CONFERENCE PROGRAM

Wednesday, May 18, 2022

12:30pm – 4:30pm
Lunch & Early Career Forum

4:30pm – 6:30pm
Early Career Scholar Welcome Receptions for Attendees

Thursday, May 19, 2022

8:00am – 9:00am
CAREER DEVELOPMENT WORKSHOPS:

Applying Social Inclusion Practices in the Lab to Create Equity in the Pain Workforce *(TUC Cinema)*
Getting Your Work Published: Where and How *(TUC Room 400 ABC)*

DEI Scholars Welcome Breakfast *(TUC Room 415AB)*

9:00am – 10:00am
Presidents Welcome and Keynote #1: NCCIH Leads New Directions in Pain Research *(TUC Great Hall)*
Speaker: Helene M. Langevin, MD, Director, National Center for Complementary and Integrative Health

Pain research in the past few decades has emphasized, and greatly enhanced, our understanding of the role played by the nervous system in chronic pain. As a result, pain as a symptom tends to be viewed from the nervous system's point of view and treated in isolation from the rest of the body. This talk will discuss pain research from the contrasting perspective of whole person health, which views pain as a conversation between peripheral tissues and the nervous system, and pain management beyond analgesia to include multisystem salutogenic mechanisms leading to long term health restoration.

10:00am – 11:30am
SIG MEETINGS -

Clinical and/or Translational Research *(TUC Great Hall)*

Sleep and Pain *(TUC Cinema)*

Pain Neuroimaging *(TUC Room 400ABC)*

Sex Differences in Pain and Analgesia *(TUC Room 417ABC)*

Abdominal and Pelvic Pain *(TUC Room 427)*

11:30am – 1:00pm
POSTER SESSION "A" – *with beverages (West Nippert Pavilion)*

1:00pm – 2:00pm
LUNCH *(West Nippert Pavilion)*

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Journal of Pain lunch meeting *(TUC Room 400ABC)*

OPEN HOUSE: University of Pittsburgh T32 Training *(TUC Room 427)*

IDEA Committee Meeting *(TUC Room 419)*

2:00pm – 3:30pm
SYMPOSIA 1 –

Under the Skin: Uncovering Novel Mechanisms of Peripheral Neuropathic Pain

Speakers: Dr. Cheryl Stucky, Medical College of Wisconsin, *Roles of keratinocytes in cutaneous neuropathic pain* Dr. Diana Tavares-Ferreira, UT Dallas; *Peripheral neuropathies: the role of mRNA transport and local translation in human peripheral nerves;* Dr. Daniela Maria Menichella, Northwestern University, *Neuron-keratinocyte communication in the epidermis in painful diabetic neuropathy;* Dr. Michael Caterina, John Hopkins, *Palmoplantar keratodermas as diverse models of cutaneous pain*

This workshop will present new evidence indicating a role for neuronal and non-neuronal cells communication in the skin and in the peripheral nerves in the pathogenesis of peripheral neuropathic pain. First Dr. Stucky will present evidence that keratinocytes become sensitized and contribute to neuropathic pain in animal models and human tissues. Second, Dr. Tavares-Ferreira will present how innovative technologies such as Visium Spatial Transcriptomics on peripheral nerves can help to characterize potential interactions between non-neuronal cells (immune cells, Schwann cells, etc.) and nerve fibers in painful peripheral neuropathy. Third, Dr. Menichella will discuss how an unbiased single-cell transcriptional approach to mouse skin and skin biopsy from patients is a powerful tool for exploring the mechanisms by which non-neuronal cells in the skin communicate with cutaneous afferents, and how this communication impacts axonal degeneration underlying peripheral neuropathic pain. Fourth, Dr. Caterina will talk about cutaneous pain as a common feature of many dermatological disease. He will discuss how dermatological genetic conditions such as palmoplantar keratodermas can be used to define cellular and molecular mechanisms contributing to pathological skin pain.

This workshop is of high relevance to the pain community because a better understanding of neuron to skin cells communication could translate into new topical interventions for the treatment of peripheral neuropathic pain. Moreover, there is currently limited translation of pain targets identified from studies in animal models to humans. One of the most critical issues that prevents consistent effective translation of our preclinical studies to clinical efficacy is that, there are fundamental molecular and physiological differences in the biology of neuropathic pain in the rodent models that we use in our preclinical studies compared with humans. These differences call for the need to use human tissues such as skin biopsy and peripheral nerves in pain translational research to prioritize potential therapeutic targets and to refine targeting strategies for peripheral neuropathic pain.

The provocative nature of the topics presented at this symposium will stimulate the audience participation and the debate among the speakers and the speakers and the audience. There will be a 20-minutes Q&A session at the end of the presentations. We will particularly encourage the participation of young investigators, students and postdoctoral fellows in the audience directly inviting them to the microphone to ask questions in-person. In case of a virtual format the audience will be asked to submit questions to the speakers using the forum provided by the virtual platform in advance to the workshop.

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The Science and Practice of Resilience in Chronic Pain

Speakers: Dr. Kimberly Sibille, University of Florida, Department of Aging and Geriatric Research, *Buffering the Burden of Chronic Pain and Optimizing Outcomes; D*r. Emily Bartley, University of Florida, Department of Community Dentistry and Behavioral Science, *The Recipe for Resilience: Exploring Adaptive Function across a Biopsychosocial Framework;* Dr. Afton Hassett, University of Michigan, Department of Anesthesiology, *Affective Balance: A New Target for Intervention in Chronic Pain*

Research has primarily focused on identifying risk factors and pathological states that contribute to pain and disability. However, evidence supports the role of protective health behaviors and resilience factors in fostering adaptive health outcomes. There is an increasing number of studies reporting the benefits of positive emotion and resilience building interventions for improving pain-related functioning. Thus, capitalizing on protective resources may be an avenue towards optimizing current pain treatments to reduce the burden of chronic pain. In this interactive session, the speakers will bridge across multiple level of analyses (e.g., social, behavioral, psychological, and biological) to discuss recent developments in the science of resilience, including novel therapeutic interventions targeting sources of pain resilience. In her talk, "Buffering the Burden of Chronic Pain and Optimizing Outcomes," Dr. Sibille will present findings on the biological interface of resilience among individuals with chronic musculoskeletal pain specific to: telomere length, a clinical composite of allostatic load, and brain structure. Research on the development and potential clinical utility of a pain resilience index will be discussed. Additionally, as sociodemographic factors contribute to disparities in chronic pain, considerations specific to resilience will be explored and opportunities to inform and improve interventions will be highlighted. Next, Dr. Bartley's presentation, "The Recipe for Resilience: Exploring Adaptive Function across a Biopsychosocial Framework," will discuss data from both experimental and clinical designs investigating the extent to which biopsychosocial factors of resilience buffer pain-associated outcomes. Recent work exploring the biology of resilient functioning across immunological and neuroendocrine systems will be presented, including findings from a telehealth intervention aimed at enhancing resilience through positive-based activities. Lastly, Dr. Hassett's presentation, "Affective Balance: A New Target for Intervention in Chronic Pain," will touch on the notion of affective balance in chronic pain and describe new results from a three-arm RCT assessing the potential benefit of enhancing standard cognitive-behavioral therapy for pain with positive activity interventions. The interventions are delivered online using telehealth coaching by medical assistants making this approach highly scalable. Discussants will place these findings within a larger context to discuss future clinical and research directions, and attendees will learn practical skills that can be applied in everyday life and are oriented toward optimizing resilience and improving health and functioning.

Researching Chronic Overlapping Pain Conditions in Man and Mouse

Speakers: Christin Veasley, Chronic Pain Research Alliance, *Prevalence, Impact, and Treatment of COPCs: The Patient Perspective;* Daniel Clauw, MD, University of Michigan, *Advances in Our Understanding of Nociplastic Pain Mechanisms in Chronic Overlapping Pain Conditions;* Andrea G Nackley, PhD, Duke University, *A Novel Mouse Model of Chronic Overlapping Pain Conditions that Integrates Genetic and Environmental Factors*

Chronic overlapping pain conditions (COPCS), including fibromyalgia syndrome, temporomandibular disorder, tension-type headache, irritable bowel syndrome, and vulvodynia represent a significant healthcare problem that affect nearly 1 in every 3 Americans, predominantly females. These conditions are characterized by persistent pain in the absence of tissue damage and often co-occur, thereby affecting multiple body sites. Sufferers are also more likely to experience non-pain comorbidities, such as sleep and mood disorders, as well as distressing symptoms,

such as cognitive dysfunction and fatigue. COPCs result in serious problems for patients, adding to the suffering and disability caused by a single pain condition. These conditions have been challenging to study clinically due to patient heterogeneity and challenging to model due to their idiopathic and multi-system pathogenesis. This session will highlight patient and public awareness of and federal investments in COPCs and discuss advancements in COPC clinical diagnosis and management and in clinically-relevant preclinical models that may facilitate the discovery of new analgesics. Ms. Veasley will provide an overview of COPCs, including their presentation, prevalence, economic and quality of life impact, and treatment options from the patient perspective. She will also present information on federal research funding investments and opportunities for COPCs, as well as describe large, multi-site NIH-funded research programs investigating the epidemiologic, clinical and mechanistic relationship among COPCs. Next, Dr. Clauw will present on the latest research findings regarding the pathogenesis of these syndromes, focusing on a better understanding of nociplastic pain. This includes the changes in CNS pain and sensory processing, as well as the low-level inflammation seen in these conditions. Finally, Dr. Nackley will present new data on a novel mouse model of COPCs that incorporates clinically-relevant genetic and environmental factors. This work will demonstrate the impact of 'minor' stresses and injuries on the development of chronic multi-site pain in genetically susceptible individuals, and discuss underlying mechanisms related to enhanced catecholaminergic tone and immune signaling.

Plan to Proactively Engage the Audience: We will work together in advance of the USASP meeting to prepare 2- 3 introductory slides that acquaint the audience with our workshop's speakers and educational objectives. We will also ensure that our individual PowerPoint presentations showcasing published and unpublished data are clear, dynamic, synergistic, and include engaging images and video clips. We will plan for each presentation to be ~20 minutes, allow ~5 minutes for questions immediately after each presentation, and then end with ~15 minute panel discussion.

Continuing to confront Racism in Pain Research: An Updated Call for a Shared Commitment across the Field of Pain

Speakers: Dr. Calia Morais, University of Alabama at Birmingham, *Confronting Racism in Pain Research: A Call to Action;* Dr. Janelle Letzen, John Hopkins; *Confronting Racism in Pain Research: Reframing Research Designs;* Dr. Anna Hood, University of Manchester, *Confronting Racism in Pain Research: A Shared Commitment for Engagement, Diversity, and Dissemination*

It has been over a year since calls for social justice echoed globally and stakeholders in the pain field continue to grapple with how to upend racism within our institutions. This symposium will provide an overview of the efforts by the Antiracism CoaliTION in Pain Research (ACTION-PR; also informally known as the Pain Justice League) to address and dismantle racism in pain research practices. Our commitment to interrogating racism was first introduced during the inaugural US-ASP meeting. We shared a preliminary antiracism framework that was informed by the ACTION-PR's expertise and lived experiences as well as feedback from colleagues discussed during a think tank in Fall 2020. Since then, the ACTION-PR has refined and expanded this framework across the translational science continuum. Overall, this refined framework encourages self-reflection at every stage of the research process, to question, learn, examine, and modify our current approaches so that all pain researchers work to eliminate pain inequities.

In the first presentation, Dr. Morais will discuss the fundamental scholarship underlying our refined antiracism framework, forms of racism, and social oppression that manifest globally, and racism as the cause of racialized pain inequities. The presenter will also discuss cultural humility to reflect, interrogate, and recognize how one's background shapes how we understand those who are different from ourselves; it is a tool through which researchers can design studies grounded in equity. In the second presentation, Dr. Letzen will discuss four common designs with strategies to modify through an antiracism lens. These approaches include a biomedical metanarrative of pain, the lack of diversity and inclusion of racialized groups, the use of "race" as a statistical variable, and the minimal consideration of social health indicators in preclinical pain research. In the third presentation, Dr. Hood discusses how to apply an antiracism framework in recruitment and community-based research practices to engage community partners. The presenter will describe how increasing the participation of racialized groups in research will enrich knowledge gained and build trust. Strategies to build diverse and inclusive research environments and decolonize dissemination practices are also presented along with current and upcoming projects that utilize an antiracism framework. Additionally, each presenter will discuss remaining knowledge gaps and the need for interdisciplinary collaborations, community partnerships, and patients' input in pain research. The ACTION-PR offers this refined framework as a next step toward equity in pain research and care and acknowledges that it should be revised as new scholarship emerges.

Advances in Methods to Understanding the Transition to/from Episodic to Chronic Visceral Pain in Dysmenorrhea

Speakers: Kevin Hellman, University of Chicago, *Novel Methods of Imaging the Transition From Episodic Menstrual Pain to Chronic Visceral Pain;* Linda Griffith, Massachusetts Institute of Technology, Center for Gynepathology Research, *Tissue Engineering & Organ-On-Chips Models of Uterine Pathophysiology in Pelvic pain;* Laura Payne, Harvard Medical School, *Behavioral and Neural Associations with Dysmenorrhea in Adolescent Girls*

More research is needed on dysmenorrhea to address gender disparity for the risk of chronic pain radically. Dysmenorrhea is the most common episodic visceral pain condition in women and the foremost risk factor for chronic pain. The proposed workshop will provide of foundation for others to extend current scientific and clinical aspects of dysmenorrhea and the mechanisms responsible for the transition to chronic visceral pain.

Novel Methods of Imaging the Transition from Episodic Menstrual Pain to Chronic Visceral Pain -Kevin Hellman, University of Chicago: We have developed several noninvasive tasks with ultrasound, fMRI, and EEG to evaluate the mechanisms of cramping pain and its transition to chronic visceral pain. During a menstrual cramp, uterine contractions, ischemia, and skeletal muscle contractions occur. Prefrontal cortical processes lead to hypersensitivity that could underlie the transition to chronic pain. Further evaluation of these mechanisms with our tools could allow others to identify new strategies for therapeutic prevention of dysmenorrhea and the transition to chronic visceral pain.

Tissue Engineering & Organ-On-Chips Models of Uterine Pathophysiology in Pelvic pain: Linda Griffith, MIT: Stress, nerve fiber innervation, immune responses, and epigenetics are important contributing factors observed in many chronic pain conditions. Our lab is building humanized in vitro models merging tissue engineering and organs—on-chips with systems biology to capture complex pain mechanisms involved in endometriosis, adenomyosis and other uterine disorders. Our studies have classified endometriosis patients according to inflammation networks in peritoneal fluid, and we are now building models relevant for dysmenorrhea. This talk will discuss the

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foundations and practical translation issues using these new tools to study chronic pelvic pain related to gynecological disorders that may have diverse mechanisms in the patient population.

Behavioral and Neural Associations with Dysmenorrhea in Adolescent Girls –Laura Payne, Harvard Medical School: Our work has demonstrated that young women with dysmenorrhea have increased pain sensitivity across the menstrual cycle, suggesting stable alterations in pain processing. However, less is known about centralized pain processes in adolescent girls with dysmenorrhea and whether these indices are present in laboratory and neuroimaging measures. I will discuss new data exploring the relationship between fMRI, quantitative sensory testing, and menstrual pain in adolescent girls with dysmenorrhea. Understanding early mechanisms involved in central sensitization of pain will allow for early identification of those at risk, which suggests the possibility of preventing the transition from recurrent to chronic pain.

3:30pm – 5:00pm
POSTER SESSION "B" – *with beverages and snack (West Nippert Pavilion)*

5:00pm – 6:30pm
SIG MEETINGS –

Basic Science – Preclinical *(TUC Great Hall)*

Psychosocial Factors and Interventions *(TUC Cinema)*

Diversity, Inclusion, and Anti-racism in Pain *(TUC Room 400ABC)*

Clinical Care and/or Patient Advocacy *(TUC Room 417ABC)*

Pain, Movement, & Rehabilitation *(TUC Room 427)*

Clinical Trials for Pain Research *(TUC Room 419)*

6:30pm – 8:30pm
Presidents Reception

Friday, May 20, 2022

8:00am – 9:00am
CAREER DEVELOPMENT WORKSHOPS:

Making Reproducability Standard in Your Lab *(TUC Room 400 ABC)*
Time Management, Competing Demands, and Working from Home *(TUC Cinema)*

9:00am – 10:00am

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State of the Society Report and Keynote #2: Understanding Mechanisms that Link Sleep and Pain in Youth: Developing Theoretically Informed Interventions *(TUC Great Hall)*
Speaker: Tonya Palermo, PhD, University of Washington

Sleep disturbances are common and impactful among individuals with chronic pain across the lifespan. Having comorbid sleep problems also predicts the continuation of chronic pain from adolescence into adulthood. Emerging evidence suggests that individuals with sleep disturbances do not receive as much benefit from psychological treatments for chronic pain. Dr. Palermo will summarize evidence linking sleep and pain in adolescents and describe behavioral mechanisms by which sleep disturbance impacts the ability to learn and implement pain self-management skills. She will highlight the urgent need to screen youth for sleep problems prior to initiating treatment and to consider implementation of sleep-specific treatments for individuals with chronic pain.

10:00am – 11:30am

SYMPOSIA 2 –

Rita Allen Award in Pain Scholars Panel *(TUC Great Hall)*

Andrew J. Shepherd (2020) The University of Texas, MD Anderson Cancer Center; *Neuro-immune Interactions in Pain Associated with Cancer and Chemotherapy;* **Peter Grace (2019)** University of Texas MD Anderson Cancer Center *Antibody Receptor Signaling via Astrocytes: A New Pathway for Neuropathic Pain* In conjunction with the Open Philanthropy Project; **Sarah Linnstaedt (2020)** University of North Carolina at Chapel Hill, *FKBP51 Inhibition to Prevent Chronic Pain Following Traumatic Stress,* In conjunction with the Open Philanthropy Project; **Jordan McCall (2019)** Washington University in St. Louis, *Using Persistent Homology to Model and Predict Spontaneous Pain Behavior,* In conjunction with the Open Philanthropy Project

Clinical Trials for Pain: Can We Be Pragmatic about Non-pharmacologic Treatments? *(TUC Cinema)*

Speakers: Steven George PT, PhD, FAPTA, Duke University, *What Makes a Trial "Pragmatic"?;* Julie Fritz PT, PhD, FAPTA, University of Utah, *Why a Pragmatic Trial?;* Qilu Yu, PhD, NIH/NCCIH, *Challenges for Pragmatic Clinical Trials;* Robert Kerns, PhD, Yale University, *Opportunities for Pragmatic Clinical Trials*

Clinical trials range on a spectrum from explanatory (i.e. high internal validity and demonstrating efficacy) to pragmatic (i.e. high external validity and determining effectiveness). Most randomized trials of pain treatments are explanatory but more recently pragmatic trial designs have been used for testing effectiveness of pain treatments. This shift provides exciting opportunities for advancing the pain research field, but only if pragmatic design elements are better understood by researchers, providers, and patients.

This session provides a primer on pragmatic trials for non-pharmacologic treatments of pain. The session will be divided into three different presentations, followed by an interactive session between the attendees and presenters. Real world examples from ongoing clinical trials will center the presentations. Presenters will provide perspectives from physical therapy, health services research, medical sociology, and biostatistics.

The total presentation time will not exceed 60 minutes and will be followed by a 30-minute moderated question and answer session. Audience engagement will be through traditional methods (Q&A), facilitated by the

moderator by using audience response polling options (if traditional methods are slow and there are polling options available at the site).

The Impact of Stigma and Discrimination on Pain Experiences across the Lifespan *(TUC Room 400ABC)*

Speakers: Hailey Bulls, PhD, *University of Pittsburgh, Stigma, the opioid crisis, and cancer pain management: Intersecting challenges;* Burel Goodin, PhD, *The Alabama at Birmingham, Stigma and discrimination: implications for pain-relevant psychological and physiological processes;* Emily Wakefield, PhD, *Connecticut Children's Medical Center/University of Connecticut School of Medicine, "Oh, only old people can get that": Stigma in adolescent chronic pain*

Stigma and discrimination are widely recognized as fundamental contributors to public health inequities. Pain and opioid-related stigmas present a mechanism by which ineffective and inequitable pain care persists. In this symposium, we will leverage the Health Stigma and Discrimination Framework (Stangl et al 2019) to conceptualize contributors to and consequences of stigma for patients with pain.

This symposium will provide an overview of the ways in which patients of various ages and pain etiologies experience stigma and discrimination, emphasizing similarities and potential mechanisms for change. Dr. Bulls will discuss the ways in which stigma and discrimination exacerbate existing challenges in cancer pain management across the cancer continuum (from active, advanced disease to survivorship) in older adults. Dr. Goodin will present novel data demonstrating the extent to which stigma and discrimination are related to pain-relevant psychological and physiological (i.e., biomarkers) profiles in children and older adults with chronic pain. Dr. Wakefield will present the experience of stigma unique to adolescent chronic pain populations and its impact on health outcomes and access to support.

Presenters will provide specific recommendations based on their work for about 20-25 minutes each, including research, policy, and potential intervention targets to guide the future of pain and opioid stigma research. For the remaining 20-30 minutes, audience members will be invited to consider barriers and facilitators to system-wide efforts to eliminate stigma and discrimination in pain care through an interactive discussion with the expert panel, and share their proposed solutions with the symposium attendees.

Justification for inclusion in the 2022 meeting: Biological and psychological variables are well-studied in the biopsychosocial model of pain, while social and interpersonal factors are less often recognized. However, eliminating stigma is critical for moving effective pain care forward. Given gaps in the literature, a discussion of patient experiences, communities, healthcare systems, policies, and the media is instrumental in ensuring that patients with pain are able to move forward, together.

Innovations in the Prevention of Chronic Post-surgical Pain in Children and Adolescents *(TUC Room 417ABC)*

Speakers: Jennifer Rabbitts, MD, *University of Washington, Seattle Children's Hospital, SurgeryPal: an mHealth cognitive-behavioral intervention to prevent transition from acute to chronic postsurgical pain in adolescents;* Melanie Noel, PhD, RPsych, *University of Calgary, Alberta Children's Hospital Research Institute, Reframe the pain: Examination of a novel parent-led intervention to reframe children's memories of post-surgical pain to be more accurate and positive*; Jennifer Stinson, RN-EC PhD, *Hospital for Sick Children, iCanCope with Post-operative Pain*

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(iCanCope Postop): Development and evaluation of a smartphone-based pain self-management program for adolescents following surgery

In the United States and Canada thousands of children undergo surgery each year. Despite evidence-based pain management and clinical standards, moderate to severe postoperative pain in children and adolescents is common. Inadequate postoperative pain management contributes to poor health outcomes, increased opioid use, and the development of chronic postsurgical pain. Psychosocial risk factors in adolescents and their parents elevate risk for poor short- and long-term pain outcomes. Successful postoperative pain management requires regular monitoring and treatment of pain after hospital discharge. Moreover, interventions targeting psychosocial risk factors have potential to interrupt a negative trajectory of persistent pain. The current symposium will discuss novel innovations to reduce acute pain and prevent the transition to chronic postoperative pain. Question/Answer: 10 to 15 Minutes

Risk and Resilience Factors Predicting Adaptation to the COVID-19 Pandemic in Individuals with Chronic Pain across the lifespan *(TUC Room 427)*

Speakers: Emily Law PhD, University of Washington School of Medicine & Seattle Children's Research Institute, *Adaptation to the COVID-19 pandemic among adolescents and young adults with chronic Pain: A mixed methods approach;* Gabrielle Pagé PhD, Université de Montréal; *Between stress and resilience: Understanding the heterogeneous impacts of the COVID-19 pandemic on individuals living with various chronic pain conditions;* Chung Jung Mun ("Moon") PhD, Arizona State University & Johns Hopkins School of Medicine, *One-year trajectories and individual differences in pain, emotional distress, and prescription opioid misuse among adults with chronic pain during the COVID-19 pandemic*

Growing evidence indicates the COVID-19 pandemic is negatively impacting mental health for many people, with epidemiologic studies showing increasing prevalence of anxiety, depression, insomnia, and substance use in the general population. However, less is known about condition-specific impact for individuals with chronic pain, including impact on the experience of pain and disability. Emerging data are mostly from cross-sectional studies which suggest similar negative impacts on mental health, but equivocal effects on pain. This session will address gaps in understanding by sharing data from six novel longitudinal studies (presented by Drs. Law, Pagé and Mun) examining adaptation to the pandemic among individuals with chronic pain across the lifespan. Risk and resilience factors predicting trajectories of mental health and pain symptoms will be examined. In an interactive Q&A session (moderated by Dr. Palermo), future directions for clinical care and research will be discussed.

Dr. Law will present two longitudinal studies examining adaptation to the pandemic among treatment-seeking adolescents and young adults with chronic pain from the U.S. Results showed that clinically elevated and persistent anxiety, depression, and insomnia symptoms were common, while pain interference remained relatively stable. Using mixed linear modeling, minority ethnicity and pandemic-related economic stress were identified as risk factors for poor outcomes. Qualitative data revealed both perceived benefits and harms of the pandemic on pain. Clinical and research implications for adolescents and young adults with chronic pain will be discussed.

Dr. Pagé will present data from three Canadian studies. First, a pan-Canadian online study aimed to measure the impact of the pandemic on pain, treatment access, stress and psychological distress during the first two waves. Second, a longitudinal study on a cohort of individuals with chronic pain aimed to identify pre-pandemic

psychological factors associated with pain deterioration during the pandemic. Finally, a longitudinal study of back pain aimed to explore the role of stress and its biological markers on the evolution of pain and psychological distress during the pandemic.

Dr. Mun will present data from a large (N=1,453) online sample of adults with chronic pain in the U.S. who were assessed three times across one year (04/2021 – 05/2022). This study investigated the impact of the COVID-19 pandemic on the trajectories of pain severity and interference, emotional distress (i.e., anxiety and depressive symptoms), and opioid misuse behaviors across one year. Potential moderating effects of socio-demographic factors and individual differences in pain catastrophizing, pain acceptance, and sleep disturbance on outcome trajectories are also examined.

11:30am – 1:00pm
POSTER SESSION "C" *with beverages (West Nippert Pavilion)*

1:00pm – 2:00pm
LUNCH

Professional Development Lunch *(TUC Room 417ABC)*

Education Committee Meeting *(TUC Room 415AB)*

OPEN HOUSE: University of Alabama at Birmingham *(TUC Room 419)*

Membership Committee Meeting *(TUC Room 411)*

2:00pm – 3:30pm

SYMPOSIA 3 –

Spinal Coding of Somatosensation *(TUC Great Hall)*

Speakers: Bo Duan, PhD, Assistant Professor, *University of Michigan, Peripheral and central mechanisms for mechanical itch;* Tayler Sheahan, PhD, *University of Pittsburgh, Cellular basis of spinal kappa opioid receptor inhibition of itch and pain;* David Acton, PhD, *Salk Institute for Biological Studies, Genetic approaches to mapping the spinal circuitry for pain and itch;* Mark Hoon, PhD, NIH, *Spinal cord circuits required for suppression of pain by cold*

It is poorly understood how distinct somatosensory inputs like pain, itch, temperature, and touch are uniquely coded within the spinal cord. The speakers in this session will share how the application of cutting-edge molecular, genetic, and imaging approaches have begun to reveal the cells and circuits within the spinal cord that underlie somatosensation under normal and pathological conditions. Moreover, the symposium will highlight spinal circuits underlying intriguing phenomena whereby somatosensory modalities gate one another (e.g., cold suppression of pain). Lastly, the speakers in this symposium are a strong group of basic scientists at different career stages.

Format & Audience Engagement: Four 15-minute presentations, each followed by 5 minutes of questions. The remaining 10 minutes of the workshop will be an open-floor discussion between the panel members and the audience on matters arising from the preceding talks, with particular emphasis on how modality specificity may be integrated at the spinal level.

Pain Inequities and Disparities: The Importance of Intersectionality *(TUC Room 400ABC)*

Speakers: Kate Nicholson, JD, *National Pain Advocacy Center, Understanding What's Lacking from Public Health Policy On Pain: Applying An Intersectional Lens and Including Diverse Patient Perspectives;* Tamara Baker, PhD, *School of Medicine at the University of Carolina at Chapel Hill in the Department of Psychiatry; What Intersectionality Means for Equitable Access to Clinical Care;* Monica Mallampalli, PhD, MSc, *Healthy Women, Strategies for Addressing Intersectionality and Inclusivity in Pain Research;* Samina Ali, MCDM, FRCP(PEM), *Faculty of Medicine & Dentistry at the University of Alberta, Edmonton University of Alberta, Edmonton; Stollery Children's Hospital and the Women and Children's Health Research Institute, The Global and Intersectional Burden of Pain in Children*

Inequities and disparities in pain experience, treatment, and research are well acknowledged in such public health initiatives as the Institute of Medicine's, Relieving Pain in America, the National Pain Strategy, and the Interagency Pain Management Best Practices Task Force Report.

Yet too often the discussion is siloed, focusing on distinct populations, while failing to conceive the problem as an intersectional one. Intersectionality is important because people are not just Black or Indigenous, male or female, children or older persons, disabled or Veterans. Those at the intersection of multiple identities too often fall through the cracks in research, translational research, and clinical care.

In the first talk, Kate Nicholson, JD, a pain patient and health policy attorney, will provide an overview of the national policies and introduce the concept of intersectionality, underscoring the importance of considering populations not typically centered in conversations about equity and disparities. Her talk will be, "Understanding What's Lacking from Public Health Policy On Pain: Applying An Intersectional Lens and Including Diverse Patient Perspectives." She will serve as moderator.

Next, Tamara Baker, PhD, an expert on d pain in older persons, racial disparities, and designing equitable clinical programs will present, "What Intersectionality Means for Equitable Access to Clinical Care." Tamara will address common themes that apply to care across the spectrum of marginalized patients.

Monica Mallampalli, PhD, MSc, a scientist and health policy expert, will then turn to the topic of research, using the case study of sex and gender as it applies to other intersecting identities with the talk, "Strategies for Addressing Intersectionality and Inclusivity in Pain Research." Monica will focus on including diverse perspectives in research design.

To complete the range of perspectives, ideally, a fourth panelist, Samina Ali, MCDM, FRCP(PEM), who is an expert in pediatric pain, will address the "Global and Intersectional Burden of Pain in Children," and discuss how our perceptions of age, disability, and gender inform pain research and care in children.

If we are allowed four panelists, each will speak for 15 minutes. Otherwise, panelists will talk for 20 minutes, leaving 30 minutes for robust discussion with the audience using Q and A and polling.

The Science of Acupuncture Analgesia: From Mechanism to Clinic *(TUC Cinema)*

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Speakers: Dr. Richard E. Harris, *University of Michigan, Insular Excitatory/Inhibitory Imbalance Links Chronic Nociplastic Pain with Acupuncture Analgesia;* Dr. Vitaly Napadow, *Massachusetts General Hospital, Neuroimaging Psychosocial Mechanisms Underlying Acupuncture and the Patient - Clinician Interaction;* Dr. Jun Mao, *Memorial Sloan Kettering Cancer Center, Evidence-Informed Acupuncture for Pain in Oncology Patients*

Acupuncture is a 2000-year-old medical technique that originated in China. By inserting thin needles into the body at specific anatomical locations, improvements in a range of symptoms, especially painful conditions, have been reported empirically and by many meta-analyses of clinical trials, including thousands and even tens of thousands of patients. However, the therapeutic value of acupuncture for pain management is fraught with controversy, largely due to difficulty to dissociate specific effects of acupuncture needling techniques from non-specific therapeutic effects such as placebo effects and context effects of social interaction. Moreover, there is ambiguity in acupuncture's effects on both clinical outcomes and physiological mechanisms. As the United States is combating an opioid crisis and the underlying challenges of pain management, acupuncture has emerged as a potential non-pharmacological option. Better understanding of how and whether acupuncture works for pain relief is even more critical as we consider the possibility of its broader usage for pain management.

This session will bring together three experienced researchers: Dr. Richard E. Harris, Dr. Vitaly Napadow, and Dr. Jun Mao all experts in the interface of pain and acupuncture research. They will present new research findings and discuss these findings in regard to implementation challenges for acupuncture treatment of chronic pain. Dr. Richard E. Harris is a Professor in the Department of Anesthesiology at the University of Michigan and has had key contributions to the neurobiology of chronic nociplastic pain and its response to acupuncture. In his talk he will highlight the excitatory/inhibitory imbalance in brain neurotransmitters in nociplastic pain and their role in acupuncture analgesia. Dr. Vitaly Napadow is a prolific acupuncture neuroimaging researcher and Director of Pain Research at Spaulding Rehabilitation Hospital. His talk will explore the neurobiology of the patient – practitioner interaction in acupuncture analgesia and the role of the central nervous system. Dr. Jun Mao is the Chief of the Integrative Medicine Service at the Memorial Sloan Kettering Cancer Center and has published influential clinical trials of acupuncture for cancer pain. His presentation will focus on the efficacy of acupuncture in clinical cancer pain populations and clinical acupuncture research more broadly. This symposium will contain broad content: encompassing the basic neurobiological underpinnings of pain in regard to its response to acupuncture, as well as evidence assessing acupuncture efficacy in the clinical setting.

Translational Approaches to Categorizing Chronic Pelvic Pain Syndromes *(TUC Room 417ABC)*

Speakers: Dr. Rui Li, *Seattle Children's Research Institute, Phenotypic evidence from a female adult pelvic pain clinic;* Dr. Christine Sieberg, *Boston Children's Hospital, Endometriosis associated pain in adolescents and young adults: Time for increased rigor;* Dr. Julie Christianson, *University of Kansas Medical Center, Assessing the translatability of a mouse model of chronic urogenital hypersensitivity*

Chronic pelvic pain (CPP) is estimated to impact 1 in 7 women in the United States and between 30-90% of adolescent females report dysmenorrhea, which negatively impacts daily activities and quality of life. A myriad of etiologies contributes to CPP and a better understanding of these underlying mechanisms, and how they relate to patient-specific measures, can improve treatment options, which currently do not provide widespread or adequate relief. Here, members of the Abdominal and Pelvic Pain Special Interest Group will present data describing phenotypic, diagnostic, and mechanistic characterizations of CPP disorders, in both clinical and preclinical studies.

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Dr. Li will present work from an interdisciplinary gynecological pain clinic that utilizes phenotyping approaches to classify female CPP disorders. The constellation of symptoms from multiple organ systems presents unique challenge for clinical evaluation and treatment of CPP. Deep phenotyping provides a holistic view of patient profiles and is well-positioned to inform etiologic, mechanistic, and interventional research. This presentation will describe two empirically derived CPP profiles that typify distinct pain mechanisms and reflect patients' social history and health care utilization.

Endometriosis, a debilitating disease affecting millions of women, costs the United States approximately $78 billion annually in pain-related disability, and is the leading cause of CPP. Substantial gaps exist in our understanding of this disease in adolescent and young adult women. Dr. Sieberg will present results on several of her grant-funded projects utilizing innovative methods, including quantitative sensory testing (QST), behavioral measures, as well as resting state and evoked (offset analgesia) neuroimaging techniques (functional magnetic resonance imaging (fMRI) and functional near-infrared spectroscopy (fNIRS)) to elucidate the biobehavioral and neural mechanisms contributing to endometriosis-associated pain in adolescents.
Dr. Christianson will present work from her laboratory on a mouse model of early life stress that develops chronic urogenital hypersensitivity in adulthood. Early life stress exposure in clinical populations impacts hippocampal development, resulting in structural and functional deficits, that contribute to chronic pain and mood disorders. Here, evidence of reduced hippocampal gene expression, neurogenesis, gray matter volume, and neurochemical response to acute stress exposure, in mice exposed to neonatal maternal separation will be discussed, as well as the impact of diet and exercise on these outcomes.

Discussion between the panelists, and with audience members, will tie together these clinical and preclinical findings to discover common mechanisms and outcomes that cluster among women with CPP in order to identify specific potential targets for therapeutic intervention.

3:30pm – 5:00pm
POSTER SESSION "D" – *with beverages and snack (West Nippert Pavilion)*

5:00pm – 6:15pm

SIG MEETINGS -

Acute (to Chronic) Pain

Pediatric Pain

Pain and Aging

Complementary and Integrative Pain Management

Substance Use and Addiction

8:00pm - ……

SIG SOCIALS – Offsite informal SIG group gatherings

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Saturday, May 21, 2022

8:00am – 9:00am
SIG Chair Breakfast *(TUC Room 415AB)*

9:00am – 10:00am
Awards and Keynote #3: Modulating Pain and Analgesia in the Amygdala *(TUC Great Hall)*

Presenter: Yarimar Carrasquillo, PhD; National Institutes of Health (NIH)

Behavioral responses to painful stimuli can be amplified or suppressed by many factors, including injuries, experiences, and context. Dr. Carrasquillo is interested in identifying brain mechanisms underlying bidirectional modulation of pain. Lab work has focused on the central amygdala (CeA), a forebrain limbic structure that is well positioned to link noxious stimuli to defense and affective responses. In this talk, Dr. Carrasquillo will discuss the evidence from her laboratory that shows that the CeA functions as a pain rheostat system that can amplify and suppress pain in a cell-type-specific manner. The results of follow up experiments that delineate cellular and circuit mechanisms underlying the dual and opposite function of the CeA will also be presented.

10:00am – 11:30am
SYMPOSIA 4 –

Dissecting the Neuronal Circuits Underlying the Sensory and Emotional Components of Pain *(TUC Great Hall)*

Speakers: Jose Moron-Concepcion, *Washington University, Dissecting the brain circuitry driving pain-induced anhedonia-like behavior;* Sarah Ross, *University of Pittsburgh, Regulation of Descending Modulation by Kor-Expressing Neurons in the RVM;* Gregory Corder, *University of Pennsylvania, Engaging endogenous analgesia to tune the valence of pain perception*

Pain is a complex phenomenon composed of sensory and emotional-affective components. As pain persists, the presence of negative affective states can lead to the development of negative emotional states such as anhedonia, anxiety, and depression. While current pharmacological therapies provide high potency in alleviating sensory disturbances, the negative affective states accompanying pain remain undertreated. Uncovering the neuronal mechanisms and brain circuitry underlying these components contributing to the pain phenomenon may provide opportunities to develop safer therapies for pain management and enhance life quality of pain patients. Data presented in this panel represent a crucial step in understanding the role of the endogenous opioid systems in the mechanisms underlying both the emotional and sensory component of pain and may provide novel targets for the treatment of pain. During this panel, we will allow at least 10 min for Q&A and follow up discussion.

Human Dorsal Root Ganglia – Novel Insights for Translational Research *(TUC Cinema)*

Speakers: Robert Gereau, Washington University; Moderator – Introduction, Valeria Cavalli, Washington University, *Transcriptomic analysis of satellite glial cells at the single cell level reveals high similarities between mouse and human;* Steve Davidson, University of Cincinnati, *Single-nucleus transcriptomic analysis of human dorsal root ganglia;* Theodore Price, University of Texas at Dallas, *Spatial transcriptomics on human DRG defines nociceptor transcriptomes and arrangement of immune cell types*

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The past quarter century has seen immense progress in our understanding of the neurobiology of pain. Despite these advances, successes in translating these findings into new treatments are scarce. This presentation will describe recent work using dorsal root ganglia from organ donors as a translational research platform. Insights into differences in gene expression and function in human DRG vs preclinical rodent models suggest that studies on human tissues can help identify potential targets that should be prioritized – or abandoned – in the search for new drugs to reduce pain and improve nerve regeneration after injury. This symposium will include a brief introduction by the moderator regarding the acquisition and use of human tissues for preclinical research, and 3 presentations of 20 min each, with 5 min for discussion following each, and a final panel of 15 min for a panel discussion with all speakers. The moderator will invite questions and discussion from the audience on how individual research groups can set up human tissue programs at their local institutions, and ask panelists for a discussion of any challenges faced and how these have been overcome.

Why should this symposium be included at the annual meeting: This year has witnessed the publication of a number of landmark studies that have provided unprecedented insight into the expression and function of a variety of potential therapeutic targets in human sensory neurons and glial cells. There is a growing interest in the use of human tissues, and these presentations will demonstrate the power of such studies to provide novel insights, as well as provide information to attendees on how similar studies can be incorporated in other research programs around the country.

Brain Mechanisms Supporting the Modulation of Pain by Novel Self-regulatory Approaches *(TUC Room 400 ABC)*

Speakers: Fadel Zeidan, *University of California San Diego, Uncoupling self from pain: Mindfulness-induced analgesia is associated with deactivation of midline self-referential neural mechanisms;* Patrick Finan, *The Johns Hopkins University School of Medicine, Targeting Mechanisms to Guide Chronic Pain Treatment Development;* Marta Ceko, *University of Colorado*

The American Academy of Physicians and other health regulatory institutions have issued new guidelines premised on employing non-opiate therapies as a first step to treat pain. This workshop will provide novel (largely unpublished; NIH-sponsored) findings delineating the active psychological and neural mechanisms supporting pain modulation by novel and emerging self-regulatory approaches.

The proposed workshop should be included in the 2022 USASP meeting because it will provide a comprehensive framework to identify novel pain modulatory mechanisms supporting innovative self-regulatory techniques. This is critical because targeted, scalable treatments are needed to address the complexity of pain. By combining experimental interventional data (Zeidan/Simons) with mechanistic examinations in chronic pain patients (Finan), we aim to advance the audience's knowledgebase to reduce perceived clinician and patient-focused barriers to promote fast acting and effective pain therapies.

Using multiple neuroimaging methods, Dr. Zeidan will present his latest findings (NCT03414138) to identify the neurofunctional connections supporting mindfulness-based analgesia. Forty pain-free participants were randomized to four, 20-minute sessions of mindfulness training or book listening. After the interventions, subjects rested and then meditated (mindfulness) or continued to rest (controls) during noxious heat (49°C) and fMRI acquisition. Visual analog scale pain ratings were collected. Mindfulness reduced pain when compared to controls. Mindfulness-based analgesia was moderated by weaker thalamic-precuneal connectivity and ventromedial PFC deactivation, respectively, indicating an attenuation of self-referential processing. Dr. Simons will present novel

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fMRI-based findings demonstrating the role of the amygdala in mediating pain and pain catastrophizing in relation to threat-safety learning, the mechanism of action for exposure treatment, in healthy (n=29) and chronic pain (n=46) adolescents. A novel threat-safety learning paradigm was combined with amygdala resting-state functional connectivity. Higher inferior parietal lobe activation mediated the association between catastrophizing and threat-safety learning in all participants. Dr. Finan will present data from his recent clinical trial (NCT03975595) examining savoring meditation in rheumatoid arthritis patients (n=41). Savoring meditation is a novel, brief meditative technique that generates and amplifies positive affect to optimize pain self-management. Dr. Finan will demonstrate that savoring meditation engages the corticostriatal circuits during noxious stimuli and augments positive affect and analgesia.

Time will be allocated after each talk for 1-2 audience-directed questions. After all presentations, Dr. Zeidan will moderate a 30-minute audience-panel discussion. Two to three questions will be focused to identify how novel analgesic mechanisms can be clinically applied. We will also discuss ways to reduce perceived barriers of incorporating non-pharmacological therapies to treat pain.

Growing and Retaining a Sustainable and Informed Clinical Pain Research Workforce *(TUC Room 417 ABC)*

Speakers: Dr. Laura D. Wandner, Ph.D., Program Director, National Institutes of Health, National Institute of Neurological Disorders and Stroke, Office of Pain Policy and Planning (Moderator), *Results from the NIH survey on clinical pain research workforce;* Dr. Meredith C.B. Adams, MD, MS, FASA, FAMIA, Assistant Professor of Anesthesiology and Public Health Sciences at Wake Forest Baptist Health, *Clinical research challenges: perspective from an anesthesiologist;* Dr. Benedict J. Kolber, Associate Professor, School of Behavioral and Brain Sciences, the University of Texas at Dallas, *Workforce enhancement efforts*

Given the prevalence of chronic pain in the U.S. and the need for better pain management techniques there is a need to grow the number of researchers who can make novel contributions to the clinical pain field. In November 2020, the Interagency Pain Research Coordinating Committee (IRPCC) discussed how the field could encourage mid-and later-career investigators to mentor more junior investigators and students who have an interest in pain research.

The promotion of younger researchers is a priority for the NIH. The IPRCC discussion prompted the National Institute of Neurological Disorders of Stroke to develop and administer a first-of-its kind survey examining factors that both help clinical pain researchers succeed and challenges that aspiring researchers face.

The survey, overseen by Dr. Laura Wandner, received more than 400 responses from pain care providers and clinician-researchers from numerous disciplines and across career stages. An analysis of the responses shows that early career researchers receive less support from the NIH or their home institutions/departments compared to their more established counterparts. It also showed that those who received formal research training or mentoring were more likely to receive federal research funding and were more likely to stay in research.
The published literature on factors that influence physicians to pursue clinical research that is specific to pain is limited. NIH's findings build on research done by Dr. Meredith Adams, an anesthesiologist, researcher and co-author of this proposal, found that most NIH grants for anesthesiology are for basic science rather than clinical research, and that there are relatively fewer research awards in this field compared to other disciplines. Dr. Adams suggests that a new research training paradigm be considered to account for the limitations of the mentoring-based model.

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To support a pain research workforce in the long term, Dr. Benedict Kolber and Dr. Kevin Tidgewell lead a program that exposes undergraduate students to pain science. Their aim is to help with an understanding of pain ahead of the "fragmented" pain education they would receive in medical school and, for those with a research interest, to consider pain for their graduate training.

Through presentations and discussions with the speakers including a 30-minute question and answer session that would also solicit audience feedback about how to enhance the clinical pain research workforce, the symposium should enable an open discourse within the pain management community about what is needed to create a larger, sustainable research workforce for the future.

Rapid Transition and Mobilization of Remotely Delivered Pediatric Pain Treatment Protocols in Response to the COVID 19 Pandemic *(TUC Room 427)*

Speakers: Susmita Kashikar-Zuck, PhD, Cincinnati Children's Hospital/ University of Cincinnati College of Medicine, *Adaptation of the FIT Teens trial for juvenile fibromyalgia in response to the COVID 19 pandemic;* Laura E. Simons, PhD, Stanford University, *Rapid transition to virtual assessment and treatment in the GET Living trial for youth with chronic pain;* Rachael Coakley, PhD, Boston Children's Hospital/Harvard Medical School, *Rapid Mobilization of an Evidence-based Psychological Intervention for Pediatric Pain During COVID-19: The Development and Deployment of the Virtual Comfort Ability Program (CAP-V)*

The COVID-19 pandemic abruptly halted in-person clinical care and research and required a shift to remote methods of assessment and treatment. In this symposium, the speakers will present how three different pediatric pain programs, Graded Exposure Treatment (GET Living), Fibromyalgia Integrative Treatment for Teens (FIT Teens) and Comfort Ability Program (CAP) navigated the rapid shift to remote delivery during the pandemic. The GET Living and FIT Teens programs are research-based randomized clinical trials and the Comfort Ability program is an evidence-based embedded clinical service with an emphasis on knowledge-mobilization and education for pain providers.

Dr. Simons will present the transition of the GET Living program to remote format, and discuss outcomes of this pilot trial based on method of delivery by treatment condition, and results of a unique single case experimental design embedded within the trial that allowed for clinical trajectories and outcomes of each participant. Insights from exit interviews of patients and parents on the in-person versus remote treatment format will provide patient-perspectives that could inform the design of future trials.

Dr. Kashikar-Zuck will present the process of modifying three treatment arms in an ongoing multi-center single-blinded RCT of the group-based FIT Teens intervention for juvenile fibromyalgia while maintaining scientific integrity of the trial. Impact on trial metrics (recruitment, retention, safety, fidelity) will be presented along with a discussion of challenges surrounding implementation of a multi-site study across 6 institutions and 5 states with varying restrictions on research activities. Methodologic, design and statistical implications will be highlighted. Dr. Coakley will describe how CAP, an embedded clinical service at 21 children's hospitals across three countries responded to the immediate demand worldwide for virtual program modification for pain care. The Knowledge-to-Action Cycle framework was used to adapt CAP in-person workshops (CAP-IP) to a virtual format (CAP-V). Through iterative and collaborative processes with network partners, CAP-V was systematically piloted and

disseminated to more than a dozen network partners within 18 months. Challenges and opportunities inherent in this transition will be discussed, with a particular focus on health equity.

An interactive discussion with the audience will include thought-provoking questions around the ethical, scientific and practical considerations in research and treatment for pediatric pain, and how best to balance flexibility with fidelity in the face of unexpected challenges. It is anticipated that the discussion will enhance novel ways of thinking about effective and equitable pain care for all children suffering from chronic pain.

This symposium is a timely and important topic for USASP because discusses how the COVID 19 pandemic affected clinical trials/dissemination efforts in chronic pain, especially those who are involved in multi-center studies and pediatric pain research.

11:45am – 1:30pm
Lunch Panel Discussion: Clinical Research Opportunities and the NIH HEAL Initiative

Speakers: Rob Edwards, PhD; Dan Clauw, MD; Kathleen Sluka, PhD; Karen Lane

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The USASP is a chapter of the International Association for the Study of Pain. USASP embraces, promotes, and fosters a culture based on inclusion, diversity, equality, and access. We especially encourage applications from members of underrepresented groups such as, but not limited to, members of underrepresented communities, members of the LGBTQ+ community, and people with disabilities.

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