disabilities studied in <3 articles.

Results: Of the 644 included articles in the larger systematic review, 94 (14.6%) articles studied brain-based developmental disabilities that appeared in <3 articles. These represented 32 different conditions. Studies covered early childhood: ages 3-5 (n=57;60.6%), middle childhood: ages 6-11 (n=80;85.1%), early adolescence: ages 12-18 (n=81;86.2%), and late adolescence/young adulthood: ages 19-24 (n=39;41.5%). Fifty-nine studies assessed acute pain; 69 studies assessed chronic pain. Observer report (n=53; 56.4%) was more common than youth self-report (n=18;19.1%). Pain outcomes included intensity/severity (n=60; 63.8%), prevalence (n=49;52.1%), frequency (n=19;20.2%), interference (n=12;12.8%), and location (n=7;7.4%).

Discussion/Conclusions: This review explores the many brain-based developmental disabilities that are understudied in the pain assessment literature. This is a critical priority for future research.
Human Synovial Fluid Sensitizes Joint Nociceptors Via Activation of Proteinase Activated Receptor-4

Melissa O'Brien¹, Jason McDougall²

¹ Dalhousie University, Pharmacology and Anesthesia, Halifax, Nova Scotia, Canada; ² Dalhousie University, Pharmacology and Anesthesia, Halifax, Nova Scotia, Canada

Introduction/Aim: Evidence suggests that the chemical mediators found within synovial fluid (SF) contribute to pain associated with osteoarthritis (OA) and rheumatoid arthritis (RA). Proteinases are elevated in arthritic joints and cleavage of proteinase activated receptors (PARs) has been shown to activate joint nociceptors and cause pain in rodents; however, few studies have investigated whether SF proteases contribute to arthritic pain. The aim of this study was to investigate whether human SF can sensitise joint afferents.

Methods: In vivo single unit electrophysiology was used to measure joint nociceptor activity in naïve male Wistar rats (307-517g). Upon identification of a joint nociceptor, animals were pretreated with either a PAR4 antagonist (pepducin P4pal10; 100 µg) or saline (100 µl) via the saphenous artery. Ten minutes later, human OA or RA SF (100 µl) was administered via the same route. Joint mechanosensation was measured over a two-hour period and spontaneous activity of nociceptors was determined.

Results: Both OA and RA SF significantly increased both evoked and spontaneous joint afferent firing (p<0.05, 2-way RM ANOVA, n= 5-9). PAR4 blockade attenuated evoked sensitisation in both treatment cohorts (p<0.05, 2-way RM ANOVA), but only reduced spontaneous firing in animals treated with RA SF (p<0.05, 1-way ANOVA).

Discussion/Conclusions: These findings suggest that arthritic synovial fluid is capable of directly sensitising joint nociceptors in part by activating PAR4. Since PAR4 involvement was more pronounced against RA SF, the role of serine proteinases in inflammatory joint pain merits further study.
Subgrouping Chronic Musculoskeletal Pain in Adolescents: Psychosocial, Somatosensory and Pain Modulation Profiles

Don Daniel Ocay¹, Cynthia Larche², Natalie Betinjane³, Alexandre Jolicoeur⁴, Marie-Josée Beaulieu⁵, Neil Saran⁶, Jean A. Ouellet⁷, Pablo M. Ingelmo⁸, Catherine E. Ferland⁹

¹ McGill University, Montreal, Quebec, Canada; ² Shriners Hospitals for Children - Canada, Montreal, Quebec, Canada; ³ Shriners Hospitals for Children - Canada, Montreal, Quebec, Canada; ⁴ Shriners Hospitals for Children - Canada, Montreal, Quebec, Canada; ⁵ Shriners Hospitals for Children - Canada, Montreal, Quebec, Canada; ⁶ McGill University, Montreal, Quebec, Canada; ⁷ McGill University, Montreal, Quebec, Canada; ⁸ McGill University, Montreal, Quebec, Canada; ⁹ McGill University, Montreal, Quebec, Canada

Introduction/Aim: A major limitation in treatment outcomes for chronic pain is the heterogeneity of the population. Moreover, there is strong evidence on the efficacy or risk supporting the use pharmacological treatments in pediatric chronic pain. The objective of the study is to subgroup pediatric patients with chronic MSK pain that will be phenotypically different from each other based on their psychosocial profile, somatosensory function, and pain modulation.

Methods: This observational cohort study recruited 302 adolescents (10-18 years) with chronic musculoskeletal pain and 80 age-matched controls. After validated self-report questionnaires on pain and quality of life were completed, quantitative sensory testing (QST) and conditioned pain modulation (CPM) was performed.

Results: Three psychosocial subgroups were identified: adaptive pain (n=125), high pain dysfunctional (n=115), high somatic symptoms (n=62). The subgroups identified also differed based on their pain intensity the day of the assessment, and their average, worst and best pain over the last month. Thermal hyperalgesia was the most common somatosensory profile (n=98), followed by mechanical hyperalgesia (n=34) and sensory loss (n=15). Conditioned pain modulation was optimal in 43% of the patients, and temporal summation pain was present in 15% of the patients.

Discussion/Conclusions: Screening self-reported questionnaires, QST, and CPM facilitate subgrouping of adolescents with chronic MSK pain in the clinical context. The combination may allow recognition of different subgroups of patients with chronic MSK pain and may ultimately contribute to personalized therapy.
Evaluation of the effect of one session of hypnotherapy administered prior to general anesthesia induction on intraoperative nociception measured by the NOL index: the HYPNOSTIMNOL study.

David Ogez1, Amraoui Jibba2, Louis Morisson3, Pierre Iskandar4, Olivier Verdonck5, Pierre Rainville6, Moulay Idrissi7, Godin Nadia8, Philippe Richebé9

1 Maisonneuve-Rosemont Hospital, CIUSSS de l'Est de l'Ile de Montreal, University of Montreal, Department of Anesthesiology and Pain Medicine, Montreal, Quebec, Canada; 2 Maisonneuve-Rosemont Hospital, CIUSSS de l'Est de l'Ile de Montreal, University of Montreal, Department of Anesthesiology and Pain Medicine, Montreal, Quebec, Canada; 3 Maisonneuve-Rosemont Hospital, CIUSSS de l'Est de l'Ile de Montreal, University of Montreal, Department of Anesthesiology and Pain Medicine, Montreal, Quebec, Canada; 4 Maisonneuve-Rosemont Hospital, CIUSSS de l'Est de l'Ile de Montreal, University of Montreal, Department of Anesthesiology and Pain Medicine, Montreal, Quebec, Canada; 5 Maisonneuve-Rosemont Hospital, CIUSSS de l'Est de l'Ile de Montreal, University of Montreal, Department of Anesthesiology and Pain Medicine, Montreal, Quebec, Canada; 6 University of Montreal, Department of Anesthesiology and Pain Medicine, Montreal, Quebec, Canada; 7 Maisonneuve-Rosemont Hospital, CIUSSS de l'Est de l'Ile de Montreal, University of Montreal, Department of Anesthesiology and Pain Medicine, Montreal, Quebec, Canada; 8 Maisonneuve-Rosemont Hospital, CIUSSS de l'Est de l'Ile de Montreal, University of Montreal, Department of Anesthesiology and Pain Medicine, Montreal, Quebec, Canada

Introduction/Aim: To explore the variations of NOL index, heart rate (HR), mean arterial pressure (MAP) and BIS index to assess the impact of hypnotherapy on the nociception induced by an experimental tetanic stimulus applied after intubation under anesthesia with minimal opioids doses.

Methods: A randomized-double-blind-trial was conducted in 50 patients scheduled for laparoscopic surgery under GA. A preinduction hypnotherapy session offering a safe place and suggestions for pain and well-being management was compared with a control that included non-hypnotic language (25 participants/group). HR, MAP, BIS, NOL were recorded every 5 seconds, for 5 minutes. Delta NOL, difference post and pretetanic stimulation was the primary endpoint; area under the curve (AUC) of NOL, changes in BIS, HR, MAP were secondary endpoints. We expected delta NOL in the hypnotherapy group to be 30% lower than without hypnotherapy.

Results: Baseline values of NOL, HR, MAP, BIS were similar between the two groups before tetanic stimulation under GA. After tetanic stimulation, the delta of NOL and AUC of NOL were similar between the two groups. The deltas of HR, MAP, BIS also showed similar variations between the two groups after tetanic stimulation.

Discussion/Conclusions: Expected 30% reduction in NOL reactivity was not achieved. Alterations in HR, MAP, BIS after noxious stimulation in hypnotherapy group were similar to those in non-hypnotic conversation group. Studies showed that hypnotherapy has an impact on
pain perception in an awake patient. This effect seems to disappear in GA patients. Expectations of a significant effect of hypnotherapy on intraoperative nociception might be reconsidered.
Defining Success in Transitions from Pediatric to Adult Chronic Pain Care: A Descriptive Qualitative Study of Perspectives of Young Adults Living with Chronic Pain

Julie Oreper¹, Ayesha Khalid², Sarah Sheffe³, Nida Mustafa⁴, Kyle Vader⁵, Rachael Bosma⁶

¹ University of Toronto, Department of Occupational Science and Occupational Therapy, Toronto, Ontario, Canada; ² University of Toronto, Department of Occupational Science and Occupational Therapy, Toronto, Ontario, Canada; ³ Women's College Hospital, Toronto Academic Pain Medicine Institute, Toronto, Ontario, Canada; ⁴ Women's College Hospital, Toronto Academic Pain Medicine Institute, Toronto, Ontario, Canada; ⁵ Queen's University, School of Rehabilitation Therapy, Kingston, Ontario, Canada; ⁶ Women's College Hospital, Toronto Academic Pain Medicine Institute, Toronto, Ontario, Canada

Introduction/Aim: The transition from pediatric to adult chronic pain care can be stressful for young adults. Previous research has explored the needs and the barriers young adults face during this transition. However, young adults’ perspectives on what a successful transition of their chronic pain care entails are not yet well understood. This study aims to explore how young adults with chronic pain define a successful transition from pediatric to adult chronic pain care, and how they would like to be empowered to achieve a successful transition.

Methods: A descriptive qualitative study involving semi-structured interviews was used to understand the perspectives of young adults with chronic pain. Interviews were audio-recorded, transcribed verbatim, and reviewed for accuracy. Qualitative inductive content analysis was used to analyze the interview data.

Results: Eight young adults with chronic pain were interviewed (all women; median age = 19 years). Five themes that addressed the study objectives are described: (1) young adults value skill-building and knowledge about transition, (2) establishing a strong therapeutic alliance with healthcare providers, (3) coordinated and planned transition, (4) social and environmental support during the transition, and (5) respect for young adults’ independence and autonomy.

Discussion/Conclusions: Findings suggest the need for a collaborative, and individualized approach for the successful transition of young adults across the continuum of chronic pain care which addresses their unique needs. To promote successful transition, clinicians should support young adults’ skills and knowledge of the transition, validate their pain and its impact on daily life, and ensure they have access to appropriate resources and supports.
Pamabrom inhibits the nociception in the 1% rat formalin test: Participation of opioid receptor and K+ channels

Mario I Ortiz¹, Raquel Cariño-Cortés², Gilberto Castañeda-Hernández³

¹ Área Académica de Medicina del Instituto de Ciencias de la Salud de la Universidad Autónoma del Estado de Hidalgo, Pachuca, Hidalgo, Mexico.; ² Área Académica de Medicina del Instituto de Ciencias de la Salud. Universidad Autónoma del Estado de Hidalgo, Pachuca, Hidalgo, Mexico.; ³ Centro de Investigación y de Estudios Avanzados del Instituto Politécnico Nacional, Ciudad de México, Mexico.

Introduction/Aim: The aim of this study was to examine the effect of metformin, naloxone and modulators of K+ channels pathway on the local peripheral antinociceptive action induced by pamabrom.

Methods: The rat paw 1% formalin test was used to assess nociception and antinociception. Fifty microliters of formalin solution were administered subcutaneously in the right paw, and the number of flinches were quantified. Both phases of the test were evaluated. Rats were treated with local peripheral administration of pamabrom (200-800 µg/paw ipsilateral or 800 µg/paw contralateral). The antinociception of pamabrom (800 µg/paw) was evaluated with and without the local pretreatment of naloxone (opioid receptor antagonist), K+ channel blockers and metformin (a hypoglycemic biguanide).

Results: Local peripheral administration of pamabrom produced a dose-dependent antinociception during the second phase of the test. Pamabrom-induced antinociception was due to a local action as its administration in the contralateral paw was ineffective. Local peripheral pretreatment of the paws with glibenclamide or glipizide (10-100 µg/paw)( K ir 6.1-2; ATP-sensitive K+ channel blockers), 4-aminopyridine or tetraethylammonium (10-100 µg/paw)(K V; voltage-gated K+ channel blockers), charybdotoxin (0.1-2 µg/paw) (K Ca 1.1; big conductance calcium-activated K+ channel blocker), apamin (0.1-2 µg/paw) (K Ca 2.1–3; small conductance Ca2+-activated K+ channel blocker), metformin and naloxone reduced the antinociception induced by pamabrom.

Discussion/Conclusions: Our data suggest that pamabrom could activate the opioid receptor-K+ channels pathway in order to produce its peripheral antinociceptive effect in the rat 1% formalin test. Likewise, a biguanides-dependent mechanism could be activated by pamabrom consecutively to generate its peripheral antinociceptive effect.
Concrete solutions to improve health and maintain care for individuals living with chronic pain: Lessons learned from the COVID-19 pandemic

M. Gabrielle Pagé, Tristan Spilak, Anais Lacasse, Lise Dassieu, Marimée Godbout-Parent, Manon Choinière

Introduction/Aim: The COVID-19 pandemic and related public health restrictions exacerbated existing treatment gaps and inequities, thus creating an urgent need for research and clinical communities to rapidly implement solutions. The study objective was to perform a state-of-the-art review of published chronic pain treatment recommendations in the context of the pandemic to develop a set of synthesized recommendations.

Methods: Search strategy included a combination of chronic pain and pandemic/COVID-19 related terms. Three databases (MEDLINE, PsycInfo, CINAHL) and the grey literature were searched, and records assessed for eligibility. Original studies, reviews, editorials, and guidelines published in peer-reviewed journals or by recognized pain organizations were considered for inclusion.

Results: Of the 1,096 records screened, 119 were included in the review. These articles contained more than 250 recommendations grouped and synthesized into six broad categories: change in clinical practice (treatments, continuity of care, health care delivery modalities), policy change, research avenues, communication and education, lifestyle, and social considerations. For example, policy change recommendations included the reimbursement of out-of-pocket or out-of-network treatments and funding for telehealth services. Continuity of care-related recommendations for example included identifying and implementing strategies to ensure continuity of care while minimizing risks of inappropriate analgesic treatments.

Discussion/Conclusions: The COVID-19 pandemic led to important disruptions of chronic pain management in an already fragile ecosystem. This provided a unique opportunity to understand ongoing challenges and identify innovative solutions. Numerous and diverse recommendations were identified and will serve as the foundation for a national consensus conference to identify priorities in pain management practices and policies.
Expectation bias in pain perception is predicted by higher segregation between resting state networks

Veronika Pak¹, Javeria Ali Hashmi²
¹ Nova Scotia Health, Department of Anesthesia, Pain Management & Perioperative Medicine, Halifax, Nova Scotia, Canada; ² Nova Scotia Health, Dalhousie University, Department of Anesthesia, Pain Management & Perioperative Medicine, Halifax, Nova Scotia, Canada

Introduction/Aim: Top-down processes such as expectations have a strong influence on pain perception. Some people are more biased towards expectations than nociceptive inputs communicated through pain pathways. Previously it has been shown that less functional connectivity between known resting-state networks (system segregation) predicts placebo analgesia. Although associated with cognition and motivation, whether system segregation is a factor through which expectations alter pain, is still unclear.

Methods: Healthy control subjects (n=39) answered pain, disability, and mood questionnaires. Subsequently, they underwent resting-state functional MRI (fMRI) followed by pain tasks that measured the effect of expectation on pain ratings. Participants were assigned to a high bias group or a low bias group based on their results from the task. We tested whether individuals who rely more on expected intensity of pain (high bias) have higher System Segregation (SS) in their brain relative to those who rely less on expectations (low bias).

Results: SS during resting-state predicts bias in pain perception at a wide range of network thresholds when tested with three different brain parcellations. Age was a significant effect: mid-age participants showed less SS and less bias. Greater SS in brain networks predicted higher depression, anxiety and pain catastrophizing scores. Participants in the high bias group showed significant change in SS from rest-to-task scans compared to people in the low bias group.

Discussion/Conclusions: These findings highlight the role of global characteristics of brain networks in mediating the effects of expectations on pain.
Virtual delivery of group-based psychotherapy for chronic pain: A qualitative exploration of treatment experiences

Catherine Paré¹, Emily Moore², M. Gabrielle Pagé³, Estelle Carde⁴

¹ McGill University, Department of Psychology, Montréal, Quebec, Canada; ² Stanford University, Department of Anesthesiology, Perioperative and Pain Medicine, Palo Alto, California, United States; ³ Université de Montréal, Department of Anesthesiology and Pain Medicine, Montréal, Quebec, Canada; ⁴ Université de Montréal, Department of Sociology, Montréal, Quebec, Canada

Introduction/Aim: The COVID-19 pandemic required a rapid adaptation to virtual healthcare delivery, including group psychotherapy. The purpose of this study was to understand the experiences of patients participating in virtual group psychotherapy in the context of a multidisciplinary pain treatment program, including the barriers and facilitators of engaging in this form of treatment.

Methods: We conducted semi-structured interviews with 20 adults living with chronic pain who were currently engaged in treatment at a tertiary care multidisciplinary pain clinic who participated in a course (5 sessions) of virtual group psychotherapy. Data were analyzed using thematic analysis, through an inductive and constructionist lens.

Results: The majority of participants were women (N = 15), and the average time living with chronic pain was 9 years. Preliminary investigations of participant interviews have led to the creation of the following themes: the connection between participants was modified by the absence of an in-person context (e.g., fewer logistical and physical difficulties) and the presence of a virtual context (e.g., perception of others and self through a screen, being at home while in group therapy). Overall, most participants reported benefitting from their connection with other people living with chronic pain; this has to be understood taking into account virtual delivery mode and contextual factors such as the ongoing COVID-19 pandemic.

Discussion/Conclusions: The results of the current study have implications for the management of pain for patients in multidisciplinary pain treatment centres, and reflect a global transition and increased acceptability of virtual treatments in healthcare settings.
Changes in wellbeing in patients with chronic pain attending an intensive virtual chronic pain management program during the COVID-19 Pandemic.

Jiyeon Park¹, Jennifer Anthonypillai², Eleni G Hapidou³

¹ McMaster University, School of Interdisciplinary Science, Waterdown, Ontario, Canada; ² McMaster University and Hamilton Health Sciences, Hamilton, Ontario, Canada; ³ McMaster University and Hamilton Health Sciences, Department of Psychiatry and Behavioral Neurosciences, Department of Psychology, Neuroscience and Behavior (PNB), Hamilton, Ontario, Canada

Introduction/Aim: Chronic pain may result in a decline of one’s wellbeing and is strongly linked to depression and anxiety. The aims of the study were: a) to examine changes in wellbeing in patients with chronic pain after attending an intensive virtual interdisciplinary pain management program; b) examine the association between the Subjective Happiness Scale (SHS) and measures of psychological distress at admission and discharge; c) identify whether SHS scores predict changes in depression, anxiety, catastrophizing, and pain acceptance.

Methods: Data were collected from participants of the intensive virtual interdisciplinary pain management program at the Michael G. DeGroote Pain Clinic in Hamilton, ON June 2020 - July 2021 (n=50, 44% females, 52% Veterans). Participants completed a number of psychometrics measuring emotional distress, acceptance of pain, and subjective happiness.

Results: ANOVAs demonstrated highly significant changes in participants’ outcomes in all but the SHS for all patients at discharge. Depression, anxiety, catastrophizing, and pain acceptance improved significantly at discharge (p < 0.001) but SHS did not (p > 0.05). However, the SHS was significantly associated with all these measures at both admission and discharge (p <0.05). Regression analysis is underway.

Discussion/Conclusions: Results highlight the effectiveness of the program in decreasing emotional distress in patients with chronic pain. The fact that happiness scores did not change significantly may reflect the effects of the COVID pandemic. However, happiness scores and measures of emotional distress were significantly associated with each other. The predictive model will be reported by the time of the presentation of this poster.
Cannabinoid CB1 receptor expression and localization in the dorsal horn of male and female human and rat spinal cord tissue

Jessica Parnell¹, Christopher Rudyk², Annemarie Dedek³, Jeffrey Landrigan⁴, Eve Tsai⁵, Michael Hildebrand⁶

¹ Carleton University, Neuroscience, Ottawa, Ontario, Canada; ² Carleton University, Neuroscience, Ottawa, Ontario, Canada; ³ Carleton University, Neuroscience, Ottawa, Ontario, Canada; ⁴ Carleton University, Neuroscience, Ottawa, Ontario, Canada; ⁵ Ottawa Hospital Research Institute, Neuroscience, Ottawa, Ontario, Canada; ⁶ Carleton University, Neuroscience, Ottawa, Ontario, Canada

Introduction/Aim: Preclinical and clinical evidence suggests that cannabis, a potent cannabinoid, has potential analgesic properties. However, there is a gap in the literature in respect to cannabinoid receptor expression and localization in the spinal cord across both sex and species, with almost nothing known in humans. We aim to investigate the differential expression of the cannabinoid type 1 receptor (CB1R) across dorsal horn laminae and cell populations. Comparisons will also be made between sex and species.

Methods: We used immunohistochemistry to examine the expression of CB1Rs in the spinal dorsal horn of male and female adult rats and humans, and quantified localization of CB1Rs within different spinal cord cell types, labelled with secondary markers. Human spinal cord samples were collected from organ donors 1-3 hours post-aortic cross-clamping.

Results: We have successfully refined and applied staining procedures from rats to fixed human tissue and found robust expression of CB1Rs in the human superficial dorsal horn. We are quantifying the relative distribution of CB1Rs in the superficial dorsal horn (labelled with CGRP) compared to the deep dorsal horn. We are also quantifying the relative localization of CB1Rs to primary pain afferents (CGRP) versus expression in dorsal horn neurons (NeuN), astrocytes (GFAP) and microglia (Iba1). Comparisons of CB1R expression are being made across sex and species to identify where CB1 signaling may converge or diverge across these variables.

Discussion/Conclusions: The preferential expression of CB1Rs in the superficial dorsal horn across both sex and species has significant implications for both the understanding and the treatment of pain.
Chronic Pain in Survivors of Childhood Cancer

Michaela Patton¹, Victoria Forster², Caitlin Forbes³, Mehak Stokoe⁴, Melanie Noel⁵, Linda Carlson⁶, Kathryn Birnie⁷, Kathleen Reynolds⁸, Fiona Schulte⁹

¹ University of Calgary, Department of Psychology, Calgary, Alberta, Canada; ² Hospital for Sick Children, Toronto, Ontario, Canada; ³ Alberta Children's Hospital, Calgary, Alberta, Canada; ⁴ Alberta Children's Hospital, Calgary, Alberta, Canada; ⁵ University of Calgary, Calgary, Alberta, Canada; ⁶ University of Calgary, Calgary, Alberta, Canada; ⁷ University of Calgary, Calgary, Alberta, Canada; ⁸ Alberta Children's Hospital, Calgary, Alberta, Canada; ⁹ University of Calgary, Calgary, Alberta, Canada

Introduction/Aim: Many survivors of childhood cancer (SCC) experience late- and long-term effects from their treatments, including pain. Yet, pain is poorly understood among SCC. The current study aimed to: 1a) describe prevalence and multiple dimensions of pain; 1b) identify patterns of chronic pain; and 2) test correlates of chronic pain in SCC.

Methods: Survivors [n=140; 48.6% male, M age =17.3 years (Range=8-25)] were recruited from across Canada. Participants completed the Pain Questionnaire, Pain Catastrophizing Scale, Patient Reported Outcome Measurement Information System (PROMIS) – Pain Interference, Anxiety, and Depression scales, Child Posttraumatic Stress Scale, and the Posttraumatic Stress Disorder Checklist for the Diagnostic Statistical Manual of Mental Disorders (Version 5).

Results: Twenty-six percent of SCC reported experiencing chronic pain (i.e., pain lasting 3 months or more). An exploratory cluster analysis showed 20% of survivors had moderate to severe chronic pain based on measures of pain intensity and interference. The combination of higher posttraumatic stress symptoms, older current age, higher pain catastrophizing, and sex (being female) significantly predicted the presence of chronic pain, \( \chi^2(4, N = 107) = 28.10, p < .001 \). Higher pain catastrophizing (OR = 1.09; 95% CI = 1.02-1.16), older current age (OR = 1.20; 95% CI = 1.07-1.34), and higher posttraumatic stress symptoms (OR = 1.92; 95% CI = 1.01-3.63) significantly predicted chronic pain.

Discussion/Conclusions: SCC should be screened for the presence and impact of chronic pain during long-term follow-up visits so appropriate interventions can be offered and implemented. Future research should investigate pain and trauma interventions tailored for this population.
Negative Interpretation Bias Predicts Pediatric Chronic Pain Outcomes

Maria Pavlova¹, Lauren Heathcote², Sabine Soltani³, Melanie Noel⁴

¹ University of Calgary, Department of Psychology, Calgary, Alberta, Canada; ² King's College London, Institute of Psychiatry, Psychology, and Neuroscience, London, United Kingdom; ³ University of Calgary, Department of Psychology, Calgary, Alberta, Canada; ⁴ University of Calgary, Department of Psychology, Calgary, Alberta, Canada

Introduction/Aim: Pediatric chronic pain is prevalent, debilitating, and costly. Interpretation biases (i.e., interpreting ambiguous information as negative/threatening) have been argued to play an important role in chronic pain. Youth with chronic pain tends to forego benign interpretations of health-related information, which, in turn, has been associated with higher functional disability levels. To date, no prospective studies examined whether interpretation bias predicts future pain outcomes. The study aimed to fill this gap by examining the predictive role of health-related interpretation bias in pediatric chronic pain outcomes.

Methods: One hundred and fifty youth aged 10 to 18 years (73% girls, M age =14.17) completed baseline questionnaires assessing their average pain intensity and interference. One week later, youth completed the Adolescent Interpretation Bias Task (AIBT) that included 16 vignettes describing ambiguous health-related situations, as well as negative and benign interpretations of each situation. Youth then rated how likely each interpretation was to occur to them and how likely they were to believe each of the interpretations. Three months later, youth reported their pain characteristics.

Results: Negative interpretation bias was related to worse pain intensity and interference at follow-up. The more likely negative interpretations were to occur to youth, the higher pain interference they reported three months later, controlling for the baseline levels of pain interference, age, and gender, $\beta = 0.25$, $p = .002$.

Discussion/Conclusions: This is the first study to examine the predictive role of interpretation bias in pediatric chronic pain outcomes. Biased interpretation of ambiguous health-related information is a promising therapeutic target in pediatric chronic pain.
Perioperative regional anesthesia on persistent opioid use and chronic pain after noncardiac surgery: A systematic review and meta-analysis

Connor G. Pepper¹, John S. Mikhaeil², James S. Khan³

¹ McMaster University, Department of Anesthesia, Hamilton, Ontario, Canada; ² University of Toronto, Department of Anesthesia and Pain Medicine, Toronto, Ontario, Canada; ³ University of Toronto, Department of Anesthesia and Pain Medicine, Toronto, Ontario, Canada

Introduction/Aim: While regional anesthesia is an effective strategy for improved perioperative pain control, it is unclear on whether regional anesthesia improves long-term pain outcomes such as chronic post-surgical pain and prolonged opioid use after surgery. We conducted a systematic review and meta-analysis to evaluate an effect of regional anesthesia on these outcomes.

Methods: Four databases (MEDLINE, EMBASE, CENTRAL, and CINAHL) were searched for randomized controlled trials that included adult patients undergoing elective non-cardiac surgeries that utilized any regional technique and reported on prolonged opioid use (opioid use ≥2-months post-surgery) and/or chronic post-surgical pain (pain ≥3-months post-surgery). Meta-analyses were conducted if ≥2 studies reported on an outcome.

Results: Twenty-nine studies (n = 4523) were included into the review. Regional anesthesia significantly reduced the rates of chronic pain at three months (odds ratio [OR] 0.54, 95% CI 0.42-0.71, p <0.001, 10 studies [1133 patients] I²=0%) and at six months (OR 0.83, 95% CI 0.71-0.97, p = 0.02, 12 studies [2845 of patients], I²=46%) postoperatively. Pooled results also indicated that regional anesthesia reduced the rate of prolonged opioid use after surgery (OR 0.42, 95% CI 0.20-0.91, p = 0.03, 5 studies [348 patients], I²=0%).

Discussion/Conclusions: Our results suggest that regional anesthesia decreases the incidence of prolonged opioid use, as well as chronic post-surgical pain at 3- and 6-months after surgery.
Predicting treatment response with sensory phenotyping in post-traumatic neuropathic pain

Olaposi Peters¹, John Markman², Michael Sohn³, Rachel De Guzman⁴, Maria Frazer⁵, Valerie Chiodo⁶, Sonia Sharma⁷, Paul Geha⁸, Jennifer Gewandter⁹

¹ University of Rochester, School of Arts and Sciences, Rochester, New York, United States; ² University of Rochester School of Medicine and Dentistry, Department of Neurosurgery, DISRUPT Program, Rochester, New York, United States; ³ University of Rochester School of Medicine and Dentistry, Department of Biostatistics and Computational Biology, Rochester, New York, United States; ⁴ University of Rochester, Rochester, Department of Neurosurgery, DISRUPT Program, Rochester, New York, United States; ⁵ University of Rochester, Rochester, Department of Neurosurgery, Rochester, New York, United States; ⁶ University of Rochester, Translational Pain Research Program Department of Neurosurgery, Rochester, New York, United States; ⁷ University of Rochester, Department of Neurosurgery, DISRUPT Program, Rochester, New York, United States; ⁸ University of Rochester, Department of Psychiatry, University of Rochester, Rochester, New York, United States; ⁹ University of Rochester, Department of Anesthesiology and Perioperative Medicine, University of Rochester, Rochester, New York, United States

Introduction/Aim: Induced-pain or gain-of-function phenotypes, have been shown to predict response to analgesics (vs. placebos) in patients with neuropathic pain. However, the predictive value of these phenotypes has never been studied in post-traumatic neuropathic pain.

Methods: Mixed-effects model for repeated measures (MMRM) were used to evaluate the efficacy of pregabalin vs. placebo in subgroups with induced-pain phenotypes (i.e., hyperalgesia or allodynia) using data from a recent, multi-national RCT (N=539) that identified phenotypic subgroups using a structured clinical exam.

Results: The difference in mean pain score after 15 weeks of treatment for the subgroup with hyperalgesia was -0.76 (p=0.001), compared to 0.19 (p=0.47) for the subgroup that did not have hyperalgesia. The treatment-by-phenotype interaction was significant (p=0.0067).

Discussion/Conclusions: These data suggest that hyperalgesia predicts response to pregabalin in patients with chronic pain associated with peripheral nerve injury. Sensory phenotyping in large, multi-site trials using a structured clinical exam has the potential to accelerate the development of new analgesics and improve the generalizability of clinical trial results.
Effect of a book aimed at improving parent-child interactions on a parent's chronic pain

Anne-Marie Pinard¹, Gabrielle Fortin², Sélena Fréchette³, Émilie Langlois⁴

¹ Université Laval, Faculté de médecine, Québec, Quebec, Canada; ² Université Laval, École de travail social et de criminologie, Québec, Quebec, Canada; ³ Université Laval, École de travail social et de criminologie, Québec, Quebec, Canada; ⁴ Université Laval, Psychologie, Québec, Quebec, Canada

Introduction/Aim: The chronic pain of a parent has a high impact on the whole family, especially on the roles of each member and their communication. However, chronic pain is difficult to explain to children. Goupil and Miville (2018) wrote a book entitled “Y’a de la visite” to illustrate the place occupied by pain and the different ways of dealing with it daily. A pictorial and descriptive pain scale is also provided to support the parent in grading and communicating their pain. This exploratory research evaluates the impact and effectiveness of the book, as well as the scale, on parent-child communication about chronic pain.

Methods: A qualitative design was used. Two semi-structured interviews were conducted two months apart with 11 parents with chronic pain and their children aged 6 to 10 years. The data collected were analyzed using Paillé & Mucchielli’s (2012) method of thematic content analysis.

Results: The analysis of the results highlights that age and prior communication about pain before reading the book influences children’s understanding and interest. In addition to allowing the emergence of new strategies and new discussions, the book helps most children to better understand the pain of the parent and its impacts. The pain scale is also a facilitating tool to support discussions.

Discussion/Conclusions: This study highlights the importance of a French-language book such as “Y’a de la visite” as a tool for communication and for maintaining positive parent-child discussions about chronic pain.
Effect of direct physiotherapy management of patients with chronic low back pain on the waiting list at the CHUL pain clinic.

Anne-Marie Pinard¹, Élodie Traverse², Orlane Ballot³, Catherine Gauthier⁴, Jean-François Canuel⁵, Hugo Massé-Alarie⁶

¹ Centre d'Expertise en Gestion de la Douleur Chronique au CHUL du Chu de Québec - Université Laval; Centre Interdisciplinaire de Recherche en Réadaptation et Intégration Sociale., Québec, Quebec, Canada; ² Centre d'Expertise en Gestion de la Douleur Chronique au CHUL du Chu de Québec - Université Laval; Centre Interdisciplinaire de Recherche en Réadaptation et Intégration Sociale., Québec, Quebec, Canada; ³ Centre d'Expertise en Gestion de la Douleur Chronique au CHUL du Chu de Québec - Université Laval; Centre Interdisciplinaire de Recherche en Réadaptation et Intégration Sociale., Québec, Quebec, Canada; ⁴ Centre d'Expertise en Gestion de la Douleur Chronique au CHUL du Chu de Québec - Université Laval, Québec, Quebec, Canada; ⁵ Centre d'Expertise en Gestion de la Douleur Chronique au CHUL du Chu de Québec - Université Laval, Québec, Quebec, Canada; ⁶ Centre Interdisciplinaire de Recherche en Réadaptation et Intégration Sociale., Québec, Quebec, Canada

Introduction/Aim: Physiotherapy is an important part of the treatment of low back pain, improving the patient’s quality of life and access to health care. This study aims to evaluate impact of physiotherapy preceding medical evaluation at the chronic pain clinic on functional abilities and pain impact of low back pain patients.

Methods: Low back pain patients on waiting list at the pain clinic were recruited and had six physiotherapy sessions over 12 weeks. Patients and physiotherapist completed pre- and post-treatment evaluations, which will be used in Wilcoxon analyses. Physiotherapy assessments included functional (distance/speed) and neural mobility measurements. The questionnaires assessed catastrophizing (PCS), pain impact on functional abilities (ODI) and specified domains (CMDS – i.e, sleep).

Results: Twelve patients (63.8 years old ±13.4; 67% women) were included, with PCS score of 27.3 (±5.7) and ODI score of 17.5 (±5.5). Preliminary results show significant improvement on neural mobility test (p < 0.05) and functional mobility test (walking distance in six minutes; p = 0.05). However, no significant improvement is observed on the pre post questionnaires (except for sleep p = 0.05 on CMDS). 83% of patients wanted to meet with the anesthesiologist, mostly for medication adjustment. 50% of the consultations were relevant according to the anesthesiologist.

Discussion/Conclusions: Even if the preliminary results are neutral, it is likely that subsequent analyzes will allow us to revise our trajectory to be more efficient and better targeted. Knowledge mobilization is essential to improve family physician’s evaluation and treatment, and access to early readaptation is essential.
Sex differences in the development of chronic pain following mild traumatic brain injury in youth

Atiqa Pirwani¹, Melanie Noel², Miriam Beauchamp³, William Craig⁴, Quynh Doan⁵, Roger Zemek⁶, Keith Yeates⁷

¹ University of Calgary, Psychology, Calgary, Alberta, Canada; ² Psychology, University of Calgary, Calgary; Research Institute, Alberta Children's Hospital; Hotchkiss Brain Institute, University of Calgary, Calgary, Alberta, Canada; ³ Department of Psychology, Universite de Montreal and Ste Justine Hospital, Montreal, Quebec, Canada; ⁴ Department of Pediatrics, University of Alberta and Stollery Children's Hospital, Edmonton, Alberta, Canada; ⁵ Department of Pediatrics, University of British Columbia and BC Children's Hospital, Vancouver, British Columbia, Canada; ⁶ Department of Pediatrics and Emergency Medicine, Children's Hospital of Eastern Ontario, Ottawa, Ontario, Canada; ⁷ Psychology, University of Calgary, Calgary Research Institute, Alberta Children's Hospital, Hotchkiss Brain Institute, University of Calgary, Calgary, Alberta, Canada

Introduction/Aim: Mild traumatic brain injury (mTBI) can be debilitating, especially due to the associated symptoms. Headache pain is the most common symptom, which can persist and become chronic. Girls tend to experience a higher prevalence of chronic pain than boys. However, little is known about how sex differences influence the transition from acute to chronic pain following mTBI. Therefore, this study explored the role sex has on a child’s reporting of post-injury pain from shortly after mTBI to 3 and 6 months later.

Methods: The sample included children with mTBI (N=700) and orthopaedic injury (OI; N=300) between the ages of 8-16 years who were recruited from 5 pediatric hospitals in Canada. Injury information was collected during the ED visit and follow-up assessments were conducted 10 days post-injury and at 3- and 6-months post-injury.

Results: Preliminary results revealed that following mTBI, pain ratings decrease over time for most of the youth. However, for 9.2% of youth, pain persisted at the 6-month post-injury timepoint. Additional analyses will examine sex as a predictor of pain chronicity at 3- and 6-month follow-up. It is expected that in comparison to the OI group, mTBI girls will display greater rating of pain intensity and unpleasantness than mTBI boys.

Discussion/Conclusions: This study will shed light on the influence that sex has on the transition from acute pain to chronic pain in youth following mTBI. Pain is underrecognized among youth with mTBI; thus, these findings can inform future intervention and prevention efforts for this vulnerable population.
Chronic Pain and Pain Interference in Adult Survivors of Childhood Cancer

Alex Pizzo¹, Wendy Leisenring², Jillian Whitten³, Lindsay Jibb⁴, Jessica Flynn⁵, Kevin Krull⁶, Kathryn Birnie⁷, Aaron McDonald⁸, Paul Nathan⁹, Leslie Robison¹⁰, Jennifer Stinson¹¹, Gregory Armstrong¹², Nicole Alberts¹³

¹ Concordia University, Montreal, Quebec, Canada; ² Fred Hutchinson Cancer Research Center, Seattle, Washington, United States; ³ Fred Hutchinson Cancer Research Center, Seattle, Washington, United States; ⁴ Hospital for Sick Children, Toronto, Ontario, Canada; ⁵ St. Jude Children's Research Hospital, Memphis, Tennessee, United States; ⁶ St. Jude Children's Research Hospital, Memphis, Tennessee, United States; ⁷ University of Calgary, Calgary, Alberta, Canada; ⁸ St. Jude Children's Research Hospital, Memphis, Tennessee, United States; ⁹ Hospital for Sick Children, Toronto, Ontario, Canada; ¹⁰ St. Jude Children's Research Hospital, Memphis, Tennessee, United States; ¹¹ Hospital for Sick Children, Toronto, Ontario, Canada; ¹² St. Jude Children's Research Hospital, Memphis, Tennessee, United States; ¹³ Concordia University, Montreal, Quebec, Canada

Introduction/Aim: Chronic pain and pain interference are common among adult survivors of childhood cancer and both are modifiable. Little is known about associated risk factors.

Methods: Adult survivors of childhood cancer (N=233, mean age=40.8 years, SD=9.0, 50.6% female, 32.5 years since diagnosis) from the Childhood Cancer Survivor Study completed chronic pain (pain lasting ≥3 months), pain interference (7-item mean score), and psychosocial measures. Treatment, disease, and demographic variables were abstracted from medical records. Multivariable logistic and linear regression models estimated odds ratios (OR) and mean effects (B) with 95% confidence intervals (CI) for associations of key risk factors with chronic pain and pain interference.

Results: 41.2% [95% CI:36.5%-49.8%] of survivors reported chronic pain, of whom 24% reported severe pain interference. Chronic pain was associated with intravenous methotrexate (OR [95% CI]; 2.67 [1.13-6.61]), respiratory (5.55 [1.99-18.12]), gastrointestinal (3.68 [1.46-10.00]), musculoskeletal (3.38 [1.25-9.81]) and neurological (2.69 [1.20-6.20]) conditions, as well as clinically significant depression with anxiety (18.28 [4.43-126.02]) or either depression or anxiety (2.89 [1.37-6.19]), and unemployment (2.01 [1.03-3.94]). Higher pain interference was associated with cardiovascular conditions (B [95% CI]; 9.72 [3.01-16.43]), neurological conditions (11.06 [3.36-18.76]), clinically significant levels of depression with anxiety (23.44 [14.75-32.31]), either depression or anxiety (9.70 [2.76-16.64]), and unemployment (12.04 [5.06-19.01]).

Discussion/Conclusions: Decades following treatment, a substantial proportion of survivors of childhood cancer report chronic pain. Treatment exposures, emotional distress, and chronic conditions were associated with increased chronic pain and pain interference. The current findings suggest emotional and physical health may be targets for pain management strategies.
Silencing cholecystokinin-expressing neurons in the dorsal periaqueductal grey decreases socially enhanced mechanical sensitivity

Sandra J. Poulson¹, Antonietta Mandatori², Simran Rehal³, Aishwarya Nair⁴, Joanna Cichalewski⁵, Loren J. Martin⁶

¹ University of Toronto Mississauga, Psychology, Mississauga, Ontario, Canada; ² University of Toronto Mississauga, Mississauga, Ontario, Canada; ³ University of Toronto Mississauga, Mississauga, Ontario, Canada; ⁴ University of Toronto Mississauga, Mississauga, Ontario, Canada; ⁵ University of Toronto Mississauga, Psychology, Cell & Systems Biology, Mississauga, Ontario, Canada

Introduction/Aim: Observing a social partner in pain enhances mechanical sensitivity in mice. We previously showed that proglumide, antagonist of cholecystokinin receptors, reduces socially enhanced sensitivity in observer mice. Our aim was to determine whether silencing neurons in the periaqueductal grey (PAG) decreased socially enhanced sensitivity.

Methods: We measured differences in number of cells positive for c-fos, an early immediate gene indicating neural activity, in several brain regions of observer C57BL/6 mice after interaction with pain or control cagemates. We also measured c-fos in observers after application of proglumide. pAAV-hSyn-DIO-hM4D(Gi)-mCherry or pAAV-hSyn-DIO-mCherry was expressed in the dorsal PAG (dPAG) in CCK-Cre:Ai14 mice for 3+ weeks, and clozapine-N-oxide (CNO) was then applied 30 minutes prior to social interaction. We measured mechanical sensitivity of observer mice after social interaction with a cagemate in pain.

Results: We found enhanced neural activity in the dPAG in mice that observed cagemates in pain compared to controls, and fewer cells activated in the dPAG after interaction with a cagemate in pain when observers were pre-treated with proglumide. After application of CNO, mice expressing DIO-hM4D(Gi) in the dPAG that observed pain cagemates did not express enhanced mechanical sensitivity compared to mice expressing DIO-mCherry control.

Discussion/Conclusions: Our results indicate activity in the dPAG is increased upon interaction with a cagemate expressing pain behaviors, and application of proglumide results in fewer activated cells in this region. Silencing CCK-expressing neurons in the dPAG decreases socially enhanced sensitivity, indicating CCK-expressing neurons play a role in activating the descending pain pathway upon socially salient stimuli.
Understanding Sensory Dysfunction in Christianson Syndrome

Shajenth Premachandran¹, Lois Miraucourt², John Orlowski³, Reza Sharif-Naeini⁴

¹ McGill University, Montreal, Quebec, Canada; ² McGill University, Montreal, Quebec, Canada; ³ McGill University, Montreal, Quebec, Canada; ⁴ McGill University, Montreal, Quebec, Canada

Introduction/Aim: Children diagnosed with Christianson syndrome (CS) have a rare neurodevelopmental disorder caused by a loss-of-function mutation in the SLC9A6 gene encoding the cation/proton exchanger NHE6. The syndrome is characterized by intellectual disability, mutism, autism spectrum disorders, as well as hyposensitivity to pain and aversion to touch. The aim of this study is to identify how the changes in function of NHE6 result in the dysfunctions in sensory perception.

Methods: We have used a mouse model of CS in which the SLC9A6 gene is deleted (NHE6KO), to conduct several behavioural tests (Hargreaves, von Frey, dynamic brush) to quantify the pain hyposensitivity and aversion to touch in these mice, in comparison to their wildtype (WT) littermates. Using immunohistochemistry, mice spinal cords will be analyzed for differences in pain and touch fibre connectivity in lamina I-II between the NHE6KO and WT mice.

Results: NHE6KO mice exhibit elevated thermal withdrawal latencies in comparison to WT mice. NHE6KO mice also displayed a greater number of nocifensive responses to innocuous mechanical stimuli in comparison to WT mice. We expect to observe touch fibres still connected to lamina I-II cells in the spinal cord of NHE6KO mice, whereas this would not be observed in the WT mice because these fibers would be pruned from lamina I-II as a result of the normal maturation of pain and touch circuits.

Discussion/Conclusions: Findings from this project will elucidate the mechanisms of pain tolerance and touch aversion in CS patients.
Beneficial placebo effects of a 10-day prolonged-continuous theta burst stimulation (pc-TBS) SHAM procedure on functional recovery of orthopedic patients suffering from an isolated upper limb fracture (IULF).

Léa Proulx-Bégin1, Marianne Jodoin2, Daphnée Brazeau3, Alberto Herrero Babiloni4, Audrey Bellemare5, Catherine Provost6, Dominique Rouleau7, Caroline Arbour8, Louis De Beaumont9

1 1) Université de Montréal 2) Hôpital du Sacré-Coeur de Montréal (CIUSSS du Nord de-l’Île-de-Montréal), Psychology, Montreal, Quebec, Canada; 2) Hôpital du Sacré-Coeur de Montréal (CIUSSS du Nord de-l’Île-de-Montréal), Montreal, Quebec, Canada; 3) 1) Université de Montréal 2) Hôpital du Sacré-Coeur de Montréal (CIUSSS du Nord de-l’Île-de-Montréal), Psychology, Montreal, Quebec, Canada; 4) McGill University 2) Hôpital du Sacré-Coeur de Montréal (CIUSSS du Nord de-l’Île-de-Montréal), Montreal, Quebec, Canada; 5) 1) Université de Montréal 2) Hôpital du Sacré-Coeur de Montréal (CIUSSS du Nord de-l’Île-de-Montréal), psychology, Montreal, Quebec, Canada; 6) Hôpital du Sacré-Coeur de Montréal (CIUSSS du Nord de-l’Île-de-Montréal), Montreal, Quebec, Canada; 7) 1) Université de Montréal 2) Hôpital du Sacré-Coeur de Montréal (CIUSSS du Nord de-l’Île-de-Montréal), Surgery, Montreal, Quebec, Canada; 8) 1) Université de Montréal 2) Hôpital du Sacré-Coeur de Montréal (CIUSSS du Nord de-l’Île-de-Montréal), Nursing, Montreal, Quebec, Canada; 9) 1) Université de Montréal 2) Hôpital du Sacré-Coeur de Montréal (CIUSSS du Nord de-l’Île-de-Montréal), Surgery, Montreal, Quebec, Canada

Introduction/Aim: Standard of care following an uncomplicated IULF beyond initial treatments typically involve a single follow-up appointment at 6 weeks following injury. This leaves patients with limited medical attention for most of their recovery, despite evidence showing that close monitoring provides patients with a feeling of reassurance and being cared for, which positively influences recovery. A recent study conducted by our team evaluated the efficacy of a 10-day pc-TBS protocol on recovery post-IULF compared to a SHAM procedure. Due to the nature of the study, patients were monitored closely for up to 1-month post-injury, which could have had positive impacts on recovery, independently of the treatment received. The current study sought to determine if patients assigned to the SHAM treatment recovered better from an IULF relative to equivalently-injured patients assigned to the standard-of-care treatment arm.

Methods: The SHAM group (N=23 patients) was enrolled in the full study (12 lab visits over 1 month) and completed multiple questionnaires, including the DASH (functional disability measure), at 1 month post-fracture. A control group (N=30 patients), equivalent in terms of sex, age, and injury type, was recruited by phone (no lab visits) and completed online questionnaires at 1 month post-fracture.

Results: Preliminary analyses indicate a significant between-group difference at the DASH questionnaire (t(51)=-3.43, p=0.001), suggesting worse functional disabilities in the control group (M=54.01, SD=19.78) compared to the SHAM group (M=35.20, SD=19.79).
Discussion/Conclusions: Part of the placebo effect observed in the pc-TBS group at 1 month post-fracture could be explained by the medical attention offered by the research team.
Segmental chiropractic spinal manipulation decreases heat pain, but not primary heat hyperalgesia.

Benjamin Provencher¹, Stéphane Northon², Carlos Gevers-Montoro³, Mathieu Piché⁴

¹ Université du Québec à Trois-Rivières, Anatomy, Trois-Rivières, Quebec, Canada; ² Université du Québec à Trois-Rivières, Anatomy, Trois-Rivières, Quebec, Canada; ³ Université du Québec à Trois-Rivières, Anatomy, Trois-Rivières, Quebec, Canada; ⁴ Université du Québec à Trois-Rivières, Anatomy, Trois-Rivières, Quebec, Canada

Introduction/Aim: Spinal manipulation (SM) is widely used for the management of low back pain. However, the mechanisms underlying its effects on pain and hyperalgesia are still poorly understood. In the present study, we examined the effects of SM on heat pain (Experiment1), primary heat hyperalgesia (Experiment2), and the associated brain activity (Experiment1-2). We hypothesized that SM would decrease heat pain, primary heat hyperalgesia and C-fiber laser-evoked potentials (LEP).

Methods: For each experiment, 80 healthy volunteers were randomly assigned to four groups: Experiment1 - no intervention; SM-T4 (segmental); SM-T8 (heterosegmental); placebo-T4; Experiment2 - inert cream/no intervention; capsaicin cream/no intervention; capsaicin cream/SM-T8; capsaicin cream/placebo. In Experiment2, sensitization was produced by the application of 1% topical capsaicin at T8. To induce heat pain and LEP related to the activation of Aδ and C fibers, laser pulses were applied to T4 (Experiment1) or T8 (Experiment2), before and after the intervention (according to group assignment).

Results: Experiment1: Laser pain was decreased by segmental SM (p=0.03), but not by other interventions (p>0.1), and LEP were not modulated significantly (p>0.05). Experiment2: Capsaicin significantly increased laser pain (p<0.001) and LEP amplitude (p<0.001). However, this hyperalgesia was not decreased significantly by SM (p=0.19).

Discussion/Conclusions: These results indicate that SM produces segmental hypoalgesia. However, SM does not decrease primary heat hyperalgesia. This lack of modulation together with the attenuation of secondary hyperalgesia by SM reported in a previous study suggests that segmental inhibition by SM may be masked by competing facilitatory processes related to peripheral sensitization.
Downregulation of parvalbumin protein in dorsal horn interneurons elicits mechanical pain hypersensitivity.

Haoyi Qiu¹, Lois Miraucourt², Hugues Petitjean³, Albena Davidova⁴, Reza Sharif-Naeini⁵

¹ McGill University, Department of Physiology and Cell Information Systems, Montreal, Quebec, Canada; ² McGill University, Department of Physiology and Cell Information Systems, Montreal, Quebec, Canada; ³ McGill University, Department of Physiology and Cell Information Systems, Montreal, Quebec, Canada; ⁴ McGill University, Department of Physiology and Cell Information Systems, Montreal, Quebec, Canada; ⁵ McGill University, Department of Physiology and Cell Information Systems, Montreal, Quebec, Canada

Introduction/Aim: In the spinal dorsal horn, one essential component of the neuronal circuit integrating touch information is the tonic firing inhibitory parvalbumin (PV)-expressing interneuron. Disturbances to its firing pattern impair circuit function and may result in pathological phenotypes. Parvalbumin (PVp) is a calcium (Ca2+)-binding protein that buffers Ca2+ accumulation in neurons after action potential trains to allow for tonic firing. Here, we examine whether decreasing PVp expression can explain the development of mechanical allodynia associated with nerve injury.

Methods: We used mice expressing tdTomato under the control of the parvalbumin gene (PV::Cre;tdTom) and performed visually guided whole-cell recordings in spinal cord slices of naïve and nerve-injured mice. We measured PVp expression by Western blot, QPCR, and immunohistochemistry. To modify PVp expression in PV neurons, we designed a rescue virus (AAV2/8) expressing PV cDNA in a Cre-dependent manner that was injected intraspinally into PV::Cre;tdTom mice. We also reduced the expression of PVp by the intraspinal injection of lentiviral particles expressing control of PV-targeting shRNA molecules.

Results: Our results indicate a decrease in PVp expression in dorsal horn PV neurons after nerve injury. This decrease is associated with the transition from normal tonic firing to frequency adaptation. Reducing PVp expression in healthy mice similarly resulted in the development of mechanical allodynia. Further, preventing a decrease in PVp expression with the rescue virus before nerve injury protected mice from developing mechanical allodynia.

Discussion/Conclusions: Our data indicate a critical role for calcium buffering through PVp in the development of mechanical allodynia after nerve injury.
Research Priorities among Canadian Military Veterans living with Chronic Pain: A Cross-Sectional Survey

Abdul-Rehman Qureshi\textsuperscript{1}, Olawutoni Makanjuola\textsuperscript{2}, Li Wang\textsuperscript{3}, Jason Busse\textsuperscript{4}

\textsuperscript{1} McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; \textsuperscript{2} McMaster University, Department of Life Sciences, Hamilton, Ontario, Canada; \textsuperscript{3} McMaster University, Department of Anesthesia, Hamilton, Ontario, Canada; \textsuperscript{4} McMaster University, Department of Health Research Methods, Evidence, and Impact; Department of Anesthesia; The Chronic Pain Centre of Excellence for Canadian Veterans; The Michael G. DeGroote Centre for Medicinal Cannabis Research., Hamilton, Ontario, Canada

\textbf{Introduction/Aim:} Chronic pain is a pervasive and debilitating condition that disproportionately affects military veterans. Research in this area should be informed by priorities of veterans.

\textbf{Methods:} From January to March 2021, we emailed a 45-item cross-sectional survey to a list of Canadian veterans that asked about the relative importance of 20 research priorities regarding chronic pain.

\textbf{Results:} 313 of 699 Canadian military veterans living with chronic pain completed $\geq 50\%$ of the survey (45\% response rate). Respondents were predominantly male (77\%) with a median age of 52. All 20 research priorities listed in the survey were endorsed as very important by $\geq 52\%$ of respondents, and three received endorsement by $\geq 85\%$: (i) optimizing chronic pain management after release from the military; and (ii) identifying and (iii) treating mental illness among veterans living with chronic pain. Women were more likely than men to endorse research on postsurgical care for chronic pain prevention or research on holistic care for chronic pain. Men were more likely than women to endorse research on physical activity or exercise for chronic pain. Individuals with higher gross income ($\geq$80,000) were less likely to endorse research into physiotherapy or chiropractic for chronic pain compared to those with lower gross income. Older respondents were less likely to endorse research on medical cannabis for chronic pain.

\textbf{Discussion/Conclusions:} Our findings provide insight into the research priorities of Canadian military veterans living with chronic pain.
Prevalence of Chronic Non-Cancer Pain among Military Veterans: A Systematic Review

Abdul-Rehman Qureshi¹, Mansi Patel², Samuel Neumark³, Li Wang⁴, Rachel Couban⁵, Jason Busse⁶

¹ McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; ² McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; ³ McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; ⁴ McMaster University, Department of Anesthesia, Hamilton, Ontario, Canada; ⁵ McMaster University, Michael G. DeGroote Institute for Pain Research and Care, Hamilton, Ontario, Canada; ⁶ McMaster University, Department of Health Research Methods, Evidence, and Impact; Department of Anesthesia; The Chronic Pain Centre of Excellence for Canadian Veterans; The Michael G. DeGroote Centre for Medicinal Cannabis Research, Hamilton, Ontario, Canada

Introduction/Aim: Chronic pain is common among military veterans, but the prevalence is uncertain as individual studies have reported estimates ranging from 25% to 72%. We conducted a systematic review to inform this issue.

Methods: We searched MEDLINE, Embase, CINAHL, PsycINFO and Web of Science from 2013 to January 2021, for observational studies that reported the prevalence of chronic noncancer pain among military veterans. We performed a random-effects meta-analysis for pooling prevalence across studies and used the GRADE approach to evaluate the certainty of evidence.

Results: 41 observational studies that enrolled 5,550,375 military veterans were eligible for review. The overall pooled prevalence of chronic noncancer pain was 34%; however, we found a significant subgroup effect based on how pain was reported. Moderate quality evidence suggests that chronic noncancer pain in general affects 45% (95% CI 31% to 56%) of military veterans, and the prevalence decreases to 11% among studies that only focussed on a specific type of chronic pain (p<0.0001 for test of interaction).

Discussion/Conclusions: Chronic noncancer pain is common among military veterans, affecting almost 1 in every 2 individuals.
LGBTQ2S+ youth exposed to early adverse childhood experiences have poorer physical health-related quality of life compared to heterosexual and cisgender peers

Tarannum Rahnuma1, Elias Abou-Assaly2, Neta Bar Am3, Karen L Cobos4, Kelsey Barrie5, Melanie Noel6, Nivez Rasic7, Daniel Kopala-Sibley8, Jillian Vinall Miller9

1 University of Calgary, Calgary, Alberta, Canada; 2 University of Calgary, Department of Anesthesiology, Perioperative and Pain Medicine, Calgary, Alberta, Canada; 3 University of Calgary, Department of Anesthesiology, Perioperative and Pain Medicine, Calgary, Alberta, Canada; 4 University of Calgary, Department of Biological Sciences, Calgary, Alberta, Canada; 5 Vi Riddell Children's Pain & Rehabilitation Centre, Calgary, Alberta, Canada; 6 University of Calgary, Department of Psychology, Calgary, Alberta, Canada; 7 University of Calgary, Department of Anesthesiology, Perioperative and Pain Medicine, Calgary, Alberta, Canada; 8 University of Calgary, Department of Psychiatry, Calgary, Alberta, Canada; 9 University of Calgary, Department of Anesthesiology, Perioperative and Pain Medicine, Calgary, Alberta, Canada

Introduction/Aim: Adverse childhood experiences (ACEs) are associated with increased risk for poorer physical health. LGBTQ2S+ youth are exposed to more ACEs as compared to individuals identifying as heterosexual and cisgender. The present study examined whether greater ACEs increases the risk for poorer physical health-related quality of life in LGBTQ2S+ youth versus heterosexual and cisgender peers.

Methods: Forty youth aged 14-18 years self-identified their sexuality and gender, and completed questionnaires regarding ACEs, pain interference, and health-related quality of life across physical, emotional, social, and school domains. Chi-square and t-tests were used to compare questionnaire data between LGBTQ2S+ and heterosexual/cisgender youth. The interaction between sexuality and ACEs was explored in relation to domain-specific health-related quality of life, accounting for age, gender, and chronic pain status.

Results: Thirty-three percent (n = 13) of participants identified as LGBTQ2S+, and 23% (n = 9) had chronic pain. LGBTQ2S+ youth did not have more chronic pain or pain interference; however, they had more ACEs and poorer health-related quality of life (all P<.05) compared to heterosexual/cisgender youth. Specifically, LGBTQ2S+ youth had lower physical health-related quality of life (P<.05). LGBTQ2S+ status and higher ACEs were associated with poorer physical health-related quality of life (P<.05).

Discussion/Conclusions: LGBTQ2S+ youth exposed to higher ACEs have poorer physical health-related quality of life as compared to heterosexual/cisgender youth, and thus may be at greater risk for developing chronic pain. Managing ACEs in LGBTQ2S+ youth may help to improve their physical health, and prevent the development of chronic pain in adulthood.
Skin-resident dendritic cells control sensory neuron activation through the CCL22-CCR4 axis in postoperative pain

Jaqueline Raymondi Silva¹, Mircea Iftinca², Francisco Fernandes Gomes³, Julia Paige Segal⁴, Olivia Margery Anne Smith⁵, Courtney Ann Bannerman⁶, Manon Defaye⁷, Ian Gilron⁸, Thiago Mattar Cunha⁹, Christophe Altier¹⁰, Nader Ghasemlou¹¹

¹ Queen's University, Kingston, Ontario, Canada; ² University of Calgary, Calgary, Alberta, Canada; ³ University of Sao Paulo, Ribeirao Preto, Brazil; ⁴ Queen's University, Kingston, Ontario, Canada; ⁵ Queen's University, Kingston, Ontario, Canada; ⁶ Queen's University, Kingston, Ontario, Canada; ⁷ University of Sao Paulo, Ribeirao Preto, Brazil; ⁸ Queen's University, Kingston, Ontario, Canada; ⁹ University of Sao Paulo, Ribeirao Preto, Brazil; ¹⁰ University of Calgary, Calgary, Alberta, Canada; ¹¹ Queen's University, Kingston, Ontario, Canada

Introduction/Aim: Inflammatory pain occurs as a result of interactions between the immune and nervous systems, which includes the activation of tissue-resident immune cells in the site of injury. We therefore sought to examine the role of dendritic cells and its mediators CCL17 and CCL22 in the development of inflammatory pain.

Methods: Male C57BL/6J mice were used for all experiments. Plantar incisional wound was used to model pain. Behaviour was assessed using the von Frey, Hargreaves and acetone tests. The antagonist C 021 was used to block CCR4 or knockout mice were used to assess loss of receptor function. γδ T cell-null and CD11cDTR mice were also used to assess whether CCR4+ cells contribute to pain outcomes.

Results: CCL17/22 are upregulated after tissue injury by dendritic cells. Both chemokines elicit mechanical and thermal hypersensitivity, a response abrogated by pharmacological blockade of CCR4 using the antagonist C 021 or in mice genetically deficient for CCR4. Calcium imaging of dissociated sensory neurons from naïve and postoperative mice showed that CCL22, but not CCL17, was able to directly activate neurons; electrophysiological recordings demonstrated that sensory neurons are sensitized to CCL22 after injury through direct CCR4 activation. These responses were blocked using C 021 or CCR4-siRNA. Finally, our data show that acute postsurgical pain and CCL17/CCL22 expression are reduced in transgenic mice depleted of dendritic cells.

Discussion/Conclusions: These results suggest a role for the CCL22:CCR4 axis in the genesis of inflammatory pain via direct communication between dendritic cells and sensory neurons, opening new therapeutic avenues for its control.
Cluster analysis of Canadian Armed Forces Veterans living with chronic pain: Life After Service Studies 2016

Julian Reyes Velez¹, James M. Thompson², Jill Sweet³, Jason Busse⁴, Linda D. VanTil⁵

¹ Veterans Affairs, Research Directorate, Charlottetown, Prince Edward Island, Canada; ² Queens University, Department of Health Sciences, Charlottetown, Prince Edward Island, Canada; ³ Veterans Affairs, Research Directorate, Charlottetown, Prince Edward Island, Canada; ⁴ McMaster University, Department of Health Research Methods, Evidence, and Impact; Department of Anesthesia; The Chronic Pain Centre of Excellence for Canadian Veterans; The Michael G. DeGroote Centre for Medicinal Cannabis Research., Hamilton, Ontario, Canada; ⁵ Veterans Affairs, Research Directorate, Charlottetown, Prince Edward Island, Canada

Introduction/Aim: Prevalence of chronic pain among Canadian Armed Forces (CAF) Regular Force Veterans released since 1998 is at about double the prevalence in the Canadian general population. This study explored the heterogeneity of Canadian Armed Forces Veterans living with chronic pain to inform service needs planning and research using cluster analysis.

Methods: We conducted a cluster analysis using findings for 2754 CAF Veterans surveyed in the 2016 Life After Service Studies. Two-step cluster analysis was performed in the 1126 (41%) with chronic pain of using five classification variables: pain severity, two mental health measures and activity limitation characteristics. Clusters were compared using sociodemographic, health, and service utilization characteristics.

Results: Veterans in cluster I (47%) rarely had severe pain (2%) or severe mental health problems (8%), and none had severe activity limitations. Veterans in cluster II (26%) reported severe pain (27%) and severe mental health problems (22%) and were likely to report severe activity limitation (91%). Veterans in cluster III (27%) were most likely to report severe pain (36%) and severe mental health problems (96%), and a majority of them reported severe activity limitations (72%). There was evidence of considerable heterogeneity in terms of socioeconomic characteristics, pain characteristics, mental and physical health status, activity limitations, social integration, and service utilization indicators.

Discussion/Conclusions: The finding that chronic pain is common among CAF Veterans with a high degree of heterogeneity has important implications for policy, services, and research, emphasizing the need for support systems that can address variability of needs in Veterans.
**Fixel-Based Analysis of Chronic Back Pain Patients Reveals Weaknesses in White Matter Structure Across Several Tracts**

Jason Robertson¹, Guillermo Aristi², Javeria Hashmi³

¹ Nova Scotia Health Authority and Dalhousie University, Department of Anesthesia, Pain Management and Perioperative Medicine, Halifax, Nova Scotia, Canada; ² Nova Scotia Health Authority and Dalhousie University, Department of Anesthesia, Pain Management and Perioperative Medicine, Halifax, Nova Scotia, Canada; ³ Nova Scotia Health Authority and Dalhousie University, Department of Anesthesia, Pain Management and Perioperative Medicine, Halifax, Nova Scotia, Canada

**Introduction/Aim:** The pathology of chronic back pain (CBP) often does not relate to tissue damage, but to neurological factors instead. How changes in the white matter pathways of the brain relate to clinical CBP symptoms, such as disability and secondary mood disorders, requires further investigation. Fixel-based analysis (FBA) is a relatively new method for analyzing diffusion-weighted MR images that addresses some of the weaknesses of traditional diffusion analysis, presenting new opportunities for understanding how white matter structure relates to CBP symptoms.

**Methods:** Healthy control subjects and CBP patients answered several pain, disability, and mood questionnaires, then underwent multiple MR scans, including diffusion-weighted imaging. The images were analyzed using the MRTrix FBA pipeline, which produced parameters representing fibre density (FD), fibre cross-section (FC), and the product thereof (FDC). Groupwise comparisons were whole-brain corrected with 5000 permutations.

**Results:** Several tracts showed significantly lower FD in CBP patients, including the bilateral thalamocortical tracts, right spinothalamic tract, right anterior thalamic radiation, body and splenium of the corpus callosum, and cerebellar white matter. Mean FD in many of these tracts negatively correlated with Pain Catastrophization Scale (PCS) scores in both groups. Conversely, FD in the genu of the corpus callosum was greater in CBP patients and predicted clinical pain characteristics and disability scores. Finally, FDC showed similar patterns of white matter decrease as FD, and mean tract FDC correlated negatively with PCS scores in CBP subjects.

**Discussion/Conclusions:** These findings illustrate several regions where white matter microstructure is weaker in CBP patients, and predicts clinical symptoms.
Mesenchymal stem cell in the treatment of knee osteoarthritis: a systematic review and meta-analysis of randomized trials

Behnam Sadeghirad¹, Sara Zandieh², Jane Jomy³, Mansi Patel⁴, Rachel Couban⁵, Feryal Momenilandi⁶, Rudolf W Poolman⁷, Jason W Busse⁸

¹ McMaster University, Department of Health Research Methods, Evidence, and Impact & Department of Anesthesia, Hamilton, Ontario, Canada; ² McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; ³ McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; ⁴ McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; ⁵ McMaster University, Department of Anesthesia, Hamilton, Ontario, Canada; ⁶ Shahid Beheshti University of Medical Sciences, Functional Neurosurgery Research Center, Shohada Tajrish Neurosurgical Center of Excellence, Tehran, Iran; ⁷ Onze Lieve Vrouwe Gasthuis, Department of Orthopedic Surgery, Amsterdam, Netherlands; ⁸ McMaster University, Department of Health Research Methods, Evidence, and Impact & Department of Anesthesia, Hamilton, Ontario, Canada

Introduction/Aim: Stem cell therapy has been introduced for management of osteoarthritis and cartilage defects. We performed a systematic review to evaluate benefits and harms of mesenchymal stem cells (MSC) therapy for knee osteoarthritis.

Methods: We searched MEDLINE, EMBASE, CINAHL, and the Cochrane Central for trials that enrolled adult patients with knee OA and randomized them to intra-articular injection of MSCs and no treatment control, placebo, or arthroscopic debridement. Pairs of reviewers independently screened potentially eligible articles and extracted data. We performed random-effects model meta-analysis for all outcomes.

Results: 16 eligible trials enrolled 682 individuals with knee OA. Compared to placebo, patients receiving MSC therapy showed 1.45 points (on 10cm VAS) reduction in pain (95% CI: -2.45 to -0.46, I²=88.6%, low quality evidence) 6 months after injections, 1.16 points (95%CI: -2.12 to -0.19, I²=65.6%; low quality) 1 year after injections, and 1.70 points (95%CI: -3.97 to -0.57, I²=86.8%; low quality) 18 to 27 months after injections. Very low quality evidence suggests improvement in physical functioning for patients who received MSC injections at 6 months follow-up for 7.49 points (on 100-point SF-36 physical functioning subscale, 95%CI: 0.54 to 14.44, I²=81.5%). We found no statistically significant benefit for physical functioning at follow-ups longer than 6 months.

Discussion/Conclusions: Our findings suggest MSC injection may result in slight reduction of pain and little to no difference improvement in function and probably mild local adverse events. Clinical use of stem cell therapy needs to be considered guardedly because of poor quality trials with small sample sizes, and considerable heterogeneity.
A role for trigeminal nerve morphogenesis in susceptibility to orofacial pain: a pre-clinical study

Shirin Sadighparvar¹, Carolina Beraldo Meloto², Reza Sharif-Naeini³

¹ McGill University, Dentistry, Montreal, Quebec, Canada; ² McGill University, Dentistry, Montreal, Quebec, Canada; ³ McGill University, Physiology, Montreal, Quebec, Canada

Introduction/Aim: Genome-wide based pathway analysis revealed ‘trigeminal (CNV) morphogenesis’ as the top pathway associated with chronic painful temporomandibular disorders (TMD). Genes in this pathway are semaphorins, plexins and neuropilins, which have pivotal roles in axonal guidance. Abolishing their signaling leads to abnormalities in the CNV axons of mice (4-6), but the consequence to pain sensitivity has not been explored. We have abolished Sema signaling in mice nociceptors to induce abnormalities along the CNV nociceptive pathways and to test how it affects orofacial pain.

Methods: We have generated a Nrp1Fl/Fl:Trpv1Cre mouse line with abolished semaphorin-signaling in nociceptors. We subjected Nrp1Fl/Fl:Trpv1Cre and wild-type (WT) mice to the radiant heat, acetone and low back pain sensitivity tests. Next, mice were subjected to sustained mouth opening to induce orofacial pain and their orofacial mechanical sensitivity was assessed using Von Frey filaments applied to the masseter region.

Results: Nrp1Fl/Fl:Trpv1Cre mice withdrew from a source of radiant heat faster and displayed a longer pain-like behavior when exposed to acetone than their WT littermates, indicating both heat and cold hypersensitivity. After the induction of orofacial pain, they also displayed a decreased threshold for withdrawing their heads in response to mechanical stimuli applied to the masseter region.

Discussion/Conclusions: Nrp1Fl/Fl:Trpv1Cre mice display increased thermal pain and low back pain (LBP) sensitivity (the latter is highly comorbid with TMD). In addition, Nrp1Fl/Fl:Trpv1Cre mice display increased orofacial pain sensitivity and hence comprise a suitable model for the investigation of the mechanisms linking CNV morphogenesis to orofacial pain.
Can We Characterize A-P/IAP Behavioural Phenotypes in People with Chronic Pain?

Vaidhehi Sanmugananthan,1, Joshua Cheng2, Kasey Hemington3, Anton Rogachov4, Natalie Osborne5, Rachael Bosma6, Junseok Kim7, Robert Inman8, Karen Davis9

1 Krembil Brain Institute, UHN and University of Toronto, Toronto, Ontario, Canada; 2 Krembil Brain Institute, UHN, Toronto, Ontario, Canada; 3 Krembil Brain Institute, UHN, Toronto, Ontario, Canada; 4 Krembil Brain Institute, UHN, Toronto, Ontario, Canada; 5 Krembil Brain Institute, UHN and University of Toronto, Toronto, Ontario, Canada; 6 Krembil Brain Institute, UHN, Toronto, Ontario, Canada; 7 Krembil Brain Institute, UHN, Toronto, Ontario, Canada; 8 Krembil Research Institute, UHN, Toronto, Ontario, Canada; 9 Krembil Brain Institute, UHN, Toronto, Ontario, Canada

Introduction/Aim: Our lab previously delineated two behavioural phenotypes in healthy individuals based on their intrinsic attention to pain (IAP) and how pain impacts their cognitive performance. Acute experimental pain generally hampers cognitive performance in healthy individuals with high IAP (P-types) but enhances cognitive performance in low IAP individuals (A-types). These phenotypes have not been studied in chronic pain populations to avoid using experimental pain in the context of chronic pain. Here we propose using pain rumination to quantify attention to pain without the need of experimental pain stimuli. We aimed to determine if A/P and IAP phenotypes could be characterized in people with chronic pain, and if pain rumination could serve as a proxy to IAP.

Methods: Data from 43 healthy controls (HC) and 43 age-/sex-matched patients with chronic pain associated with ankylosing spondylitis were retrospectively analyzed. A/P designations were based on reaction time (RT) differences between pain and no-pain trials in an interference task. IAP was determined from a mind-wandering task. Pain rumination was determined from the pain catastrophizing scale’s pain rumination subscale.

Results: The patient and HC groups both had higher proportions of A-types than P-types. IAP and rumination scores were not significantly different between groups but were positively correlated in patients and not HCs. IAP and pain rumination were not significantly correlated with differences in RT or RT variability in either group.

Discussion/Conclusions: This study raises issues of A-P and IAP test protocols in the context of chronic pain and supports the use of pain rumination assessment as a proxy for IAP.
The role of astrocyte neuronal metabolic coupling in the anterior cingulate cortex in the perception and behavioural response to continuous pain in mice

Kaitlin Scherer¹, James Tang², Paige Reid³, Aquilla Reid-John⁴, Giannina Descalzi⁵

¹ University of Guelph, Biomedical Sciences, Guelph, Ontario, Canada; ² University of Guelph, Biomedical Sciences, Guelph, Ontario, Canada; ³ University of Guelph, Biomedical Sciences, Guelph, Ontario, Canada; ⁴ University of Guelph, Biomedical Sciences, Guelph, Ontario, Canada; ⁵ University of Guelph, Biomedical Sciences, Guelph, Ontario, Canada

Introduction/Aim: Several studies have identified key changes to neuronal structure and function in the emotion-pain network of the brain in chronic pain patients. While mounting evidence indicates that astrocyte-neuronal lactate shuttling (ANLS) is necessary for learning induced neuroplasticity, whether this process is involved in chronic pain induced neuroplasticity remains unknown. This study tested the hypothesis that ANLS in the anterior cingulate cortex (ACC) is necessary for the perception and behavioural response to continuous pain.

Methods: Adult male C57BL/6J mice were used for all experiments. We assessed chronic inflammatory pain through hindpaw injections of Complete Freund’s Adjuvant (CFA) and performed western blot analyses on ACC samples to measure the expression levels of monocarboxylate transporters (MCT) MCT4 and MCT2, which bi-directionally transport lactate in astrocytes and neurons respectively. We also tested the effects of disrupting ANLS in the ACC through antisense oligonucleotide (AS-ODN) mediated knockdown of MCT4 and MCT2 in the Formalin Test and Hot Plate Test.

Results: Seven days after CFA injection, MCT4 levels, but not MCT2, were increased in the mouse ACC. Accordingly, AS-ODN mediated knockdown of MCT4 reduced nocifensive behaviour during the second phase, but not the first phase, of the Formalin Test.

Discussion/Conclusions: These results suggest that ANLS in the ACC is involved in chronic inflammatory pain and is necessary for the perception and behavioural response to continuous inflammatory pain. This study identifies critical contributions of ANLS in long term changes of neuronal functioning and identifies ANLS as a potential target for novel treatments of chronic pain.
Evaluation of hippocampal subfields volume and cortical thickness of the parahippocampal gyrus in relationship to anxiety and disability in chronic low back pain patients: preliminary results

Monica Sean¹, Félix Janelle², Kevin Whittingstall³, Guillaume Léonard⁴, Pascal Tétreault⁵

¹ Université de Sherbrooke, Anesthésiologie, Sherbrooke, Quebec, Canada; ² Université de Sherbrooke, Médecine nucléaire et radiobiologie, Sherbrooke, Quebec, Canada; ³ Université de Sherbrooke, Médecine nucléaire et radiobiologie, Sherbrooke, Quebec, Canada; ⁴ Université de Sherbrooke, École de Réadaptation, Sherbrooke, Quebec, Canada; ⁵ Université de Sherbrooke, Anesthésiologie, Sherbrooke, Quebec, Canada

Introduction/Aim: The hippocampus is known to be involved in the development of chronic low back pain (CLBP). The aims of this study were to evaluate relationships between volumetric values of three hippocampus subfields (Cornu Ammonis (CA) 1-3, CA4-Dentate-Gyrus, Subiculum) and cortical thickness of parahippocampal gyrus with anxiety and the impact of pain on daily activities.

Methods: 10 healthy subjects (HS) and 17 CLBP subjects were recruited to acquire brain structural data using T1 Magnetic Resonance Imaging (MRI) images and psychological data. Anxiety was obtained using the State and Trait Anxiety Inventory (STAI-S/T). The impact of pain on daily activities was obtained using the Pain Outcomes Questionnaire (POQ). Volumetric values of hippocampus subfields were obtained using the automated pipeline HIPS from volBrain (volbrain.upv.es). Cortical thickness of parahippocampal gyrus was obtained using FreeSurfer (version 7).

Results: In CLBP, Spearman’s correlation (adjusted for age and sex) showed negative relationships between STAI-S/T scores and right subiculum field normalized volume (STAI-S: r=-0.62 p=0.02 and STAI-T: r=-0.52; p=0.05). In addition, a correlation between POQ score and bilateral cortical thickness of parahippocampal gyri were observed (right: r=0.60; p=0.02 and left: r=0.71; p=0.003). In HS, there was a positive correlation only with STAI-T and the right subiculum (r=0.78; p=0.02).

Discussion/Conclusions: These results are supported by the literature where anxiety was linked with hippocampal subfields impairments. Investigating hippocampal properties and their relationship to psychological data in CLBP could reveal the interplay between hippocampus function and behavioral phenotype. Furthermore, we are currently collecting longitudinal data on these participants to evaluate stability of these findings.
Description of the Validity of the Nociception Level Index (NOL) for Nociception Assessment in Anesthetized Patients Undergoing Surgery: A Systematized Review

Shiva Shahiri T.¹, Philippe Richebé², Melissa Richard-Lalonde³, Céline Gélinas⁴

¹ McGill University, Ingram School of Nursing, Montreal, Quebec, Canada; ² University of Montreal, Department of Anesthesiology and Pain Medicine, Montreal, Quebec, Canada; ³ McGill University, Ingram School of Nursing, Montreal, Quebec, Canada; ⁴ McGill University, Ingram School of Nursing, Montreal, Quebec, Canada

Introduction/Aim: Maintaining optimum analgesia in anesthetized patients is challenging due to the inability to self-report pain or exhibit pain-related behaviours. Inadequate analgesia is associated with complications such as persistent postoperative pain and risk of developing chronic pain. The single physiological parameters have shown limitations for assessing the nociception level. This review aims to describe and analyze the validation studies of the only multi-parameter technology, the Nocicpetion Level (NOL) index.

Methods: A systematized review was conducted using a comprehensive search with the following search terms in four databases: nociception measurement, NOL, validation studies. A quality assessment using an adapted GRADE approach for measurement tools, and a risk of bias assessment using QUADAS-2 tool were performed by two reviewers.

Results: A total of 6 validation studies with 234 anesthetized patients were included. Discriminative validation of the NOL was supported with an increase in NOL values with a median range of 16 to 44 after the nociceptive stimuli (intubation, skin incision, standardized tetanic stimulation) under no or minimal doses of opioids, compared with the non-nociceptive time points. Criterion validation was supported by higher performance of the NOL to classify nociceptive versus non-nociceptive stimuli with area under the curve (AUC) > .90 compared with single parameters (heart rate [HR], Blood Pressure [BP]) with AUC < .70. Index values of 10 - 15 were found to be indicative of nociception with good sensitivity (range: 73-89%) and specificity (range: 80-92%).

Discussion/Conclusions: The NOL index performed superiorly in detecting the nociceptive stimuli compared with traditional monitoring of HR and BP.
The relative contributions of subjective appraisals and child physiology in predicting parent physiological arousal during toddler vaccination

Ilana Shiff¹, Miranda DiLorenzo², Dan Flanders³, Eitan Weinberg⁴, Deena Savlov⁵, Rebecca Pillai Riddell⁶

¹ York University, Toronto, Ontario, Canada; ² York University, Toronto, Ontario, Canada; ³ University of Toronto, Toronto, Ontario, Canada; ⁴ University of Toronto, Toronto, Ontario, Canada; ⁵ University of Toronto, Toronto, Ontario, Canada; ⁶ York University, Toronto, Ontario, Canada

Introduction/Aim: Parents play an important role in managing young children’s pain-related distress (Pillai Riddell et al., 2013). The extent to which parents regulate their own physiological arousal has been shown to be a key mechanism underlying this effect (DiLorenzo et al., 2021). The aim of the present study was to examine how much of parent physiological arousal is based on toddler physiological distress after accounting for parents’ subjective appraisal of child pain.

Methods: The study included a collapsed sample of children (n = 108) who participated in two waves (18 and 24 months) of a longitudinal study (the OUCH Cardio Cohort). Parent and child heart-rate was averaged over 30-second epochs using the MindWare analysis system (HRV Analysis 3.1.3.) before the first needle and immediately, one and two minutes after the last needle. Parent subjective appraisal of distress and child pain were assessed through parent ratings of their pre- and post-needle worry as well as post-needle appraisals of children’s pain.

Results: Child heart-rate immediately following the needle as well as parents’ appraisal of pain predicted parent heart-rate one minute following the needle (trending toward significance, $\beta = 0.36$, $p = 0.08$ and $\beta = 0.22$, $p = 0.08$, respectively). Parent appraisal of child pain was the only significant predictor of parent heart-rate at two minutes post-needle ($\beta = 0.24$, $p = 0.05$).

Discussion/Conclusions: Our findings suggest that child physiological distress influences parent physiological arousal initially but once parents make pain appraisals, child physiological distress is less impactful.
Comparison of older and younger adults with pain referred to a rural community chronic pain management program in Northwestern Ontario

HADI SHOJAEEI¹, Abigale Kent², Fatima Lakha³, Angela Mailis⁴

¹ Northern Ontario School of Medicine University, Thunder Bay, Ontario, Canada; ² Northern Ontario School of Medicine University, Thunder Bay, Ontario, Canada; ³ Pain and Wellness Centre, Vaughan, Ontario, Canada; ⁴ University of Toronto, Department of Medicine, Vaughan, Ontario, Canada

Introduction/Aim: Clinical research indicates that chronic pain perceptions and experiences are influenced by patient age. The study aims to compare demographic and pain characteristics of older (>65) and younger (<65) chronic non-cancer pain patients referred to the Chronic Pain Management Program (CPMP) in Thunder Bay, Ontario.

Methods: This is a retrospective study of 411 consecutive new pain patients (older n=90 and younger n=321) seen during January-December 2019. Demographic characteristics, Brief Pain Inventory (BPI) pain ratings, opioid intake and diagnosis were obtained using retrospective chart review. Patients were classified in Group I (pure biomedical pathology), Group II (mixed biomedical causes and psychological factors) and Group III (no detectable physical pathology but psychological factors were considered important).

Results: Male/female ratio was 1:1.5 vs 1:2 and mean age 72±6 vs 47±12 respectively for the older vs younger patients. Low back/buttocks/hips were the most prevalent pain site. No statistical difference was found in average BPI pain score (older 7±2 vs younger 6±2). Most older adults (67%) were classified as group I vs 44% of the younger patients (p <0.01). Only 10% of older adults were classified in Group III vs 34% of the younger population (p<0.05). Opioid use was similar (47% of older adults and 43% of younger patients). Current cannabis use for pain was more prevalent in the younger group vs the older adults (28% vs 13%, <0.05).

Discussion/Conclusions: Older adults with chronic pain present with greater physical, and less psychosocial impairment as compared to younger adults. The findings are consistent with previous literature.
Stellate ganglion block beyond chronic pain - A literature review on its application in painful and non-painful conditions.

Heena Singh¹, Dr. Manikandan Rajarathinam²

¹ London Health Sciences, Anesthesia and Perioperative Medicine, London, Ontario, Canada; ² London Health Sciences, Anesthesia and Perioperative Medicine, London, Ontario, Canada

Introduction/Aim: Cervical sympathetic blocks or Stellate ganglion blocks (SGB) have been commonly used in treatment of painful conditions such as Complex regional pain syndrome (CRPS). However, there is literature to suggest the utility of this procedure in managing non-painful conditions. The focus of this literature review is to provide an overview of current indications for SGBs for painful and non-painful conditions.

Methods: We identified published journal articles in the past 25 years from EMBASE and PubMed databases with keywords “cervical sympathetic block and stellate ganglion blocks”. 1556 articles were obtained from literature search among which 311 articles were reviewed.

Results: There is lack of evidence to support the use of SGB for CRPS. There is limited evidence to support the efficacy of these blocks in post-operative pain management for upper limb surgeries and management of refractory angina. There is moderate evidence in favour of SGB for treatment of non-painful conditions such as PTSD, cerebral vasospasm and refractory ventricular arrhythmias. There is limited evidence to support the benefits of these blocks in managing vasomotor symptoms in post menopausal women and breast cancer related lymphedema. In addition, there have been various case series illustrating the benefits of SGB in treatment of upper limb erythromelalgia, persistent hiccups, thalamic pain, atypical facial pain, central post-stroke pain, palmar hyperhidrosis and orofacial pain.

Discussion/Conclusions: SGB have shown a variety of uses in the management of various non-painful conditions beyond the well-known treatment for CRPS, although further studies are required with larger sample sizes.
The neurochemical mediation of conditioned hyperalgesia in mice.

Aleksandrina Skvortsova¹, Lucas V. Lima², Simon Carrier³, Robert Contofalsky⁴, Jeffrey Mogil⁵

¹ McGill University, Psychology Department, Montreal, Quebec, Canada; ² McGill, Psychology, Montreal, Quebec, Canada; ³ McGill University, Psychology, Montreal, Quebec, Canada; ⁴ McGill University, Psychology, Montreal, Quebec, Canada; ⁵ McGill University, Psychology, Montreal, Quebec, Canada

Introduction/Aim: Conditioned hyperalgesia has been found in male (but not female) mice and humans after a single pairing of an environmental context with pain. The aim of this study was to investigate the neurochemical mediation of this phenomenon. Specifically, we attempted to block conditioned hyperalgesia with dexamethasone, an anti-inflammatory and anti-stress compound, and the CCK antagonist, proglumide, which blocks nocebo hyperalgesia in humans.

Methods: A conditioning paradigm with one training and one test day was used. On the training day, following the determination of pain sensitivity (Hargreaves’ test), a tonic noxious stimulus (intraperitoneal injection of 0.9% acetic acid; 10 ml/kg) was coupled with a particular context. On the test day, mice were re-tested on Hargreaves’ test either in the same or in a different context. Mice were randomly assigned to one of drug conditions: proglumide (50 mg/kg); dexamethasone (1 mg/kg); or saline. Drugs were administered before the tonic stimulus on the training day and at the start of the test day.

Results: A significant increase in pain sensitivity was observed in saline-treated male but not female mice tested in the same context on the test day. This conditioned hyperalgesia was blocked by proglumide and not affected by dexamethasone. The drugs had no effect on pain in female mice.

Discussion/Conclusions: Proglumide blocks conditioned hyperalgesia in male mice. Given that proglumide blocks nocebo hyperalgesia in humans, this suggests that conditioned hyperalgesia may represent a form of nocebo. Ongoing studies are attempting to elucidate the neurochemical specificity of the effect, using CCK1- and CCK2-specific ligands.
Sex-dependent neuropeptide release following resiniferatoxin administration.

Olivia Smith¹, Jaqueline Raymondi Silva², Nader Ghasemlou³

¹ Queen's University, Department of Biomedical and Molecular Sciences, Kingston, Ontario, Canada; ² Queen's University, Department of Biomedical and Molecular Sciences, Kingston, Ontario, Canada; ³ Queen's University, Department of Biomedical and Molecular Sciences, Department of Anesthesiology & Preoperative Medicine, and Center for Neuroscience Studies, Kingston, Ontario, Canada

Introduction/Aim: Over 80% of all nociceptors are TRPV1+, thus depletion or silencing of these neurons may provide novel strategies for the treatment of pain. The activation of the TRPV1+ nerve fibres cause the release of neuropeptides such as calcitonin gene-related peptide (CGRP) and Substance P (SP). These neuropeptides are known for being mediators of neurogenic inflammation and contribute to neuropathic pain outcomes. Resiniferatoxin (RTX) is a potent functional analog of capsaicin and is used to deplete TRPV1+ neurons in rodents.

Methods: C57BL/6J mice aged 4-10 weeks old received RTX injections subcutaneously (30, 70 and 100µg/kg) over three consecutive days. Spinal cord and dorsal root ganglia were collected one-hour after injection, and neuropeptide levels were investigated using qPCR and ELISA.

Results: While standardizing a protocol for RTX injection in C57BL/6J mice, we observed that male mice 8-10+ weeks of age had a significantly higher incidence of mortality following the first of three injections when compared to male mice aged 4-6 weeks, and female mice regardless of age. Female mice showed an increased mRNA expression of the neuropeptides CGRP and SP after RTX treatment as well as cell death markers at 4-weeks of age when compared to 10-week-old females and all male mice. No change at the protein level was observed.

Discussion/Conclusions: Our results suggest a sexual dimorphism in the nociceptor response following RTX administration at the mRNA level and a potential sex dependent mechanism underlying mortality following RTX that is likely related to neuropeptide levels.
Intolerance of uncertainty in pediatric chronic pain: Dyadic relationships between youth and parents

Sabine Soltani¹, Melanie Noel², Alexandra Neville³, Kathryn A. Birnie⁴

¹ University of Calgary, Calgary, Alberta, Canada; ² University of Calgary, Psychology, Calgary, Alberta, Canada; ³ University of Calgary, Calgary, Alberta, Canada; ⁴ University of Calgary, Department of Anesthesiology, Perioperative and Pain Medicine, Calgary, Alberta, Canada

Introduction/Aim: Intolerance of uncertainty (IU) is an established transdiagnostic risk factor for a myriad of mental health issues. The role of IU in chronic pain remains largely unstudied, which is surprising given that living with chronic pain is fraught with uncertainty. No study to date has examined the stability of parent and youth IU over time or their reciprocal roles in pain and mental health outcomes.

Methods: A dyadic analytic approach (actor-partner interdependence models) was used to assess the longitudinal stability and interrelationships of IU among a cohort of youth with chronic pain and their parents. At baseline and follow-up, both youth and parents (n=156 dyads) completed questionnaires assessing IU, pain characteristics, and clinical outcomes (pain interference, anxiety, depressive, and posttraumatic stress symptoms). Relationships between parent and youth IU, pain interference, and mental health symptoms were also examined.

Results: Our findings support the construct stability of IU over time, as well as intrapersonal (actor) effects of IU on follow-up pain interference and mental health symptoms in youth and on mental health symptoms in parents. There were no interpersonal (partner) effects over time between youth and parent IU or between their own IU and the pain and mental health outcomes of the other dyad member.

Discussion/Conclusions: These findings align with previous research evidencing IU as a transdiagnostic risk factor for a range of mental health concerns and extend previous findings by showing the stability of parent and youth IU over time and its predictive relevance to both parent and youth pain and mental health symptoms.
Impact of the COVID-19 pandemic on youth with chronic pain, their parents, and siblings: A mixed-methods study

Sabine Soltani1, Sarah Brennenstuhl2, Kathryn A. Binnie3, Tatiana Lund4, Jamie Kaufhold5, Tieghan Killackey6, Manon Choinière7, Gabrielle Page8, Lise Dassie9, Anaïs Lacasse10, Chitra Laloo11, Patricia Poulin12, Pablo Ingelmo13, Samina Ali14, Marco Battaglia15, Fiona Campbell16, Andrew Smith17, Myles Benayon18, Isabel Jordan19, Justina Marianayagam20, Lauren Harris21, Vina Mohabir22, Jennifer Stinson23, Melanie Noël24

1 University of Calgary, Psychology, Calgary, Alberta, Canada; 2 University of Toronto, Lawrence S. Bloomberg Faculty of Nursing, Toronto, Ontario, Canada; 3 University of Calgary, Department of Anesthesiology, Perioperative and Pain Medicine, Calgary, Alberta, Canada; 4 University of Calgary, Calgary, Alberta, Canada; 5 University of Calgary, Calgary, Alberta, Canada; 6 The Hospital for Sick Children, Child Health Evaluative Sciences, Toronto, Ontario, Canada; 7 University of Montreal, Department of Anesthesiology, Montreal, Quebec, Canada; 8 Université de Montréal, Department of Anesthesiology and Pain Medicine, Faculty of Medicine; Department of Psychology; Research Center of the Centre hospitalier de l’Université de Montréal, Montreal, Quebec, Canada; 9 Université de Montréal, Department of Biomedical Sciences; Research Center of the Centre hospitalier de l’Université de Montréal, Montreal, Quebec, Canada; 10 Université du Québec en Abitibi-Témiscamingue, Department of Health Sciences, Rouyn-Noranda, Quebec, Canada; 11 The Hospital for Sick Children, Toronto, Ontario, Canada; 12 University of Ottawa, Anesthesiology and Pain Medicine, Ottawa, Ontario, Canada; 13 Montreal Children’s Hospital, Anesthesia and Chronic Pain Management, Montreal, Quebec, Canada; 14 University of Alberta, Medicine & Dentistry - Pediatrics, Edmonton, Alberta, Canada; 15 Centre for Addiction and Mental Health, Division of Child and Youth Psychiatry, Toronto, Ontario, Canada; 16 The Hospital for Sick Children, Anesthesia and Pain Medicine, Toronto, Ontario, Canada; 17 Centre for Addiction and Mental Health, Toronto, Ontario, Canada; 18 McMaster University, Medicine, Hamilton, Ontario, Canada; 19 Squamish, British Columbia, Canada; 20 Northern Ontario School of Medicine, Sudbury, Ontario, Canada; 21 The Hospital for Sick Children, Child Health Evaluative Sciences, Toronto, Ontario, Canada; 22 The Hospital for Sick Children, Child Health Evaluative Sciences, Toronto, Ontario, Canada; 23 The Hospital for Sick Children, Child Health Evaluative Sciences, Toronto, Ontario, Canada; 24 University of Calgary, Psychology, Calgary, Alberta, Canada

Introduction/Aim: Pediatric chronic pain was a public health emergency before the COVID-19 pandemic, and this problem has been predicted to escalate further. Pain tends to occur intergenerationally in families, and youth with chronic pain and their parents have high rates of mental health issues, which can exacerbate pain further. Siblings of youth with chronic pain have been largely overlooked in research, as has the impact of the pandemic on posttraumatic stress symptoms, substance use, and healthcare utilization.

Methods: This mixed-methods, cross-sectional study examined pain, mental health symptoms, substance use, and healthcare utilization in youth with chronic pain (n=354), their parents (n=233), and siblings without chronic pain (n=155) during the pandemic.
**Results:** Levels of mental health symptoms were found to be high, particularly in those individuals most personally impacted by the pandemic. For parents with chronic pain (but not youth with chronic pain), greater personal COVID impact was related to worse pain interference. Rates of healthcare utilization were high, with 60-70% of youth with chronic pain and their parents reporting seeing their family physician in the past 2 weeks, and with most consultations due to youth pain. Qualitative content analysis of youth (n=44), parent (n=14), and sibling interviews (n=11) revealed three overarching themes related to: access to virtual care, managing mental health, and concerns about contracting COVID-19.

**Discussion/Conclusions:** Future longitudinal research assessing these outcomes across early to later waves of the pandemic, particularly among marginalized and racialized communities is needed to ensure equitable and timely access to pain and mental health assessment and treatment.
Predicting Parental Judgments of Acute Pain: The Relative Impact of Caregiver Distress versus Toddler Pain Behaviours

Amy Stern¹, Jessica Zaffino², Cheryl Chow³, Rebecca Pillai Riddell⁴

¹ York University, Psychology, Toronto, Ontario, Canada; ² York University, Psychology, Toronto, Ontario, Canada; ³ York University, Psychology, Toronto, Ontario, Canada; ⁴ York University, Psychology, Toronto, Ontario, Canada

Introduction/Aim: Previous studies have shown that parents largely base their assessment of infant pain on factors other than the pain behaviours of their children (Pillai Riddell et al., 2014; Mamedova et al., 2019). The present study aimed to examine which variables predict parents’ judgments of toddlers’ post-immunization pain. It was hypothesized that child pain behaviours and parental worry would be the strongest predictors.

Methods: One hundred and fifty-five parent-toddler dyads were selected from a larger longitudinal study that observed infants during their routine immunization appointments in the later half of the second year of life (18 and 24 months). Toddlers’ pain behaviours were coded and analyzed in the following 15 second epochs: immediately prior to the first injection, immediately following the last injection, and 1-and 2- minutes following the needle using the Face, Legs, Activity, Cry, Consolability Scale (FLACC; Merkel, Voepel-Lewis, Shayevitz, & Malviya, 1997). Parents rated their own worry levels before and after the immunization.

Results: Regression analysis suggests that toddlers’ pain behaviours in the reactivity phase following the needle and parental assessment of their own worry before and after the needle accounted for moderate amounts of variance in parental pain judgements (R²=0.32). The magnitude of the Beta weights suggested that toddlers’; pain behaviours immediately after the needle were stronger than parent worry.

Discussion/Conclusions: These findings suggest that toddlers’ pain behaviours and parental worry are both significant predictors in parent pain assessments. Further research is needed to investigate other variables that contribute to parent judgments of toddler pain.
A unique CRMP2 binding site on NaV1.7 defines regulatory specificity and inhibits chronic neuropathic pain

Harrison Stratton1, Kimberly Gomez2, Paz Duran3, Dongzhi Ran4, Lisa Boinon5, Santiago Loya6, Cheng Tang7, Aida Calderon8, Liberty François-Moutal9, Aubin Moutal10, Cynthia Madura11, Shizhen Luo12, Samantha Perez-Miller13, May Khanna14, Rajesh Khanna15

1 NYU College of Dentistry, Molecular Pathobiology, New York City, New York, United States; 2 NYU College of Dentistry, Molecular Pathobiology, New York City, New York, United States; 3 NYU College of Dentistry, Molecular Pathobiology, New York City, New York, United States; 4 University of Arizona, Pharmacology, Tucson, Arizona, United States; 5 NYU College of Dentistry, Molecular Pathobiology, New York City, New York, United States; 6 NYU College of Dentistry, Molecular Pathobiology, New York City, New York, United States; 7 NYU College of Dentistry, Molecular Pathobiology, New York City, New York, United States; 8 NYU College of Dentistry, Molecular Pathobiology, New York City, New York, United States; 9 University of Arizona, Pharmacology, Tucson, Arizona, United States; 10 University of Arizona, Pharmacology, Tucson, Arizona, United States; 11 University of Arizona, Pharmacology, Tucson, Arizona, United States; 12 University of Arizona, Pharmacology, Tucson, Arizona, United States; 13 NYU College of Dentistry, Molecular Pathobiology, New York City, New York, United States; 14 NYU College of Dentistry, Molecular Pathobiology, New York City, New York, United States; 15 NYU College of Dentistry, Molecular Pathobiology, New York City, New York, United States

Introduction/Aim: The voltage-gated sodium channel isoform 1.7 (NaV1.7) is critical for nociceptive neurotransmission. We have pioneered an indirect approach for selective NaV1.7 regulation by targeting the cytosolic phosphoprotein collapsin response mediator protein 2 (CRMP2). However, the mechanism underlying this selective interaction remains unknown.

Methods: Peptide microarrays, western blots, and immunoprecipitation were used to probe the NaV1.7-CRMP2 interaction. Patch clamp electrophysiology and the spared nerve injury (SNI) model of neuropathic pain were used to determine the functional consequences of interfering with this regulatory interaction.

Results: We discovered a unique 15 amino acid NaV1.7-CRMP2 regulatory sequence (NaV1.7-CRS) that binds CRMP2 (Kd <1 μM) from human, macaque, pig, and rat spinal cord tissue. When the NaV1.7-CRS is deleted, NaV1.7 currents in primary sensory neurons are reduced by ~50% without affecting TTX-R currents. Treatment with a cell penetrant NaV1.7-CRMP2 interfering peptide or the peptide in an adeno-associated virus serotype 9 (AAV9) reduced NaV1.7 currents in rat and macaque DRGs. Uncoupling this interaction reduced NaV1.7 trafficking, presynaptic NaV1.7 localization, and spinal CGRP release. This treatment also reversed mechanical allodynia in rats with SNI induced neuropathic pain. Interfering with NaV1.7-CRMP2 coupling did not affect motor coordination, and spared thermal, inflammatory, and post-surgical nociception.

Discussion/Conclusions: The exclusive relationship between CRMP2 and NaV1.7 is determined by specific binding in the NaV1.7-CRS domain. This finding has significant translational
potential as the effects observed in rodent DRGs were recapitulated in nonhuman primate neurons. Our strategy supports the selective targeting of the CRMP2-NaV1.7 interaction as a gene therapy to treat neuropathic pain.
Comparing nucleus accumbens shell and core functional connectivity profiles in healthy adults and patients with chronic back pain

Adam Sunavsky¹, Jason Robertson², Jennika Veinot³, Javeria Hashmi⁴

¹ Dalhousie University, Anaesthesia, Pain Management, & Perioperative Medicine, Halifax, Nova Scotia, Canada; ² Dalhousie University, Anaesthesia, Pain Management, & Perioperative Medicine, Halifax, Nova Scotia, Canada; ³ Dalhousie University, Anaesthesia, Pain Management, & Perioperative Medicine, Halifax, Nova Scotia, Canada; ⁴ Dalhousie University, Anaesthesia, Pain Management, & Perioperative Medicine, Halifax, Nova Scotia, Canada

Introduction/Aim: The nucleus accumbens (NAc) is a critical structure implicated in the aetiology of chronic pain. However, the respective roles of the two NAc substructures, the shell and core, in mediating chronic pain has not been widely studied.

Methods: Resting state fMRI scans in 41 healthy controls (HC) and 39 patients with chronic back pain (CBP) were acquired. Differences between shell and core resting state functional connectivity (rsfc) within and between HC and CBP were assessed using whole-brain corrected contrasts. Significant regions in the CBP > HC contrast were used to predict Neuropathic Pain Scale (NPS) scores.

Results: In both HC and CBP, the regionwise comparison showed similar rsfc patterns: the core was more connected to salience, language, and memory regions, while the shell was more connected to default mode network (DMN) regions. The groupwise analysis revealed that HC had greater connectivity with language, memory, sensory, and sub-cortical networks relative to CBP patients in both the shell and core; CBP patients had greater connectivity with attention, executive, and DMN regions. There was no significant effect (p = 0.829) of shell versus core in determining the differences between healthy and CBP groups. The rsfc between a network of frontal regions (e.g., dorsolateral prefrontal cortex) and the shell and core were significantly correlated to the pain intensity subscale of the NPS (p < .05, corrected).

Discussion/Conclusions: These findings show similar patterns of NAc shell and core fc within HC and CBP participants while highlighting distinct differences between groups; these rsfc values predict CBP intensity.
Integrating CARD (Comfort-Ask-Relax-Distract) for improving COVID-19 pediatric vaccinations in community pharmacies: before and after study

Anna Taddio¹, James Morrison², Victoria Gudzak³, Charlotte Logeman⁴, C Meghan McMurtry⁵, Lucie Bucci⁶, Christine Shea⁷, Noni MacDonald⁸, Molly Yang⁹
¹ University of Toronto, Faculty of Pharmacy, Toronto, Ontario, Canada; ² Whole Health Pharmacy Partners, , Markham, Ontario, Canada; ³ University of Toronto, , Toronto, Ontario, Canada; ⁴ SickKids, , Toronto, Ontario, Canada; ⁵ University of Guelph, , Guelph, Ontario, Canada; ⁶ Canadian Public Health Association, , Ottawa, Quebec, Canada; ⁷ University of Toronto, , Toronto, Ontario, Canada; ⁸ Dalhousie University, , Halifax, Nova Scotia, Canada; ⁹ Whole Health Pharmacy Partners, , Markham, Ontario, Canada

Introduction/Aim: CARD (Comfort-Ask-Relax-Distract) is an educational tool demonstrated to reduce Immunization Stress-Related Responses (ISRR) in pediatric school-based vaccinations. The objective was to integrate CARD in pharmacy-based pediatric COVID-19 vaccinations and evaluate impact on ISRR and satisfaction with vaccination.

Methods: Before-and-after study in 5 independent community pharmacies offering COVID-19 vaccinations to children aged 5-11 years. During the before phase (control), no changes were made to practices. During the after phase, CARD was integrated (e.g., children prepared a coping plan using the CARD checklist, distraction toolkits were placed in waiting and vaccination spaces, vaccinations were performed with privacy, needles were obscured). In both phases, children self-reported pain and fear (0-10). Children and parents compared the experience to the last needle (better, same, worse). In the after phase, they reported how much CARD helped (not at all, a little bit, moderate amount, a lot).

Results: 153 children participated (72 control, 81 CARD). Demographic characteristics did not differ between groups (mean age, 8 years). Fear during vaccination was lower in the CARD group (2.5) vs. control (3.7); p=0.02. Pain did not differ (2.4 vs. 3.0, respectively; p=0.15). Children in the CARD group (vs. control) reported more positive experiences compared to their last needle (p=0.01); parents’ responses did not differ (p=0.15). Both children and parents reported CARD helped; the median score was moderate for children and a lot for parents.

Discussion/Conclusions: CARD reduced children’s fear and improved their vaccination experience when integrated in community pharmacy-based COVID-19 pediatric vaccinations.
Initial development and validation of the Pain Self-Compassion Scale among people self-reporting chronic pain

France Talbot¹, Virginie Daigle², Dania Boudreau³, Janis France⁴, Douglas French⁵, Christopher France⁶

¹ Université de Moncton, School of Psychology, Moncton, New Brunswick, Canada; ² Université de Moncton, Moncton, Quebec, Canada; ³ Université de Moncton, Moncton, Quebec, Canada; ⁴ Ohio University, Athens, Ohio, United States; ⁵ The Atlantic Pain Clinic, Moncton, New Brunswick, Canada; ⁶ Ohio University, Athens, Ohio, United States

Introduction/Aim: General self-compassion has been linked to psychological adjustment to chronic pain. Significant associations have been found with pain-related protective and vulnerability factors. However, no pain-specific measure of self-compassion is available. This study aims to develop and validate the Pain Self-Compassion Scale (PSCS).

Methods: A pool of 54 items was chosen based on item content of the general Self-Compassion Scale, which was adapted to reflect compassionate and non-compassionate responding when faced with intense pain and pain interference. A sample of 318 adults with chronic pain was recruited using MTurk (50.9% men; mean age = 39.3, SD = 12.0).

Results: A principal component factor analysis revealed two underlying factors: a positive dimension (self-compassionate pain responding; COMP) and a negative dimension (self-uncompassionate pain responding; NON-COMP) explaining 42.2% and 17.3% of the variance respectively. The two factors were moderately correlated (r = .42) and internal consistency was satisfactory α = .97 for each factor). Convergent and divergent validity was supported by significant correlations with key positive and negative pain-related variables. The COMP subscale was more strongly correlated with pain resilience (rs = .68 versus -.48) while the NON-COMP subscale was correlated with pain intensity (r = .23) and pain disability (r = .54) and more strongly correlated with pain catastrophizing (rs = .62 versus -.30).

Discussion/Conclusions: Based on this initial study, the PSCS appears to be a valid and reliable measure. Such a pain-specific measure would likely be useful to assess adjustment to chronic pain and the impact of pain-related self-compassionate interventions.
Introduction/Aim: Needle related responses such as pain or fear can create barriers to vaccinations and delay the possibility of reaching community immunity. Vaccination noncompliance due to needle fear can lead to increased burden from vaccine-preventable diseases. We characterized needle fears and coping strategies among clients attending a mass COVID-19 clinic to inform vaccination delivery processes.

Methods: Clients attending the Waterloo Region Health Sciences COVID-19 mass clinic between June and August 2021 were invited to complete a paper survey about needle related stress symptoms (fear, pain, and dizziness) experienced during vaccination and factors that promote distress and coping. Data were analyzed descriptively.

Results: Of 2488 clients reporting on their symptoms, 16% reported needle fear. The majority of whom reported low levels (scores <3 out of 10) of pain (51%) or dizziness (79%). However, up to 14% reported being scared of the needle, 20% of respondents aged 12-19 reported being very scared (6-10 scores). Concerns about the needle or other side effects of the vaccine were the most reported factors contributing to negative vaccination stress-related experiences especially among adults aged 25-40. Conversely, having a mental distraction (30%), being vaccinated in private (17%), having a support person present (17%) were reported as beneficial.

Discussion/Conclusions: The prevalence of any needle fear was reported by 16%. Interventions that promote more positive experiences should be routinely incorporated into the vaccination delivery processes broadly, including distraction, presence of a support person and privacy. There is opportunity to provide information about vaccination side effects to additionally lessen anxieties.
Evaluation of In-Person versus Virtual Interprofessional Chronic Pain Group Programs

Gregory Tippin¹, Abi Muere², Veronica Wong³, Jennifer Anthonypillai⁴, Laura Katz⁵

¹ McMaster University Medical Centre; McMaster University, Michael G. DeGroote Pain Clinic; Department of Psychiatry and Behavioural Neurosciences, Hamilton, Ontario, Canada; ² McMaster University Medical Centre, Michael G. DeGroote Pain Clinic, Hamilton, Ontario, Canada; ³ McMaster University Medical Centre, Michael G. DeGroote Pain Clinic, Hamilton, Ontario, Canada; ⁴ McMaster University Medical Centre, Michael G. DeGroote Pain Clinic, Hamilton, Ontario, Canada; ⁵ McMaster University Medical Centre; McMaster University, Michael G. DeGroote Pain Clinic; Department of Psychiatry and Behavioural Neurosciences, Hamilton, Ontario, Canada

Introduction/Aim: The Michael G. DeGroote Pain Clinic offers an 8-session interprofessional Pain Management Group Program for individuals with chronic pain. Prior to the COVID-19 pandemic, programming was delivered in-person. Following the onset of the COVID-19 pandemic in 2020, an adapted virtual program was developed. The aim of this study was to evaluate the outcomes for the in-person versus virtual group programs.

Methods: Questionnaires were completed by patients attending their first (baseline) and last (discharge) sessions of the in-person and virtual Pain Management Group Programs. Data were analyzed using descriptive statistics and t-tests.

Results: Ninety-two percent of in-person participants (231/250) and 85% of virtual participants (98/115) completed questionnaire packages. Paired sample t-tests indicated significant decreases in depression, anxiety, stress; perceived disability; fear of pain/re-injury; and catastrophizing (ts ≥ 3.886, ps ≤ .001), as well as significant increases in pain self-efficacy (ts ≥ 5.86, ps ≤ .001) at discharge compared to baseline for both programs. Additionally, independent sample t-tests demonstrated no significant differences between the in-person and virtual programs for the aforementioned patient outcomes (ts ≤ |1.27|, ps ≥ .10).

Discussion/Conclusions: Interprofessional chronic pain management is considered the gold standard of treatment for chronic pain. The Michael G. DeGroote Pain Clinic’s interprofessional Pain Management Group Programs were effective in decreasing distress and disability related to chronic pain. Importantly, the virtual program demonstrated similar outcomes to in-person programming. Research on efficacy of virtual chronic pain programs is essential as the future of healthcare will likely be a hybrid of in-person and virtual care.
Prevalence and Characteristics of Pain in Survivors of Childhood Cancer

Perri R Tutelman¹, Christine T Chambers², Conrad V Fernandez³, Annette Flanders⁴, Lauren C Heathcote⁵, Gregory MT Guilcher⁶, Julia MacLeod⁷, Melanie Noel⁸, Fiona SM Schulte⁹, Jennifer N Stinson¹⁰, Maya Stern¹¹, Robin Urquhart¹²

¹ Dalhousie University, , Halifax, Nova Scotia, Canada; ² Dalhousie University, , Halifax, Nova Scotia, Canada; ³ IWK Health Centre, , Halifax, Nova Scotia, Canada; ⁴ IWK Health Centre, , Halifax, Nova Scotia, Canada; ⁵ King's College London, , London, N/A, United Kingdom; ⁶ Alberta Children's Hospital, , Calgary, Alberta, Canada; ⁷ Dalhousie University, , Halifax, Nova Scotia, Canada; ⁸ University of Calgary, , Calgary, Alberta, Canada; ⁹ University of Calgary, , Calgary, Alberta, Canada; ¹⁰ The Hospital for Sick Children, , Toronto, Ontario, Canada; ¹¹ Dalhousie University, , Halifax, Nova Scotia, Canada; ¹² Dalhousie University, , Halifax, Nova Scotia, Canada

Introduction/Aim: Survivors of childhood cancer are at risk for pain as a late effect of treatment. However, the prevalence and characteristics of pain in this population are unclear as existing studies have largely relied on non-validated and single item pain assessment instruments. This study aimed to describe the prevalence and characteristics of pain in survivors of childhood cancer using a valid, multidimensional pediatric pain assessment instrument.

Methods: Participants were 54 survivors of childhood cancer between the age of 8-17 years (M=13 years, 50% female). Survivors had a range of cancers diagnoses including: leukemia (54%), solid tumors (35%), lymphoma (7%), and CNS tumors (4%). On average, participants were 7 years (SD=4.1, range=1-16 years) post-treatment. Participants reported on multiple dimensions of pain experienced during the last week including location, intensity, and duration using a multidimensional pain assessment instrument.

Results: Thirty survivors (56%) reported experiencing pain in the past 7 days. Pain locations included legs/feet (60%), back (43%), head/neck (33%), arms/hands (23%), abdomen (17%) and/or chest (10%). For most survivors (70%), pain was chronic (i.e., present >3 months). For those reporting pain, the average pain intensity in the last 7 days was clinically significant (i.e., a rating >3/10; M=3.9/10, SD=1.47, range=1-7/10). Female survivors in the sample reported significantly higher levels of pain intensity compared to males (t(52)=3.31, p<.01).

Discussion/Conclusions: Pain is commonly experienced by survivors of childhood cancer and varies in intensity, location, and frequency. Comprehensive multidimensional assessments of pain yield important information that may guide intervention in this population.
Sex-specific mechanisms regulate spinal microgliosis after peripheral nerve injury

Alba Ureña Guzmán¹, Shannon N Tansley², Arkady Khoutorsky³

¹ McGill University, Department of Anesthesia and Faculty of Dentistry, Montreal, Quebec, Canada; ² McGill University, Department of Anesthesia and Faculty of Dentistry, Montreal, Quebec, Canada; ³ McGill University, Department of Anesthesia and Faculty of Dentistry, Montreal, Quebec, Canada

Introduction/Aim: Peripheral nerve injury (PNI) induces microglial activation and proliferation in the spinal cord, which contributes to the development of neuropathic pain. Male and female mice display similar levels of microgliosis after PNI in the spared nerve injury (SNI) model of neuropathic pain. However, it was recently shown that microglia in male mice proliferate more as compared to females three days post-SNI. In this study, we investigated how equal PNI-induced microgliosis is maintained in males and females despite differences in microglia proliferation.

Methods: We collected the lumbar spinal cord of male and female mice at days 1, 2, and 3 post-SNI and sham surgeries. To evaluate differences in proliferating and apoptotic microglia, we co-labeled cells with Ki67, CC3, and Iba1. To assess the pattern of microgliosis, we used 3D imaging of fluorescently labeled microglia in Tmem119-CreERT2:Ai14 mice. The spinal cord of Tmem119-CreERT2:Ai14 mice was collected on days 1, 2, and 3 after SNI, cleared with the X-Clarity Tissue clearing system and imaged using light-sheet microscopy.

Results: We examined three mechanisms that could account for the differences in the origin of microgliosis after SNI. First, microglia from female mice could proliferate earlier after SNI in comparison to males. Second, male microglia could undergo apoptosis at a higher rate than females. Third, microglia could migrate from the proximities of the spinal cord at a higher pace in female mice.

Discussion/Conclusions: This study investigates sex-specific patterns and origin of microgliosis after PNI.
Team-based primary care for the management of chronic low back pain: a qualitative study of healthcare provider perspectives

Kyle Vader¹, Catherine Donnelly², Therese Lane¹, Gillian Newman¹, Dean Tripp⁵, Jordan Miller⁶
¹ Queen's University, Kingston, Ontario, Canada; ² Queen's University, Kingston, Ontario, Canada; ³ Patient Partner, Toronto, Ontario, Canada; ⁴ Patient Partner, Toronto, Ontario, Canada; ⁵ Queen's University, Kingston, Ontario, Canada; ⁶ Queen's University, Kingston, Ontario, Canada

Introduction/Aim: Chronic low back pain is a prevalent and disabling health issue. Team-based models of primary care are ideally positioned to provide comprehensive care for patients with chronic low back pain. A better understanding of primary care team perspectives can inform future efforts to improve how care is provided for patients with chronic low back pain in this practice setting. The purpose of this study was to understand healthcare providers overall experiences, perceived barriers and facilitators, and recommendations when providing team-based primary care for the management of chronic low back pain.

Methods: We conducted an interpretive description qualitative study based on focus group discussions with healthcare providers from team-based primary care settings in Ontario, Canada. Data were analyzed using thematic analysis.

Results: We conducted five focus groups with five different primary care teams, including a total of 31 healthcare providers. We identified four themes (each with sub-themes) related to overall experiences, perceived barriers and facilitators, and recommendations when providing team-based primary care for the management of chronic low back pain, including: 1) care pathways and models of service delivery, 2) team processes and organization, 3) team culture and environment, and 4) patient needs and readiness.

Discussion/Conclusions: Primary care teams are implementing diverse care pathways and models of service delivery for the management of patients with chronic low back pain, which can be influenced by patient, team, and organizational factors. Results have potential implications for future research and practice innovations to improve how team-based primary care is delivered for patients with chronic low back pain.
Neonatal opioid withdrawal affects neurodevelopment of the somatosensory system

Nynke J van den Hoogen¹, Charlie HT Kwok², Tuan Trang³

¹ University of Calgary, Hotchkiss Brain Institute, Calgary, Alberta, Canada; ² University of Calgary, Calgary, Alberta, Canada; ³ University of Calgary, Calgary, Alberta, Canada

Introduction/Aim: Opioid abuse and misuse have increased greatly over the last decades across the adult population, including pregnant women. When a child is born to an opioid dependent mother, the exposure to opioids is suddenly terminated, causing neonatal opioid withdrawal. This poses severe risks for the infant, where they experience debilitating withdrawal symptoms like irritability, tremors, feeding intolerance, and respiratory distress. In addition, the high degree of nervous system plasticity directly after birth ensures withdrawal can affect long-lasting changes in the somatosensory circuit. In this study, we examined the neurodevelopmental consequences of neonatal opioid withdrawal.

Methods: C57BL/6J mice received escalating doses of morphine (10-50 mg/kg) over 5 days (postnatal day 5-10), and withdrawal was precipitated by injection of the opioid receptor antagonist naloxone (2 mg/kg) two hours after the last morphine dose. Neonatal mice undergoing withdrawal were left to mature in their home cage. In adulthood (8 weeks), mice were assessed for nociception related behaviours. Tissue was collected to assess the cFos response (a surrogate marker for neuronal activation) in the brainstem following withdrawal at neonatal and adult ages.

Results: Naloxone precipitated robust opioid withdrawal behaviours, with neonatal animals displaying differences in withdrawal behaviours and unique neuronal activation patterns within key brainstem regions. In adulthood, animals that had undergone neonatal opioid withdrawal show an increased response to repeated opioid withdrawal. Response to injury in adulthood will be assessed. Baseline mechanical sensitivity was unaffected.

Discussion/Conclusions: In summary, neonatal opioid withdrawal affects neurodevelopment of the somatosensory system lasting into adulthood.
Inhibition of acute inflammation leads to chronification of inflammatory pain

Lucas Vasconcelos Lima¹, Gabrielle Guanaes Dutra², Theodora Markova³, Marc Parisien⁴, Jaqueline Silva⁵, Nader Ghasemlou⁶, Luda Diatchenko⁷, Jeffrey Mogil⁸

¹ McGill University, Psychology, Montreal, Quebec, Canada; ² McGill University, Psychology, Montreal, Quebec, Canada; ³ McGill University, Montreal, Quebec, Canada; ⁴ McGill University, Montreal, Quebec, Canada; ⁵ Queen's University, Kingston, Ontario, Canada; ⁶ Queen's University, Kingston, Ontario, Canada; ⁷ McGill University, Montreal, Quebec, Canada; ⁸ McGill University, Psychology, Montreal, Quebec, Canada

Introduction/Aim: Recent data from a human genetics study suggests that pain resolution is coordinated by inflammatory cells during the acute phase of an inflammatory response. We hypothesized that inhibition of inflammatory response might lead to pain chronification.

Methods: CD-1 male and female mice were treated with dexamethasone, diclofenac, gabapentin or vehicle for seven consecutive days after receiving an inflammatory injury (complete Freund’s adjuvant; CFA). Mechanical paw-withdrawal threshold (PWT) was measured prior at regular intervals until average PWTs returned to baseline values. The involvement of neutrophils was examined by depletion using anti-Ly6G or direct injection of isolated neutrophils into the hind paw. Finally, we tested whether cryotherapy would have similar effects after CFA injury.

Results: Dexamethasone produced an acute anti-allodynic effect in the CFA injured mice, but significantly delayed PWT recovery to baseline. Diclofenac, gabapentin, lidocaine, and cryotherapy all reduced allodynia during the treatment period, but only diclofenac and cryotherapy prolonged the duration of CFA-induced allodynia, suggesting that the delay in recovery is, in fact, due to the reduction of inflammation. Finally, treatment with anti-Ly6G antibody reduced acute allodynia but prologued its duration whereas neutrophil injection entirely prevented the allodynia-prolonging effect of dexamethasone, suggesting that neutrophils are involved in the resolution of pain after injury and that dexamethasone delays allodynia recovery by directly affecting neutrophils.

Discussion/Conclusions: Our observations suggest that interfering with the inflammatory response immediately after injury with a corticosteroid, NSAID or cryotherapy, although producing the acute relief of pain, might simultaneously lead to pain chronification.
Brain regions underlying working memory are linked to subjective experience of chronic pain

Jennika Veinot¹, Javeria Ali Hashmi²

¹ Dalhousie University, Anesthesia, Pain Management and Perioperative Medicine, Halifax, Nova Scotia, Canada; ² Dalhousie University, Anesthesia, Pain Management and Perioperative Medicine, Halifax, Nova Scotia, Canada

Introduction/Aim: Chronic pain (CP) often exists in the absence of noxious stimuli, suggesting that top-down factors influence its perception. Top-down modulation of pain relies on working memory (WM), a cognitive system that often shows deficits in CP patients. The dorsolateral prefrontal cortex (dlPFC) co-ordinates WM and is also implicated in pain modulation. Recently the vlPAG, a region already recognized for its role in top-down pain modulation, has also been implicated in WM.

Methods: Here, we investigate how visual threat cues paired with painful heat stimuli influence pain perception in 72 CP patients. In addition, we used task and resting-state functional MRI (fMRI) to test if the activity and connectivity of dlPFC and vlPAG are modulated by threat cues, and if these properties can be used to predict CP intensity and WM accuracy.

Results: Increased pain intensity was associated with decreased working memory scores. Pain was greater when identical stimuli were paired with high threat cues relative to low threat cues. fMRI response showed higher activation in left vlPAG and lower activation in left dlPFC in response to heat stimuli paired with low threat cues versus high threat cues. However, vlPAG showed less reduction in response to heat in people with low WM. Greater resting-state functional connectivity between left dlPFC and left vlPAG predicted worse WM and greater CP intensity.

Discussion/Conclusions: Overall, this study demonstrates a neural pathway that mediates CP and memory loss and offers new insights for understanding CP and for developing new therapeutic targets.
Interventional treatments for chronic, axial or radicular, non-cancer, spinal pain: a systematic review and network meta-analysis of randomised trials

Xiaoqin Wang1, Grace Martin2, Behnam Sadeghirad3, Rachel Couban4, Jason Busse5

1 McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; 2 McMaster University, Department of Medicine, Hamilton, Ontario, Canada; 3 McMaster University, Hamilton, Ontario, Canada; 4 McMaster University, Michael G. DeGroote Institute for Pain Research and Care, Hamilton, Ontario, Canada; 5 McMaster University, Department of Health Research Methods, Evidence, and Impact; Department of Anesthesia; The Chronic Pain Centre of Excellence for Canadian Veterans; The Michael G. DeGroote Centre for Medicinal Cannabis Research, Hamilton, Ontario, Canada

Introduction/Aim: To conduct a systematic review of RCTs to explore the effectiveness and harms of interventional procedures for the management of chronic, non-cancer, axial or radicular spinal pain.

Methods: We included RCTs that compared different interventional procedures or compared interventional procedures with a placebo/sham procedure or usual care for adult patients with spinal pain. Pairs of reviewers independently screened articles, extracted data, and assessed risk of bias. We used frequentist random-effects network meta-analyses. We will use the GRADE approach to assess the certainty in evidence.

Results: We included 88 RCTs that enrolled a total of 8364 patients. For local pain, only radiofrequency ablation of facet or sacroiliac joint nerves (Joint RF) showed better pain relief than placebo (MD -1.44 on a 10cm VAS, 95% CI -2.13, -0.75). Multiple interventional procedures showed improved pain relief vs. placebo for radicular pain: nerve block with steroids (MD -3.15, 95% CI -5.32, -0.97), Joint RF (MD -2.12, 95% CI -3.30, -0.93), epidural injection (EI) of steroids (MD -1.00, 95% CI -1.87, -0.13), EI with local anesthetics (LA) (MD -1.37, 95% CI -2.66, -0.09), EI with steroid and LA (MD -1.52, 95% CI -2.70, -0.34), and EI with LA plus radiofrequency of DRG (MD -3.73, 95% CI -6.00, -1.46). We are in the process of completing analyses for other outcomes, and rating the certainty of evidence, which will be completed in time for the conference.

Discussion/Conclusions: Our analysis suggests that only Joint RF is effective for reducing local pain. Multiple interventional procedures may be more effective than placebo for radicular pain. Our confidence in these findings will be dependent on the overall certainty of the evidence.
Predictors of Prolonged Recovery Following Acceptance for Disability or Sick Absence Benefits: A Systematic Review and Meta-Analysis of Observational Studies

Li Wang1, Vahid Ashoorion2, Yaping Chang3, Henry Kwon4, Cody Tran5, Dan Liu6, Sha Diao7, Sean Kennedy8, Katie Kennedy9, Sara Ghazizadeh10, Alireza Malektojari11, Yanfei Li12, Zijun Li13, Ke Guo14, Haitong Zhao15, Minyan Yang16, Mina Ma17, Rachel Couban18, Jason Busse19

1 McMaster University, Department of Anesthesia, Hamilton, Ontario, Canada; 2 McMaster University, Hamilton, Ontario, Canada; 3 McMaster University, OrthoEvidence, Burlington, Ontario, Canada; 4 Wayne State University School of Medicine, Detroit, Michigan, United States; 5 McMaster University, Michael G. DeGroote School of Medicine, Hamilton, Ontario, Canada; 6 Sichuan University, Evidence-Based Pharmacy Center/Department of Pharmacy, West China Second University Hospital, Chengdu, China; 7 Sichuan University, Evidence-Based Pharmacy Center/Department of Pharmacy, West China Second University Hospital, Chengdu, China; 8 University of Toronto, Department of Diagnostic Radiology, Toronto, Ontario, Canada; 9 University of Toronto, Dalla Lana School of Public Health, Toronto, Ontario, Canada; 10 Hormozgan University of Medical Sciences, Bandarabbas, Iran; 11 Hormozgan University of Medical Sciences, Bandarabbas, Iran; 12 Evidence-Based Medicine Center of Lanzhou University, Lanzhou, China; 13 Evidence-Based Medicine Center of Lanzhou University, Lanzhou, China; 14 Evidence-Based Medicine Center of Lanzhou University, Lanzhou, China; 15 Evidence-Based Medicine Center of Lanzhou University, Lanzhou, China; 16 Evidence-Based Medicine Center of Lanzhou University, Lanzhou, China; 17 Evidence-Based Medicine Center of Lanzhou University, Lanzhou, China; 18 McMaster University, Michael G. DeGroote Institute for Pain Research and Care, Hamilton, Ontario, Canada; 19 McMaster University, McMaster University, Hamilton, Ontario, Canada

Introduction/Aim: Injuries and illnesses that result in time off work are important public health problems. In Canada, approximately one million occupational injury claims are reported each year by workers’ compensation boards. Most injured patients recover in a timely manner and return to work; however, approximately 10% do not, which accounts for 65% to 75% of resources spent on disability claims. Early identification of high-risk claims could help inform optimal management. We are conducting a systematic review and meta-analysis of observational studies to identify factors associated with prolonged recovery after receipt of disability benefits.

Methods: We searched MEDLINE, EMBASE, CINAHL, and PsycINFO to identify cohort or case-control studies that explored risk factors associated with prolonged recovery (e.g., claim duration, return to work) after receipt of wage-replacement benefits. We will pool estimates of association, when possible, for all independent variables reported by >1 study, and reported pooled measures in both relative (odds ratios) and absolute (risk increase) terms to optimize interpretability. We will explore heterogeneity of pooled estimates with seven a priori hypotheses. We will assess risk of bias for individual studies, and use the GRADE approach to summarize the certainty of evidence for all meta-analyses.
Results: Our literature search identified 19909 citations, of which 255 observational studies were eligible for our review. We are in the process of extracting the data and completing analyses.

Discussion/Conclusions: Our review will be the first to systematically evaluate factors associated with prolonged recovery after receipt of wage-replacement benefits for an injury or illness.
Prevalence of Fatal and Non-fatal Overdose Following Prescription of Opioids for Chronic Pain: A Systematic Review and Meta-analysis of Observational Studies

Li Wang¹, Patrick Jiho Hong², Yasir Rehman³, Brian Younho Hong⁴, Wenjun Jiang⁵, Alka Kaushal⁶, Rachel Couban⁷, Jason Busse⁸

¹ McMaster University, Department of Anesthesia, Hamilton, Ontario, Canada; ² University of Toronto, Department of Anesthesiology and Pain Medicine, Toronto, Ontario, Canada; ³ McMaster University, Hamilton, Ontario, Canada; ⁴ University of Toronto, Division of Plastic and Reconstructive Surgery, Toronto, Ontario, Canada; ⁵ McMaster University, Faculty of Science, Hamilton, Ontario, Canada; ⁶ University of Manitoba, Department of Family Medicine, Winnipeg, Manitoba, Canada; ⁷ McMaster University, Michael G. DeGroote Institute for Pain Research and Care, Hamilton, Ontario, Canada; ⁸ McMaster University, Department of Health Research Methods, Evidence, and Impact; Department of Anesthesia; The Chronic Pain Centre of Excellence for Canadian Veterans; The Michael G. DeGroote Centre for Medicinal Cannabis Research., Hamilton, Ontario, Canada

Introduction/Aim: Long-term opioid use is associated with serious harms, including overdose. We conducted a systematic review and meta-analysis to explore the overall prevalence of nonfatal and fatal overdose of opioids when prescribed for chronic pain.

Methods: We searched MEDLINE, EMBASE, CINAHL, and PsycINFO from inception to November 2021, for observational studies reporting fatal or non-fatal overdose following prescription of opioids for chronic pain. We assessed the risk of bias of all eligible studies, and used random-effects meta-analysis with Freeman-Tukey Double Arcsine transformation to pool prevalence across studies.

Results: Twenty cohort studies including 22,452,480 patients prescribed opioids for chronic pain were eligible for review. The prevalence of opioid-related death (fatal overdose) ranged from 0.2–17.5‰ (median 2‰, IQR 0.6–3‰), and the pooled prevalence of fatal opioid overdose was 1.6‰ (95%CI 0.6–3). The prevalence of non-fatal opioid overdose ranged from 0.02–14.9% (median 2.3%, IQR 0.5–4.7%), and the pooled prevalence of non-fatal opioid overdose was 2.7‰ (95%CI 1.6–4.1%). Among patients who reported a previous non-fatal opioid overdose, the pooled risk of fatal overdose was 38‰ (95%CI 6–92‰). A sensitivity analysis using logit transformation showed similar results.

Discussion/Conclusions: Our review suggests that for every 10,000 patients prescribed opioids for chronic pain, 23 will overdose and survive and 16 will experience a fatal opioid overdose. Among patients who had previous non-fatal overdose, the risk of fatal overdose increases to 380 per 10,000 patients.
Introduction/Aim: While health researchers have revealed the ways in which pain can affect patients across biopsychosocial dimensions, we know less about how ‘burdensome’ it can be to live with acute, chronic, and other kinds of pain. To understand this ‘burden of pain’ the Arthritis Research Center of Canada and their research partners developed a ‘Citizen-Science’ platform that solicits information about living with pain symptoms from the citizens of British Columbia, Canada. By engaging citizens in contributing, co-analyzing, and discovering information about their pain symptoms, we can gain insights into the aspects of pain that merit further investigation and increase awareness of these under-explored ‘burdens.’

Methods: To understand the usability of this Citizen-Science platform, we tested an initial version of it with visitors at the Central City Mall in Surrey, British Columbia. This intercept study was an important step in gaining first-hand perspectives from ‘citizens’ – the intended users of this platform – who provided critical insights into the usability needs for diverse populations.

Results: Findings uncovered the multiple challenges people face in communicating their pain experiences over such online platforms. The insights were grouped into four key themes that serve as guiding principles for further development of the ‘Citizen-Science’ platform and may inform similar other community-based health tracking platforms.

Discussion/Conclusions: Although some insights were unique to the specific visuals participants saw, the key themes indicate deeper needs for facilitating communication about pain within and outside of the healthcare community.
Using Affective Images as Prompts to Better Understand the 'Burdens of Pain'

Bhairavi Warke¹, Diane Gromala², Ankit Gupta³, Christopher Shaw⁴, Linda Li⁵

¹ Simon Fraser University, Interactive Arts and Technology, Surrey, British Columbia, Canada; ² Simon Fraser University, Interactive Arts and Technology, Surrey, British Columbia, Canada; ³ Simon Fraser University, Interactive Arts and Technology, Surrey, British Columbia, Canada; ⁴ Simon Fraser University, Interactive Arts and Technology, Surrey, British Columbia, Canada; ⁵ University of British Columbia, Department of Physical Therapy, Vancouver, British Columbia, Canada

Introduction/Aim: Pain is notoriously difficult to articulate; thus, assessing its impact on a person’s quality of life, ability to work, and one’s biopsychosocial ‘lived experience’ is formidable. Our team of health researchers/clinicians, patient-partners, and designers conducted a collaborative workshop focused on discovering new approaches to better understand this ‘burden of pain.’

Methods: One of the methods used in this workshop was derived from the commonly used ‘card-sorting’ method used by designers and human-computer interaction experts. We deployed ‘Mood Cards’ each bearing an image meant to evoke an emotional response or recognition of ‘attunement.’ The participants were asked to select one or two images that best represented their emotional experiences with their pain symptoms and share them with the group.

Results: This helped participants to better articulate their pain experience and express how it may create burdens in their day-to-day lives that most often remain invisible or silent. By opening conversations and enabling profound insights about diverse ‘burdens’ of pain, the cards also left a legacy in the subsequent design of a Citizen Science web portal — of maintaining critical spaces and methods for citizens to give voice to affective dimensions and burdens that may arise from pain.

Discussion/Conclusions: Our initial test demonstrates the potential of such ‘mood cards’ in effectively reducing the barriers to communicating the burden of pain. Therefore, we propose further investigations of the use of carefully selected affective images as a method for initiating more rigorous pain communication in clinical and non-clinical settings.
Placebo hypoalgesia and nocebo hyperalgesia produced by observational learning: A systematic review and meta-analysis

Stefanie H. Meeuwis1, Elżbieta A. Bajcar2, Mateusz T. Wasylewski3, Helena Bieniek4, Waclaw M. Adamczyk5, Sofiia Honcharova6, Marianna Di Nardo7, Giuliana Mazzoni8, Przemysław Bąbel9

1 Jagiellonian University, Institute of Psychology, Pain Research Group, Krakow, Poland; 2 Jagiellonian University, Institute of Psychology, Pain Research Group, Krakow, Poland; 3 Jagiellonian University, Institute of Psychology, Pain Research Group, Krakow, Poland; 4 Jagiellonian University, Institute of Psychology, Pain Research Group, Krakow, Poland; 5 1) Jagiellonian University; 2) The Jerzy Kukuczka Academy of Physical Education, 1) Institute of Psychology, Pain Research Group; 2) Institute of Physiotherapy and Health Sciences, Laboratory of Pain Research, Katowice, Poland, Krakow, Poland; 6 Jagiellonian University, Institute of Psychology, Pain Research Group, Krakow, Poland; 7 Sapienza University of Rome, Department of Dynamic, Clinical Psychology and Health, Rome, Italy; 8 Sapienza University of Rome, Department of Dynamic, Clinical Psychology and Health, Rome, Italy; 9 Jagiellonian University, Institute of Psychology, Pain Research Group, Krakow, Poland

Introduction/Aim: Placebo effects can be induced by observational learning (OL). No systematic review has yet summarized the efficacy of this process in shaping placebo effects using a meta-analytic approach. Our review aims to qualitatively and quantitatively assess the available data on OL as a method of inducing placebo hypoalgesia and nocebo hyperalgesia.

Methods: Eight databases were searched as well as references of included studies. Studies were included if (1) they enrolled healthy volunteers or patients with any pain condition; (2) OL was used to induce placebo/nocebo effects in pain. No restrictions regarding publication date were applied. Studies were screened for eligibility and assessed by two independent assessors. Data regarding mean pain intensity and unpleasantness ratings, pain expectancy ratings, and participants characteristics, e.g., empathy as well as type of OL (direct/indirect) were extracted from included studies. Risk of bias was assessed using modified Downs and Black checklist. Results of studies with comparable designs were pooled in meta-analytical syntheses.

Results: Twenty one trials were included in the review, with 17 pooled in meta-analysis. No studies involving pain patients were found. In studies featuring parallel groups design, placebo effects were stronger in the experimental compared to no-observation control groups. The observer’s empathy showed a weak positive correlation with placebo effects magnitude.

Discussion/Conclusions: Our review offers new insights into how various types of OL shape placebo and nocebo effects and the role that observer’s empathy may have in this process. The potential practical implications for clinical practice of the review findings are discussed.
Patient Responses to the Term Pain Catastrophizing: Thematic Analysis of Cross-sectional International Data

Fiona Webster¹, Laura Connøy², Riana Longo³, Beth Darnall⁴

¹ Western University, London, Ontario, Canada; ² Western University, London, Ontario, Canada; ³ Western University, London, Ontario, Canada; ⁴ Stanford University, Stanford, California, United States

Introduction/Aim: In the spring of 2020, a team at Stanford University launched the project Rename Pain Catastrophizing, which included an anonymous international online survey to understand the perspective of care providers and patients with chronic pain regarding the term “pain catastrophizing.” The intention is to help determine whether it is time to change the definition or use of this term—and to possibly develop a new term that is more patient-centered.

Methods: 1033 surveys were analyzed. The survey included demographic questions, close-ended questions, and open-ended questions. The open-ended survey questions were: (1) what comes to mind when you hear the term pain catastrophizing? (2) what would be a better term for pain catastrophizing? (3) is there anything else you would like to tell us on the topic? Responses from these questions were analyzed using qualitative thematic data analysis. A coding framework was developed inductively and applied to the data. Themes were then identified from the codes.

Results: We identified the following five themes: 1) the meaning people attribute to the term; 2) how the term is operationalized; 3) association with gender stereotypes; 4) questioning the rationale for the term; and 5) suggestions for a new term.

Discussion/Conclusions: Few studies have asked patients what “pain catastrophizing” means to them. The survey results show an overwhelming resistance to the term, its damaging effects upon care, and the perceived influence of negative gender stereotypes. Further, it illuminates how the psychologization of chronic pain—evident through the term pain catastrophizing—can ignore social context and delegitimize patient experiences.
**TRIM 32-mediated type I interferon signaling causes chronic mechanical hypersensitivity**

Calvin Wong¹, Diana Tavares-Ferreira², Behrang Sharif³, Theodore Price⁴, Philippe Seguela⁵, Arkady Khoutorsky⁶

¹ McGill University, Montreal, Quebec, Canada; ² University of Texas at Dallas, Dallas, Texas, United States; ³ McGill University, Montreal, Quebec, Canada; ⁴ University of Texas at Dallas, Dallas, Texas, United States; ⁵ McGill University, Montreal, Quebec, Canada; ⁶ McGill University, Montreal, Quebec, Canada

**Introduction/Aim:** mTOR is a highly evolutionarily conserved serine/threonine kinase that regulates cell homeostasis through key cellular processes, including cell growth and proliferation, translation, autophagy, and cytoskeleton organization. mTOR is present in two structurally and functionally distinct multiprotein complexes: mTORC1 (mTOR Complex 1) and mTORC2. mTORC1 regulates the rate of eIF4E-dependent mRNA translation through the repressor protein 4E-BP1. Although it has been established that activation of the mTORC1 following noxious stimuli is one of the many crucial mechanisms involved in mediating mRNA translation leading to the development of chronic pain; it is still unclear how these different mRNA’s contribute to enhanced hypersensitivity.

**Methods:** To study the role of eIF4E-dependent translation in pain, we selectively ablated 4E-BP1 in Nav1.8-positive nociceptors. We conducted behavioral and electrophysiological experiments to investigate manipulation of this pathway, as well as translating ribosome affinity purification (TRAP) to study differentially expressed genes (DEGs) in nociceptors.

**Results:** Our behavioral experiments demonstrate that 4E-BP1 cKO mice exhibit enhanced mechanical hypersensitivity at baseline, but not thermal hypersensitivity. cKO Nav1.8-positive nociceptors also demonstrated a trend of enhanced intrinsic excitability. Lastly, TRAP RNA-sequencing revealed DEG’s up and downregulated in 4E-BP1 cKO mice, particularly in pathways involved in antiviral responses and mitochondria activity.

**Discussion/Conclusions:** Our study demonstrates for the first time the central role of eIF4E-dependent translational control in nociceptors in the development of pain hypersensitivity. Specifically, we show enhanced TRIM 32-mediated interferon signaling as a key mechanism that contributes to selectively mechanical hypersensitivity.
Clinic-based assessment of sensitivity to physical activity is not associated with daily intraindividual pain variability among individuals with back pain.

Arthur Woznowski-Vu¹, Marc O. Martel², Alexandre Gervais³, Sara Ahmed⁴, Michael Sullivan⁵, Timothy H. Wideman⁶

¹ McGill University, School of Physical and Occupational Therapy, Montreal, Quebec, Canada; ² McGill University, Faculties of Dentistry & Medicine, Montreal, Quebec, Canada; ³ McGill University, School of Physical and Occupational Therapy, Montreal, Quebec, Canada; ⁴ McGill University, School of Physical and Occupational Therapy, Montreal, Quebec, Canada; ⁵ McGill University, Department of Psychology, Montreal, Quebec, Canada; ⁶ McGill University, School of Physical and Occupational Therapy, Montreal, Quebec, Canada

Introduction/Aim: Individuals with back pain experience pain fluctuations in daily life to different degrees, referred to as intraindividual pain variability (IPV). The clinic-based assessment of sensitivity to physical activity (SPA) may serve as a proxy for IPV. SPA refers to negative pain-related reactions to physical activity engagement. Although both SPA and IPV evaluate the dynamic nature of pain, no study to date has explored their relationship. This study aimed to address this gap.

Methods: Adults with back pain (< six-month onset) completed questionnaires, SPA assessment, and nine days of smartphone-based ecological momentary assessment (EMA). SPA was assessed using four indices (evoked pain intensity, pressure pain threshold at the back and hands, Situational Catastrophizing Questionnaire) in relation to a ten-repetition lifting task, individually tailored to evoke ≥20 out of 100 pain intensity from the first lift. IPV was assessed using five EMA-based indices: intraindividual pain variance, mean square of successive difference in pain, and probability of acute change in pain of three types (pain-only flare-up, activity-related pain flare-up, pain flare-up with impact on mood or activity levels). Data analyses consisted of an exploratory Pearson’s correlation matrix between all SPA and IPV indices.

Results: Sixty-two participants participated in EMA (median completion rate: 59%). Seventeen out of 20 associations between SPA and IPV indices were not statistically significant (p < .05), and the remaining three were inconsistent in the direction of the association.

Discussion/Conclusions: Overall, these exploratory analyses suggest that clinic-based assessment of SPA does not seem associated with daily IPV among individuals with back pain.
Introduction/Aim: Chronic post-surgical pain (CPSP) is a common complication associated with reduced quality of life. Large prospective studies are needed to assess the incidence, characteristics, and risk-factors for CPSP after cardiothoracic surgery.

Methods: This is a prospective cohort study of adult patients who underwent cardiothoracic surgery between 2011-2015. Data were collected perioperatively and patients were followed up at 3, 6, and 12-months after surgery where they were assessed for CPSP (defined as non-zero pain on a 0-10 numeric rating scale) around the surgical incision site. Descriptive statistics were calculated and risk-factors for CPSP were determined through univariate and multivariate logistic regression analyses.

Results: A total of 1,505 patients were included with a mean (SD) age of 58.9 (14.0) years-old, and 472 (31.9%) being women. The incidence of CPSP at 3, 6, and 12-months was 30.0%, 20.5% and 15.7%, respectively. At 3-months, CPSP was on average mild-to-moderate pain intensity (3.23 [1.98]). The large majority (64.5%) of patients reported this pain disorder to last second-to-minutes and occurring at least once a week (45.7% of patients). Independent predictors of CPSP at 3-months and 1-year included female sex, younger age, preoperative severe anxiety, chronic preoperative pain, acute postoperative pain, and higher opioid use within 5 days after surgery.

Discussion/Conclusions: Our results indicate that nearly one in three patients who underwent cardiothoracic surgery developed CPSP at 3-months, with half of these patients continuing to report pain at 1-year. Future explorations will need to be directed at preventing CPSP in those at high risk of pain.
Calcium-dependent potassium channels control the firing properties of parvalbumin-expressing spinal cord neurons

Shi Chen Xu¹, Lois S. Miraucourt², Hugues Petitjean³, Reza Sharif-Naeini⁴

¹ McGill, Physiology, Montreal, Quebec, Canada; ² McGill, Physiology, Montreal, Quebec, Canada; ³ Benephyt Laboratory, Strasbourg, France; ⁴ McGill, Physiology, Montreal, Quebec, Canada

Introduction/Aim: Spinal dorsal horn inhibitory interneurons expressing parvalbumin (PV) are characterized by their ability to fire at high frequencies. This ability is believed to prevent tactile information from reaching nociceptive projection neurons through a feedforward inhibitory gate. These firing properties are thought to be directly dependent on the calcium chelating properties of the PV protein, preventing the activation of calcium-dependent potassium channels which would otherwise hyperpolarize the cell membrane and causing adaptive firing. Here, we set out to test the effect of incrementing [Ca]i on the firing pattern of PV neurons.

Methods: Acute spinal cord slices from PV::Cre;tdTom mice allow patch clamp recordings from fluorescent PV-expressing interneurons. Slices were used up to 6 hours after dissection and maintained in carbogenated aCSF. A series of K-glucuronate based internal solutions including different concentration of CaCl2 and EGTA were prepared to achieve free [Ca]i levels of 150 nM, 20 uM, 200 uM and 2mM. Neuronal activity was evoked by 1 sec step current injections from -200 to +200 pA.

Results: Our results show that increasing [Ca]i dose-dependently blocks the aptitude of the PV neurons to fire tonically and induce a prevalent adaptation to the firing. In addition, we found that neurons lost their ability to tonically fire with >20 uM [Ca]i.

Discussion/Conclusions: Our findings indicate that free internal calcium plays a critical role on the electrical properties of PV interneurons and may be important in the setting of mechanical allodynia after nerve injury.
Treatments for chronic pain patients associated with temporomandibular disorders: a network meta-analysis of randomized control trials.

Liang Yao¹, Behnam Sadeghirad², Rachel Couban³, Jason Busse⁴

¹ McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; ² McMaster University, Hamilton, Ontario, Canada; ³ McMaster University, Michael G. DeGroote Institute for Pain Research and Care, Hamilton, Ontario, Canada; ⁴ McMaster University, Department of Health Research Methods, Evidence, and Impact; Department of Anesthesia; The Chronic Pain Centre of Excellence for Canadian Veterans; The Michael G. DeGroote Centre for Medicinal Cannabis Research., Hamilton, Ontario, Canada

Introduction/Aim: The effectiveness and safety of these treatments remain uncertain. We therefore conducted a systematic and network meta-analysis (NMA) focused on the benefits and harms of treatments in chronic TMD pain patients.

Methods: We included randomized trials comparing interventions for chronic pain patients associated with TMDs. Paired reviewers independently extracted the characteristics and outcomes information and assessed the risk of bias information. We performed the network meta-analysis (NMA) using a frequentist random-effects model. We adopted GRADE approach to rate the certainty of the direct, indirect and network estimates.

Results: After the ti/ab and full text screening, we included 216 studies. For pain reduction, the results indicate, when comparing with placebo, the following interventions are probably effective and with moderate certainty: CBT + NSAIDs, manipulation + postural exercise, mobilization, CBT, trigger point release, exercise, postural exercise, NSAIDS, standard of care and arthritis supplement. For physical function, the exercise, physical therapy, manipulation, acupuncture proved to be more effective than placebo and at moderate certainty. Unfortunately, only 31 studies with 1987 TMD pain patients reported the adverse events, given the small cases and short duration of follow up, the confidence intervals were extremely wide and the certainty of evidence of the interventions were at low or very low.

Discussion/Conclusions: Generally, for chronic pain patients with TMDs, some conservative treatments like the exercise, mobilization, and CBT, seems to be more effective and less likely to have serious harms, than pharmacological treatments and surgical therapies.
T-cell activation networks are negatively associated with chronic pain in patients with spinal cord injury

Amanda Zacharias¹, Jihoon Choi², Courtney Bannerman³, Margot Gunning⁴, Qingling Duan⁵, Nader Ghasemlou⁶

¹ Queen's University, Department of Biomedical and Molecular Sciences; School of Computing, Kingston, Ontario, Canada; ² Queen's University, Department of Biomedical and Molecular Sciences, Kingston, Ontario, Canada; ³ Queen's University, Department of Biomedical and Molecular Sciences, Kingston, Ontario, Canada; ⁴ Queen's University, Department of Biomedical and Molecular Sciences, Kingston, Ontario, Canada; ⁵ Queen's University, Department of Biomedical and Molecular Sciences, School of Computing, Kingston, Ontario, Canada; ⁶ Queen's University, Department of Biomedical and Molecular Sciences, Department of Anesthesiology and Perioperative Medicine, Kingston, Ontario, Canada

Introduction/Aim: Most patients with spinal cord injury (SCI) report chronic neuropathic pain. The biological mechanisms underlying this persistent pain remain unknown. We sought to identify differences in gene expression from whole blood samples of SCI patients with chronic pain compared to SCI patients without pain.

Methods: We used gene expression microarray data from Gene Expression Omnibus: GSE69901. First, we removed an outlier sample during quality control, resulting in eleven SCI patients with chronic neuropathic pain and thirteen SCI patients without pain. Next, we performed differential expression analysis (DEA) using the limma Bioconductor package and weighted co-expression network analysis (WGCNA in R) to identify genes and gene networks, respectively, associated with chronic neuropathic pain. We then used the Molecular Signatures Database to determine enrichment of biological pathways from our lists of associated genes and networks.

Results: DEA did not identify any differentially expressed genes, but WGCNNA yielded five co-expression networks associated with chronic pain in SCI patients. Of these, three networks were enriched for genes related to T-cell activation based on the Molecular Signatures Database. These three gene networks were negatively associated with chronic pain in SCI, suggesting protective effects on pain outcomes.

Discussion/Conclusions: Findings from our study indicate that T-cell activation may be important for chronic neuropathic pain in SCI patients. This is supported by earlier studies suggesting that T-cells are key regulators in the manifestation and maintenance of chronic pain. Moreover, our findings suggest that future studies should specifically investigate the role of T-cell activation in persistent neuropathic pain in patients with SCI.
Beyond Previous Pain Responding: Role of Parent Behaviour in Toddlerhood

Jessica Zaffino¹, Amy Stern², Cheryl Chow³, Rebecca Pillai Riddell⁴

¹ York University, Psychology, Toronto, Ontario, Canada; ² York University, Toronto, Ontario, Canada; ³ York University, Psychology, Toronto, Ontario, Canada; ⁴ York University, Psychology, Toronto, Ontario, Canada

Introduction/Aim: Previous research has shown the contribution of parental soothing behaviour on infant pain reactivity and regulation over the first year of life (Lisi et al., 2013). The current study aimed to replicate this study in toddlers during a vaccination appointment in the second year of life (18 months).

Methods: The sample included 147 parent-infant dyads. Appointments were videotaped and subsequently coded to measure infant pain using the Face, Legs, Activity, Cry, Consolability Scale (FLACC; Merkel et al., 2002). Parental soothing behaviour was coded using the Measure of Adult and Infant Soothing and Distress (MAISD; Cohen et al., 2005). Data was analyzed: 1-minute before the needle (baseline), immediately after the needle (reactivity), 1-minute after the needle (regulation 1), and 2-minutes after the needle (regulation 2). Hierarchical multiple regression was used to determine if parental behaviour predicted infant pain after accounting for earlier child pain responding.

Results: Regression models predicting child pain-related distress at baseline, needle, 1- and 2-minutes post vaccine from earlier pain behaviours and previous/concurrent parent behaviours were significant (R²s respectively were: R²=.16, R²=.24, R²=.50, R²=.65). Physical comforting, rocking and verbal reassurance accounted for a small amount of the variance during baseline and the needle phase, and a larger amount of variance during the regulation phases.

Discussion/Conclusions: The findings suggest that after controlling for previous child pain, parent soothing behaviours significantly predict child pain over the second year of life. Future research should expand on these findings and examine other variables that may influence child pain.
Alterations in Brain Subcortical Volumes in Chronic Pain Patients Using Opioids

Azin Zare\textsuperscript{1}, Christophe Tanguay-Sabourin\textsuperscript{2}, Gianluca Guglietti\textsuperscript{3}, Matthew Fillingim\textsuperscript{4}, Yueh En Wang\textsuperscript{5}, Jax Norman\textsuperscript{6}, Marc O. Martel\textsuperscript{7}, Mathieu Roy\textsuperscript{8}, Luda Diatchenko\textsuperscript{9}, Etienne Vachon-Presseau\textsuperscript{10}

\textsuperscript{1} McGill University, Montreal, Quebec, Canada; \textsuperscript{2} McGill University, Montreal, Quebec, Canada; \textsuperscript{3} McGill University, Montreal, Quebec, Canada; \textsuperscript{4} McGill University, Montreal, Quebec, Canada; \textsuperscript{5} McGill University, Montreal, Quebec, Canada; \textsuperscript{6} McGill University, Montreal, Quebec, Canada; \textsuperscript{7} McGill University, Montreal, Quebec, Canada; \textsuperscript{8} McGill University, Montreal, Quebec, Canada; \textsuperscript{9} McGill University, Montreal, Quebec, Canada; \textsuperscript{10} McGill University, Montreal, Quebec, Canada

\textbf{Introduction/Aim:} A dramatic increase has occurred in opioid use for treating chronic non-cancer pain patients despite cited concerns related to the adverse effects of these drugs. Neuroimaging research has shown alterations in the brains of chronic pain populations and opioid users. However, small sample sizes limit the reproducibility of these findings. Here, we leveraged a large populations cohort to explore the subcortical volumetric changes associated with opioid use among people with chronic pain.

\textbf{Methods:} We conducted an observational study with data obtained from the UK-Biobank, including magnetic resonance imaging (MRI), pain status and self-reported medications. Subcortical volumes were assessed using segmented T1-weighted structural MRIs, preprocessed by the UK-Biobank pipeline. After controlling for sex and age, statistically significant differences in these structures were compared across chronic pain patients using opioids (CPO) (n=411), chronic pain patients not using opioids (CP) (n=12327) and healthy controls not using opioids (HC) (n =22591) using one-way ANCOVAs, followed by an unpaired t-test for two-by-two comparison.

\textbf{Results:} Significant differences were identified in volumes of the left nucleus accumbens among all groups (p =0.001, f =6.27). Post-hoc analysis revealed significant difference between CPOs and CPs and between CPOs and HCs (p<0.05), with small effect sizes (Cohen’s d= -0.21, -0.23). No significant difference was found between CPs and HCs.

\textbf{Discussion/Conclusions:} Our results point to an association between opioid use in chronic pain patients and structural changes in brain regions implicated in the reward circuitry. These findings are consistent with clinical studies showing differences in motivational behaviors among chronic pain opioid users.
Values and preferences towards medical cannabis among patients with chronic pain: A mixed methods systematic review

Linan Zeng1, Lyubov Lytvyn2, Xiaojin Wang3, Natasha Kithulegoda4, Silvana Agterberg5, Yaadwinder Shergill6, Meisam Abdar Esfahani7, Anja Fog Heen8, Thomas Agoritsas9, Gordon H Guyatt10, Jason Busse11

1 West China Second University Hospital, Pharmacy Department/Evidence-based Pharmacy Center, Chengdu, China; 2 McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; 3 McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; 4 Women’s College Hospital, Institute for Health System Solutions and Virtual Care, Toronto, Ontario, Canada; 5 Yeshiva University, Ferkauf Graduate School of Psychology, New York, New York, United States; 6 McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; 7 McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; 8 Lovisenberg Diaconal Hospital, Department of Medicine, Oslo, Norway; 9 McMaster University, Department of Health Research Methods, Evidence, and Impact, Hamilton, Ontario, Canada; 10 McMaster University, Hamilton, Ontario, Canada; 11 McMaster University, Department of Health Research Methods, Evidence, and Impact; Department of Anesthesia; The Chronic Pain Centre of Excellence for Canadian Veterans; The Michael G. DeGroote Centre for Medicinal Cannabis Research., Hamilton, Ontario, Canada

Introduction/Aim: Opioids are commonly prescribed for chronic pain; however, increasing awareness of the modest benefits and risks of addiction, overdose and death have generated interest for alternative management strategies, including medical cannabis. We conducted a mixed methods systematic review of evidence addressing values and preferences towards medical cannabis among people living with chronic pain.

Methods: We searched MEDLINE, EMBASE, and PsycInfo from inception to March 2020, to identify quantitative, qualitative and mixed methods studies reporting values and preferences towards medical cannabis among people living with chronic pain. We analyzed data using meta-narrative synthesis (quantitative findings were qualitized) and tabulated review findings according to identified themes.

Results: Of 1,838 initial records, 15 studies proved eligible for review. High to moderate certainty evidence showed that patient’s use of medical cannabis for chronic pain was influenced by both positive negative social factors (e.g., stigma surrounding cannabis use). Most patients using medical cannabis favored products with balanced ratios of tetrahydrocannabinol (THC) and cannabidiol (CBD), or high levels of CBD, but not high THC preparations. Many valued the effectiveness of medical cannabis for symptom management even when experiencing adverse events related to concentration, memory or fatigue. Reducing use of prescription medication was a motivating factor for use of medical cannabis, and concerns regarding addiction, losing control or acting strangely were disincentives. Out-of-pocket costs were a barrier, whereas legalization of medical cannabis improved access and incentivized use.
Discussion/Conclusions: Our findings highlight factors that clinicians should consider when discussing medical cannabis.
Introduction/Aim: The use of cannabis for the management of chronic pain is becoming increasingly common. Clinicians and patients considering medical cannabis require evidence on benefits and harms to make informed decisions. This systematic review and meta-analysis summarizes the evidence on adverse events related to medical cannabis from non-randomized studies. Results from this review informed a new BMJ Rapid Recommendation guideline.

Methods: We searched MEDLINE, EMBASE, PsychInfo, and CENTRAL from inception to April 1, 2020. We pooled the proportion of patients experiencing adverse events and assessed the certainty of evidence using the GRADE approach.

Results: We identified 39 eligible studies that enrolled 12,143 adult patients with chronic pain. Very low certainty evidence suggests that adverse events are common (prevalence: 26.0%; 95% CI 13.2 to 41.2) among users of medical cannabis or cannabinoids for chronic pain, particularly psychiatric adverse events (prevalence: 13.5%; 95% CI 2.6 to 30.6) but that serious adverse events, adverse events leading to discontinuation, cognitive adverse events, accidents and injuries, and dependence and withdrawal syndrome are uncommon—each typically occurring in fewer than one in 20 patients.
**Discussion/Conclusions:** There is very low certainty evidence that adverse events are common among people living with chronic pain who use medical cannabis but that few patients experience serious adverse events. Future research should compare adverse events of medical cannabis with other management options, including opioids. Our review is limited by the non-comparative design of studies, which precludes confident inferences regarding the proportion of adverse events that can be attributed to cannabis.
Spinal Phox2a projection neurons relay spared nerve injury-induced neuronal plasticity changes from the spinal cord to the brain

Xinying Zhang¹, Artur Kania²

¹ McGill University, Integrated Program in Neuroscience, Montréal, Quebec, Canada; ² McGill University, Institut de Recherches Cliniques de Montréal, Montréal, Quebec, Canada

Introduction/Aim: Peripheral nerve injury elicits plastic changes in spinal nociceptive circuits, resulting in allodynia and the development of chronic neuropathic pain (CNP). Eventually, it causes maladaptive changes in the brain, frequently leading to increased anxiety and depression comorbidities. Little is known about the precise role of spinal projection neurons (PNs) in the transmission of CNP-evoked plastic changes from the spinal cord to the brain.

Methods: We recently characterised a population of lamina I and lamina V/LSN PNs that express Phox2a and innervate pain-related brain areas. Spinal cord-specific loss of Phox2a (Phox2acKO) results in reduced innervation of the parabrachial nucleus, and a reduction of nocifensive coping behaviours. To determine the role of Phox2a PNs in CNP, we induced spared nerve injury (SNI) model in both Phox2acKO and control groups, and examined the development of mechanical and thermal hypersensitivity, anxio-depression-like behaviours, as well as cFos and Iba1 expression at pain-related brain regions.

Results: We found that spinal-revel nociceptive response did not differ significantly between Phox2acKO and control mice. However, coping behaviour to cold was attenuated in Phox2acKO mice, as was as their anxio-depression behaviour. Furthermore, the SNI-dependent upregulation of cFos expression in the parabrachial nucleus was also attenuated in the Phox2acKO mice. The analysis of the impact of SNI on microglial activity and further cognitive behaviours is pending.

Discussion/Conclusions: Together, our results argue that the normal function of spinal Phox2a projection neurons is required for the development of supraspinal effects of SNI and may constitute a therapeutic target for the relief of CNP.
A Potential of Systemic Contribution in Neuropathic Pain

Wen Bo (Sam) Zhou¹, Xiang Qun Shi², Oladayo Oladiran³, Jingwen Meng⁴, You Nan Liu⁵, Simon Tran⁶, Francis Beaudry⁷, Ji Zhang⁸

¹ McGill University; the Alan Edwards Center for Research on Pain, Dentistry, Montreal, Quebec, Canada; ² Alan Edwards Center for Research on Pain, Montreal, Quebec, Canada; ³ The Alan Edwards Center for Research on Pain, Montreal, Quebec, Canada; ⁴ McGill University; The Alan Edwards Center for Research on Pain, Montreal, Quebec, Canada; ⁵ McGill University, Dentistry, Montreal, Quebec, Canada; ⁶ McGill University, Dentistry, Montreal, Quebec, Canada; ⁷ Université de Montréal, Montreal, Quebec, Canada; ⁸ McGill University; The Alan Edwards Center for Research on Pain, Faculty of Dentistry; Neurology and Neurosurgery, Faculty of Medicine, Montreal, Quebec, Canada

Introduction/Aim: Although several clinical studies report the presence of a persistent, low-grade systemic chronic inflammation (SCI) in various chronic pain conditions, its contribution to neuropathic pain remains poorly understood. We aim to understand the potential contribution of SCI to chronic pain.

Methods: We assessed the protein profile in the serum of mice following the partial sciatic nerve ligation (PSNL) or sham surgery using proteomic analysis. We transferred PSNL or sham serum to naïve mice via intravenous injection and assessed mechanical and cold sensitivity with von Frey and acetone tests. To target a myriad of inflammatory mediators at once, we tested bone marrow cell extracts (BMCE), a substance rich in anti-inflammatory cytokines and growth factors, as a potential treatment modality.

Results: Our results revealed that PSNL altered the serum protein profile compared to that from sham surgery. While sham serum did not change the pain sensitivity of naïve mice, PSNL serum triggered widespread mechanical and cold hypersensitivity in naïve mice. Furthermore, we have found that a regimen of systemic BMCE administration significantly ameliorated PSNL-induced mechanical and cold allodynia, altered the serum protein profile compared to that of vehicle-treatment, and the serum after treatment no longer induced mechanical and cold allodynia when transferred to naïve mice.

Discussion/Conclusions: These findings not only demonstrate that nerve injury results in long-lasting SCI, which has a significant impact on pain behavior, but also show a therapeutic potential of systemic BMCE administration in neuropathic pain by restoring serum proteic homeostasis.
Modeling the structure of shared genetic variance for pain conditions and psychopathology

Katerina Zorina-Lichtenwalter¹, Carmen Bango², Marta Čeko³, Matthew Keller⁴, Lukas Van Oudenhove⁵, Tor Wager⁶, Naomi Friedman⁷

¹ University of Colorado Boulder, Institute of Behavioral Genetics, Boulder, Colorado, United States; ² Dartmouth College, Department of Psychological and Brain Sciences, Hanover, New Hampshire, United States; ³ University of Colorado Boulder, Department of Psychology and Neuroscience and Institute of Cognitive Science, Boulder, Colorado, United States; ⁴ University of Colorado Boulder, Department of Psychology and Neuroscience and Institute for Behavioral Genetics, Boulder, Colorado, United States; ⁵ KU Leuven, Department of Chronic Diseases and Metabolism, Leuven, N/A, Belgium; ⁶ Dartmouth College, Department of Psychological and Brain Sciences, Hanover, New Hampshire, United States; ⁷ University of Colorado Boulder, Department of Psychology and Neuroscience and Institute for Behavioral Genetics, Boulder, Colorado, United States

Introduction/Aim: Pain and individual psychiatric disorders correlate, but it is unclear how general these associations are. Risk for chronic pain may overlap only with specific psychiatric disorders, with specific categories of disorders (e.g., internalizing disorders), or with multiple categories of disorders. Moreover, the shared risk may relate to only specific pain conditions, or cut across many conditions. We used genetic correlations from large genome-wide association studies (GWAS) to evaluate these possibilities with genomic structural equation models (GenomicSEM) of latent factors for pain conditions and psychopathology.

Methods: We used GenomicSEM to estimate genetic correlations of 2 pain factors with 4 psychopathology factors. General and musculoskeletal pain factors were based on genetic correlations for 24 conditions marked by persistent pain and spanning numerous body sites and suspected etiologies. Internalizing, externalizing, psychosis, and compulsive thought disorder factors were based on genetic correlations for 11 psychopathology measures.

Results: Genetic correlations between pain conditions and psychopathology measures were numerous and consistent with the factor model. The general pain factor correlated strongly ($rs=.68-.67$) with externalizing (ADHD, smoking, alcohol, cannabis) and internalizing (depression, anxiety, PTSD) factors; it correlated less ($rs=-.12-.10$) with psychosis (schizophrenia, bipolar disorder) and compulsive (anorexia, obsessive compulsive disorder) thought disorder factors.

Discussion/Conclusions: General genetic risk for pain is strongly associated with some but not all psychopathology factors, rather than being specific to individual disorders. This shared risk suggests a possible role for the interpretive component of physical and psychological trauma in pain chronification and affective disorders, to be explored in future studies.
Chemogenetic Inhibition of Anterior Insula Attenuates Pain-Induced Facial Grimacing

Alicia Zumbusch¹, Milan Valyear², Leah Abdel-Reda³, Tess Brogard⁴, Jeffrey Mogil⁵
¹ McGill University, Psychology, Montréal, Quebec, Canada; ² McGill University, Psychology, Montréal, Quebec, Canada; ³ McGill University, Psychology, Montréal, Quebec, Canada; ⁴ McGill University, Psychology, Montréal, Quebec, Canada; ⁵ McGill University, Psychology, Montréal, Quebec, Canada

Introduction/Aim: Lesion studies show that ablating the anterior insula attenuated facial expressions of pain as measured by the Mouse Grimace Scale (MGS) while leaving the intensity of pain unchanged as measured via reflexive behaviour. Our aim was to replicate this finding using chemogenetics, in service of a broader goal of mapping the neuroanatomical and neurochemical basis of grimacing behaviour and pain affect.

Methods: We expressed inhibitory designer receptors [designer receptors exclusively activated by designer drugs (DREADDs)] in the anterior insula of adult male and female CD-1 mice. After 4-6 weeks of viral transfection, we evaluated pain behaviour in these mice using the acetic acid (AA) abdominal constriction test. Abdominal constrictions (i.e., writhing behaviour) and facial grimacing (via the MGS) were captured using videos collected for 30 minutes both before (baseline) and immediately after an intraperitoneal (i.p.) injection of 10 ml/kg of 0.9% acetic acid immediately followed by either the DREADD-activating ligand clozapine-N-oxide (CNO+AA) or vehicle solution (VEH+AA).

Results: Mice that received CNO+AA showed significantly attenuated grimacing compared to mice that received VEH+AA. There was no such difference in abdominal constrictions (writhing).

Discussion/Conclusions: Chemogenetically inhibiting the insula to control the affective component of pain is a crucial step in illuminating circuit-type and cell-type specificity in different aspects of the pain experience. Ongoing research using Cre lines will allow us to identify with specificity and directionality, a proposed pain network wherein we can map the circuitry involved in different aspects of the pain experience.