

2025 USASP Annual Scientific Meeting

Advancing Pain Research: Innovations to Enhance Care

April 29-May 2, 2025 | The Radisson Blu Aqua Hotel, Chicago, Illinois

Hybrid Event



Meeting Program

Tuesday, April 29, 2025

8:00am – 12:30pm

Board of Directors Meeting

Room: Mediterranean

8:00am – 4:15pm

Essential Updates in Pain Management Workshop for Primary Care Providers

Organizers: *Scott Fishman, MD* (University of California, Davis)

Co-Directors: *Naileshni Singh, MD & Chinar Sanghvi, MD* (University of California, Davis)

Room: Caribbean/Caspian

Updated Essentials of Primary Care Pain Management is a one-day course offered for physicians, NP/PAs, nurses, and other clinicians interested in education by expert faculty regarding the management of patients with complex pain conditions. The course will target pressing topics related to pain management with didactic presentations and in-person discussion and demonstration sessions. The learner objectives include understanding effective evaluation and diagnosis of the patient in pain as well as implementation of evidence-based treatment options for pain. This program will offer CMEs for eligible participants. Joint Accreditation Statement.

In support of improving patient care, this activity has been planned and implemented by Amedco LLC and UC Davis Health Center for Advancing Pain Relief. Amedco LLC is jointly accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Accreditation Council for Pharmacy Education (ACPE), and the American Nurses Credentialing Center (ANCC), to provide continuing education for the healthcare team. Amedco Joint Accreditation #4008163.

Physicians (ACCME) Credit Designation

Amedco LLC designates this enduring material for a maximum of 6.00 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity. Participants will sign-in when they arrive and will be given the weblink and instructions to request their CMEs after the workshop is over.

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12:00pm – 4:30pm

Early Career Forum

Room: Atlantic A

Sickle Cell Disease SIG Inaugural Meeting

The new USASP Sickle Cell Disease (SCD) SIG invites you to participate in a half day preconference workshop on Tuesday, April 29 (from noon to 4:30pm). Please join us for talks from established SCD investigators spanning basic, clinical and translational topics, an early career blitz, networking opportunities and science speed dating. Registration is required. A box lunch will be provided.

12:30pm – 4:30pm

2025 Leadership Academy Workshop

Room: 221 Blu Bar and Lounge, Radisson Blu Aqua

1:00 pm-4:30 pm

Pre-Conference Workshop: Empowering Pain Research: Leveraging PCORI for Funding and Stakeholder

Organizers: Dr. Mark Bicket, MD, PhD, (University of Michigan), Dr. Erin Krebs, MD, MPH, FACP, (Minneapolis VA Health Care System/University)

Join Drs. Mark Bicket and Erin Krebs for a unique pre-conference workshop to help our members learn about the funding process from the Patient-Centered Outcomes Research Institute (PCORI). "Empowering Pain Research: Leveraging PCORI for Funding and Stakeholder Engagement" is crafted specifically to help researchers including but not limited to mid-career and senior researchers unlock the full potential of their work to make a bigger impact in the field of pain management. This not-to-be-missed, 3-hour intensive session diving into comparative effectiveness research is designed to provide attendees with key knowledge and actionable strategies for securing PCORI funding, engaging effectively with stakeholders, and enhancing patient-centered outcomes. Designed to include extensive audience participation, the sessions and discussion will include expert presentations, real-world case studies, advice from PCORI Program Officers, and practical tips in shifting your framework to patient-centered approaches that broaden your research portfolio. Early career investigators are welcome to attend.

Room: Mediterranean

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4:30 pm-6:30 pm

President's/Welcome Reception

Room: Atlantic Foyer

All attendees are welcome to attend. We will be toasting to the inaugural USASP fellows. Come for light hors d'oeuvres, and a cash bar will be provided. Exhibitors will be present.

Wednesday, April 30, 2025

8:30am – 9:00am

President's Welcome

Plenary Presentation: Growing Pains: What I Learned From Growing Up With Chronic Pain

Speaker: Cameron Young

Room: Atlantic A

9:00am – 10:00am

Plenary Presentation: Enhancing Access to Pain Relief through Innovative Patient-Centered Formats, Technologies, and Trial Designs

Speaker: Beth Darnall, PhD, Stanford University

Room: Atlantic A

10:15am – 11:30am

Poster Session A

Room: Atlantic B

11:30am – 11:45am

Break

Symposia Block 1

11:45am – 1:15pm

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Scholars Research Panel: Rita Allen Foundation Scholars Award in Pain and USASP-MAYDAY Clinical/Translational Research Scholars

Kate Sadler, PhD¹, Jie Chen, PhD, Hadas Nahman Averbuch, PhD

The University of Texas at Dallas¹, Florida State University², Washington University³

Abstract: TBD

Room: Atlantic A

11:45am – 1:15pm

Sleep, Circadian Rhythms, and Chronic Pain Across the Lifespan: Insights for Chronic Pain Management

Chung Jung Mun, PhD¹, See Wan Tham, MBBS, MS², Yohannes Woldeamanuel, MD³, Patrick Finan, PhD⁴

Arizona State University¹, University of Washington School of Medicine², Mayo Clinic Arizona³, University of Virginia School of Medicine⁴

Emerging research highlights that disturbances in sleep (e.g., insomnia) and circadian rhythms (e.g., fragmented or irregular rhythms) are important risk factors for the development, persistence, and exacerbation of chronic pain. While sleep and circadian rhythms are neurobiologically intertwined, each plays a distinct role in pain processing. However, co-assessment of these factors remains limited within pain research, leaving a gap in understanding how sleep and circadian disruptions independently and interactively impact chronic pain outcomes, particularly across different stages of life. This multidisciplinary panel of clinician-scientists will present cutting-edge research on the role of sleep and circadian disturbances in chronic pain among adolescents and adults, as well as preliminary findings from an innovative behavioral intervention targeting both sleep and circadian disturbances for chronic pain management. Dr. Mun, a pain psychologist and researcher, will discuss findings from a study exploring the effects of sleep and circadian rest-activity rhythm disruptions on daily pain severity in 140 women with temporomandibular disorders. Dr. Tham, a pediatric pain physician and researcher, will present data on sleep deficiency and the variability of sleep-wake rhythm parameters between adolescents with chronic abdominal pain and those who are pain-free. Dr. Woldeamanuel, a neurologist and headache researcher, will share research findings on personalized circadian-based interventions (including sleep) for

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migraine and explore the underlying mechanisms. Together, this symposium aims to deepen the understanding of how disturbances in sleep and circadian rhythms are associated with chronic pain across the lifespan and to explore novel therapeutic strategies targeting these factors.

Room: Caribbean/Caspian

11:45am – 1:15pm

Cancer Pain: What Can We Learn From Reverse Translation?

Judith Paice, PhD¹, Nicole Scheff, PhD², Matthew Sapio, PhD³

Northwestern University¹, University of Pittsburgh², National Institute of Health³

Cancer pain is a dynamic issue impacting patients at diagnosis and through survivorship. The way we view and treat cancer pain may impact prognosis and response to therapeutic strategies. This symposium will focus on insights from clinical and basic science research from investigators spanning all career stages who are working to understand the dynamic issue of cancer pain from the patient perspective all the way down to the tumor microenvironment. First, Dr. Paice will present an overview of the types of pain syndromes most common and the use of opioids as the current standard of care in this patient population. Dr. Scheff will discuss pretreatment pain as a potential biomarker in cancer to indicate perineural invasion, immune evasion, and metastasis using both clinical samples and data collected from preclinical models. Dr. Sapio will discuss the impact of pain on cancer treatments, particularly radiation, and the therapeutic strategy of starting TRPV1 fibers to reduce pain and improve radiation response.

Room: Baltic/Bering

11:45am – 1:15pm

Innovative Targets for Headache Treatment

Adriana Della Pietra, PhD¹, Gregory Dussor, PhD², Mark Burish, MD, PhD³, Andrew Russo, PhD¹

University of Iowa¹, The University of Texas at Dallas², University of Texas Health Houston³

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Over 50% of migraine, post-traumatic headache, cluster headache, and other headache patients remain undertreated, signaling a critical need for alternative therapeutic strategies. This symposium will explore the latest advances in novel treatments for headache disorders, focusing on innovative mechanisms involving glymphatic function, circadian rhythms, neuroimmunology, and neuromodulation. Dr. Adriana Della Pietra will present preclinical research on how glymphatic system dysfunction contributes to headache, particularly post-traumatic headache, and discuss the therapeutic potential of targeting the noradrenergic system to restore glymphatic clearance and alleviate pain. Dr. Gregory Dussor will expand on the preclinical perspective by exploring the role of protease-activated receptor 2 (PAR2) and the work in his laboratory on this receptor in behavioral models and electrophysiology in human sensory neurons. This receptor is activated by proteases released by various immune cells. Importantly, this work helps provide important mechanistic information that bridges to ongoing work in the clinic as PAR2 monoclonal antibodies move into human trials for migraine. Dr. Mark Burish will conclude the session by providing clinical insights into the management of cluster headaches and migraine through the regulation of circadian rhythms at the cellular, systems, and behavioral levels. His recent work identifying circadian characteristics within the trigeminal ganglion suggests a potential link to the daily cycles of headaches, offering a novel perspective on how circadian regulation could influence headache disorders. Together, the speakers will provide a comprehensive overview of novel treatments for headaches, offering new therapeutic targets to improve patient outcomes.

Room: Pacific Ballroom

1:15pm – 2:15pm

Lunch

2:15pm – 3:30pm

Poster Session B

Room: Atlantic B

3:30pm – 3:45pm

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Beverage Break

Room: Atlantic Foyer

Symposia Block 2

3:45pm – 5:15pm

Music for Pain: Towards a Mechanistic Understanding

Mathieu Roy, PhD¹, Julian Thayer, PhD², Joke Bradt, PhD³

McGill University¹, Irvine and The Ohio State University², Drexel University³

Music and music-based interventions (MBIs) are receiving increasing attention as promising approaches for pain management because of their favorable effects on pain, low cost, and absence of negative side-effects and complications common to pharmacological and surgical/procedural treatments. Yet, the mechanisms underlying music's pain-reducing effects remain largely unknown. This is problematic because without a clear model of underlying mechanisms, researchers and clinicians alike can only rely on trial and error to maximize MBI's full therapeutic potential. In this symposium, we will 1) share findings from a series of laboratory studies aimed at uncovering the key elements of music responsible for its hypoalgesic effects including the role of arousal, valence, distraction, and reward circuitry activation; 2) present a recently developed dynamical systems model of musically-induced emotions and describe the neurovisceral underpinnings of this model, including the link between the auditory nerve and the amygdala, and the interaction of medial prefrontal cortex and brainstem pain network outputs to the cardiovascular system via the vagus nerve; and 3) present an overview of evidence to date of underlying mechanisms for music's hypoalgesia effects, based on a recently completed scoping review. Finally, we will introduce attendees to three research networks, funded by the National Institutes of Health and the National Endowment for the Arts, aimed at promoting and supporting multidisciplinary research to enhance mechanistic understanding of music for pain management. These networks will play a crucial role in advancing mechanistic understanding of the hypoalgesic effects of music and, ultimately, improving patient care and well-being.

Room: Atlantic A

3:45pm – 5:15pm

Bridging the Gap Between Acute and Chronic Pain: The Role of Perioperative Transitional Pain Services

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Faye Rim, MD¹, Maxwell Slepian, PhD², Patricia Lavand'homme, MD, PhD³, Alexandra Sideris, PhD¹

Hospital for Special Surgery/Weill Cornell Medicine¹, University Health Network/University of Toronto², University Catholic of Louvain³

Chronic postsurgical pain (CPSP) is a major concern after surgery, with a median incidence ranging from 20-30%. While most patients recover after their procedure, a subset does not follow the typical trajectory leaving them vulnerable to the development of CPSP and overly reliant on opioids. Patients with CPSP may suffer from poor quality of life and use a disproportionate amount of healthcare resources. Research efforts over the past two decades have identified patient and clinical risk factors contributing to CPSP, and interventions have focused on perioperative preventative strategies including the creation of Transitional Pain Services (TPSs). This symposium brings together diverse clinical and research perspectives from practitioners who created, oversee, and study TPSs across various health care systems, including those in the United States, Canada, and Europe. The speakers will outline the role of TPSs as multidisciplinary services that offer personalized, mechanism-based interventions for surgical patients at increased risk for severe acute pain, persistent post-surgical pain, and prolonged or aberrant opioid use. Speakers will highlight experiences from their hospitals, including the need for a TPS, the structure and staffing models, pharmacological and non-pharmacological approaches and treatments administered to patients, their impact on patient recovery and outcomes, as well as challenges with implementation and continued buy-in for a TPS program.

Room: Caribbean/Caspian

3:45pm – 5:15pm

Research Insights into Mechanisms of Discogenic Low Back Pain

Rebecca Wachs, PhD¹, Dmitriy Sheyn, PhD², Joseph Lesnak, DPT, PhD³

Arizona State University¹, Cedars-Sinai Medical Center², University of Texas at Dallas³

Low back pain (LBP) is the leading cause of disability worldwide, and 40% of those with LBP have discogenic pain which arises from degeneration of the intervertebral disc (IVD). While much research has been done looking at mechanisms of disc

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degeneration, little known about how disc degeneration leads to LBP. A greater understanding of these mechanisms can lead to better treatment strategies from those suffering from discogenic LBP. This symposium will look at advances in both preclinical and clinical research of discogenic pain to better understand how IVD degeneration leads to LBP symptoms. Dr. Rebecca Wachs will discuss alterations in dorsal root ganglia (DRG) that occur in preclinical models of LBP to lead to increased hyperalgesia. Dr. Wachs' talk will focus on changes seen in ion channels and cytokines to produce hyperalgesia. Dr. Dmitriy Sheyn will present on research with both porcine models and human tissue to uncover discogenic pain mechanisms. Dr. Sheyn's talk will also highlight what these findings mean for the development of treatments such as stem cell therapies. Finally, Dr. Joseph Lesnak will present on human tissue models of discogenic LBP produced from disc samples from individuals with low back pain and cultured human DRG neurons. Dr. Lesnak's work will highlight how factors released from degenerated discs can activate and sensitize human DRG neurons. The audience will gain valuable insight into current research efforts to understand how IVD degeneration can lead to LBP.

Room: Baltic/Bering

3:45pm – 5:15pm

Angling Toward Analgesics from Diverse Perspectives and Approaches

Bryan Roth, MD, PhD¹, Rebecca Seal, PhD²

University of North Carolina, Chapel Hill¹, University of Pittsburgh²

An overwhelming imperative in the pain field is to identify better analgesics. This symposium presents an integrated vision of how to understand and control nociception. We aim to convey advances in basic, translational and clinical pain research with the sense of excitement that comes from therapeutic discovery. The presentations address fundamentals of analgesia-related protein structures, discovery of novel ligands for such receptors, and identification of key nociceptive circuits. These findings are extended to translational and clinical investigations. Dr. Roth is the developer of chemogenetics and presents a multilayered investigation of transmembrane GPCRs subserving analgesia using CryoEM and ultra-high throughput in silico screening. Dr. Roth has identified new

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lead candidates having analgesic actions. Dr. Seal presents a transcriptomic cellular atlas of the dorsal horn across species from mice to humans as a translational framework for the development of novel pain therapeutics that target specific cell types of the dorsal horn. These targets are discussed with respect to studies from her laboratory that have illuminated the neural circuitry that mediates mechanical allodynia. Dr. Iadarola presents molecular investigations of two classes of nociceptive dorsal root ganglion neurons subserving tissue damage versus bio-warning signals and clinical interventions that inactivate these critical afferent populations to treat intractable pain. This symposium synthesizes multiple discovery research approaches to analgesia based on both broad and fundamental perspectives.

Room: Pacific Ballroom

5:15-5:30: Transition

5:30pm – 7:00pm

IDEA Committee Meeting

Room: Baltic/Bering Room

5:30pm – 7:00pm

SIG Meetings

Room: Various Locations

Thursday, May 1, 2025

8:30am – 9:00am

Gold-Haythornthwaite Lifetime Achievement Award Presentation

Presenter: John Farrar, MD, PhD

Awardee Presentation

Room: Atlantic A

9:00am – 10:00am

**Plenary Presentation: Breaking Boundaries of Pain Management:
Harnessing the Value and Power of Virtual Reality**

Speaker: Luana Colloca, MD, PhD, University of Maryland, Baltimore

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Virtual Reality (VR) is transforming the way we understand and interact with pain, offering new avenues for research, clinical applications, and patient care. In this plenary, Dr. Luana Colloca will explore the intersection of VR and pain science, discussing how immersive technology reshapes sensory processing, enhances treatment responsiveness, and opens novel pathways for non-pharmacological interventions. Drawing from experimental studies and clinical trials, this lecture will highlight the mechanisms behind VR's efficacy and its potential to redefine patient outcomes.

Room: Atlantic A

10:15am – 11:30am

Poster Session C

Room: Atlantic B

11:30am-11:45am

Break

Symposia Block 3

11:45am – 1:15pm

Pain Research Enters the Age of Big Data

Katherine Martucci, PhD¹, Yenisel Cruz-Almedia, MSPH, PhD², Tor Wager, PhD³, Michael Falcon, OTD, MHA⁴

Duke University¹, University of Florida², Dartmouth College³, Hawaii Pacific University⁴

Pain research has entered the era of big data, finally allowing researchers to discern the etiology behind complex and mysterious pain conditions. Multimodal data from thousands of patients will give researchers tools to finally address the complex, multifaceted questions around the biology of chronic pain. Multimodal datasets can include self-reported (e.g., pain intensity and interference) and experimental pain (e.g., quantitative sensory testing) as well as neurobiological factors (e.g., brain imaging for brain structure, function and biochemistry), and blood for immune function, genetic, epigenetic, and omics profiling. Combining many data types, researchers can interrogate the mechanisms driving pain at multiple levels of analysis, group individuals based on their underlying pathophysiology, and identify new biological targets for

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treatment. Complex data profiles may also help determine who is at high risk for developing chronic pain conditions, and how to build resilience against chronic pain. Collecting and analyzing these large, complex datasets requires large consortia of researchers with a wide diversity of expertise and a commitment to make data publicly available. Attendees will learn about the benefits and challenges of working in large consortia, and how to make use of the data being collected. Talks will cover large studies including the UK BioBank; the Acute to Chronic Pain Signatures consortium; the Multidisciplinary Approach to the Study of Chronic Pelvic Pain (MAPP) Research Network; and the Restoring Joint Health and Function to Reduce Pain (RE-JOIN) Consortium. Moderator Michael Falcon, a person with lived experience of chronic pain, will provide his perspective and modify the discussion.

Room: Caribbean/Caspian

11:45am – 1:15pm

Interdisciplinary Strategies to Decode Mechanisms of Musculoskeletal Pain

Hang Lin, PhD¹, Rachel Miller, PhD², Allan Basbaum, PhD³, Nadeen Chahine, PhD⁴, Kelsey Collins, PhD⁵

University of Pittsburgh¹, Rush University², University of California San Francisco³, Columbia University⁴

Musculoskeletal diseases are the largest contributors to chronic pain and leading indications for opioid prescription. Clinically, substantial discordance exists between pain and radiographic evidence of structural damage in musculoskeletal diseases, which challenges the assumption that pain represents existing structural damage. Although musculoskeletal pain is the primary driver for patient care-seeking behavior in conditions like osteoarthritis, low back pain, and fracture, the current understanding of the mechanisms of musculoskeletal pain is limited. This workshop will focus on interdisciplinary, preclinical, and in vitro strategies to decode mechanisms of musculoskeletal pain. Hang Lin, PhD will demonstrate a joint-on-a-chip human induced pluripotent stem cell system to interrogate musculoskeletal pain and screen drugs in vitro. Then, Rachel Miller will give her perspective on translational preclinical models to understand pain in osteoarthritis, and share how the NIH CCOMP P30 can support work in this space. Third, Allan Basbaum, PhD, will present new tools and techniques to understand fracture pain. This session will be moderated by Nadeen Chahine, PhD and

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Kelsey Collins, PhD, who are working on low back pain and knee joint pain, respectively. Presenters are encouraged to address the role of age, sex differences, and multi-morbidity in their presentations to help solve the whole animal and whole person health problem of musculoskeletal pain across musculoskeletal diseases. The session will conclude with a moderated panel discussion with audience questions and a focus on developing an interdisciplinary strategy to decode mechanisms that are conserved or diverge across musculoskeletal diseases to pave the way toward novel non-opioid therapeutics.

Room: Pacific Ballroom

11:45am – 1:15pm

Othering: Effects of Stigma and Discrimination on Pain

Calia Torres, PhD¹, Ellen Terry, PhD², Bright Eze, PhD², Samantha Meints, PhD³

University of Alabama at Birmingham¹, University of Florida², Harvard Medical School³

Othering, a social process of marginalization, is associated with healthcare disparities and reinforces inequities and bias. In this symposium, three speakers from diverse racial, ethnic and geographic backgrounds will discuss two forms of othering, stigma and discrimination, and their impact on pain and treatment outcomes. We will explore intersectional health-related stigma (IHRS) and discrimination among diverse populations of patients with chronic pain; how the impact of othering on pain differs across race, ethnicity, and sex/gender; and identify correlates and potential mechanisms by which othering impacts pain. Importantly, we will discuss interventions by which we can minimize othering and its impact on pain. Dr. Meints will share cross-sectional and longitudinal results examining the relationship between IHRS and pain across three populations: women with chronic pelvic pain, adults with chronic low back pain (CLBP), and individuals undergoing spine surgery. She will also explore the intersection of racial discrimination and pain stigma across Black and White adults with CLBP. Dr. Terry will discuss the associations between discrimination and clinical pain, disability and functional performance among Black and White adults with knee osteoarthritis. She will provide data suggesting discrimination might differentially affect structural brain components across race/ethnicity and sex. Dr. Torres will provide the results of two studies examining racial discrimination, pain stigma, and pain management practices among racialized individuals living with chronic pain. She will highlight heterogeneity in negative experiences across racialized groups and

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implications for future research and intervention development, including the potential for building on ethnic identity to address discrimination.

Room: Baltic/Bering

11:45am – 1:15pm

Advances in Nociceptive Pain: Assessment, Treatment, and Neurobiological Mechanisms

Joel Fishbein, PhD¹, Yoni Ashar, PhD², Laura Simons, PhD³

VA San Diego University of California San Diego¹, University of Colorado Anschutz Medical Campus², Stanford University School of Medicine³

Nociceptive pain—pain that arises from altered nociception despite no tissue or somatosensory disease or lesion—offers a common mechanism to help explain diverse pain conditions (e.g., low back pain, tension headache, and fibromyalgia). Given the relatively new recognition of nociceptive pain as a distinct entity, research on effective assessments, targeted treatments, and neurobiological underpinnings is critical. In this symposium, we will present innovations in the assessment, treatment, and neurobiological mechanisms of nociceptive pain. Joel Fishbein, PhD, will present findings on a new brief self-report questionnaire to assess nociceptive pain, the Nociceptive Pain Questionnaire, collaboratively developed by researchers, clinicians, and patients. Factor analytic results (N = 378) indicate three core clinical domains of nociceptive pain: 1) influence of thoughts/emotions on pain, 2) allodynia/hyperalgesia, and 3) variable pain location/timing. Laura Simons, PhD, will present evidence supporting graded exposure therapy for nociceptive pain. She will describe how graded exposure therapy, by reintroducing avoided movements or activities, can significantly reduce avoidance behaviors, modulate central pain sensitivity, and improve overall function in those with nociceptive pain. Dr. Yoni Ashar will describe new findings on the neurobiological mechanisms of nociceptive pain and its treatment. He will present data linking nociceptive pain to multisensory sensitization via heightened unpleasantness and insula responses to aversive auditory stimuli, as well as longitudinal mediation analyses investigating gray matter volume change as a mediator of Pain Reprocessing Therapy. Moderator Luana Colloca, MD, PhD will bring expertise in the neurobiological bases of pain and its modulation to synthesize research findings and guide discussion.

Room: Atlantic A

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1:15pm – 2:15pm

Lunch

Room: Atlantic A, Caribbean/Caspian & Pacific Ballroom

1:15pm – 2:15pm

Journal of Pain Editorial Board Meeting

Room: Aegean/Adriatic Room

1:15pm – 2:15pm

Education and Professional Development Committee Meeting

Room: Mediterranean

2:15pm – 3:30pm

Poster Session D

Room: Atlantic B

3:30pm – 3:45pm

Beverage Break

Room: Atlantic Foyer

Symposia Block 4

3:45pm – 5:15pm

Brain Mechanisms for the Transition from Acute to Chronic Pain

Paul Geha, MD¹, Siobhan Schabrun, PhD², Paulo Branco, PhD³, A. Vania Apkarian, PhD³

University of Rochester¹, University of Western Ontario², Northwestern University³

Chronic pain exacts a significant burden on individuals, healthcare, and society. Chronic pain has no cure, and once entrenched, it is often irreversible. Thus, focusing on prevention is critically important. Doing so requires a better understanding of the mechanisms underpinning the transition from acute to chronic pain, identifying modifiable risk factors, and developing tools that can identify individuals at risk for developing chronic pain. In this symposium, we will explore the brain's role in the

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transition from acute to chronic pain, highlighting findings from studies in humans using neuroscience tools including structural and functional MRI, electroencephalography, and transcranial magnetic stimulation. We will specifically discuss longitudinal studies that followed patients over time after pain onset—within days of whiplash injury, weeks of experimentally induced temporomandibular disorder and months after the onset of back pain—and attempt to identify brain properties that hold predictive value for the later development of chronic pain. We will discuss 1) how brain properties influence the risk of developing and maintaining chronic pain, and their predictive value for long-term outcomes; 2) whether these properties represent predispositions or reflect maladaptive adaptations to injury; 3) their possible underlying mechanisms; and 4) how longitudinal studies may identify potential novel targets and interventions to prevent the transition from acute to chronic pain. Together, this symposium will shed light on the role of nociceptive, somatosensory, and emotional learning circuitry in the development of chronic pain, and highlight potential new directions for research in the field, as well as new translational opportunities.

Room: Baltic/Bering

3:45pm – 5:15pm

Mechanisms of DRG and Spinal Cord Stimulation for Pain Control

Andrei Sdrulla, MD, PhD¹, Kerry Bradley, PhD², Michael Gold, PhD³

Oregon Health and Science University¹, Nervo Corp², University of Pittsburgh³

Supporters of neuromodulation approaches, such as spinal cord stimulation and dorsal root ganglion (DRG) stimulation for the treatment of chronic pain point to results from successful trials documenting large effect sizes and lasting effects. Critics of these approaches point out that the trials have been supported by the neuromodulation industry and are not run blind. This landscape may be changing with both interest from NIH in the mechanisms underlying these therapeutic approaches and the advent of neuromodulation approaches that lend themselves to blinded control trials. These issues will be addressed in this symposium, with Kerry Bradley, Vice President, Scientific Affairs for Nervo Corporation providing a summary of the clinical and preclinical work that's been published, as well as insights from his team on how to address the lingering concerns with this technology. Michael Gold will summarize the

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mechanisms thought to underlie the therapeutic efficacy of DRG stimulation for the treatment of chronic pain, as well as recent data from his laboratory suggesting that satellite glial cells within the DRG may play a significant role in the mechanisms underlying this stimulation approach. Finally, Andei Sdrulla, will discuss recent results from his laboratory characterizing the modulatory effects of SCS on dorsal horn interneurons and output projection neurons studied with an intersectional genetics approach to drive the expression of the genetically encoded calcium indicator GCaMP6s in molecularly defined spinal populations.

Room: Atlantic A

3:45pm – 5:15pm

Transdisciplinary Perspectives and Emerging Evidence to Enhance Care in Painful Diabetic Neuropathy (PDN)

Paola Pacifico, MD, PhD¹, Melissa Elafros, MD, PhD², Jijun Xu, MD, PhD³, Eva Feldman, MD, PhD⁴

Northwestern University¹, University of Michigan², Cleveland Clinic³, Case Western Reserve University⁴

Painful diabetic neuropathy (PDN) presents significant challenges due to research gaps, such as a limited understanding of its mechanisms, a lack of disease-modifying therapeutics, and unpredictable symptomatic treatment responses. Additionally, clinical gaps exist in the assessment, diagnosis, and management of PDN, including a lack of familiarity with emerging evidence among frontline healthcare providers. This symposium aims to bridge these gaps by offering a transdisciplinary overview of PDN, covering the latest molecular findings, clinical approaches to diagnosis and treatment, and advances in interventional and neuromodulatory therapies. Participants will leave with an enhanced understanding of PDN's underlying mechanisms and be better equipped to utilize and describe the limitations of evidence-based treatments for patient care. Audience engagement will be encouraged through an interactive Q&A session, fostering a dynamic exchange between attendees and presenters. This symposium is unique as it incorporates both foundational and innovative perspectives, integrating translational research with cutting-edge interventional techniques to improve the care of PDN patients.

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Room: Caribbean/Caspian

3:45pm – 5:15pm

Minor Cannabinoids for the Treatment of Chronic Pain: From Mouse to Man

Andrea Jones, PhD¹, John Streicher, PhD², Ziva Cooper, PhD³, Nicholas Gilpin, PhD⁴
Louisiana State University Health Sciences Center¹, University of Arizona², University of California, Los Angeles³

Cannabinoid drugs are legal for medicinal and recreational use in most states, but their use has vastly outpaced our understanding of their effects on pain outcomes, and health more generally. **Dr. Jones** will discuss data describing the effects of inhalation of vaporized cannabichromene (CBC) and cannabigerol (CBG), both alone and in combination with cannabidiol (CBD), on nociceptive, behavioral and physiological outcomes in a rat model of chronic inflammatory pain (CFA). Her data suggest that CBC and CBG vapor inhalation attenuate hypersensitivity in CFA-treated rats, and alter locomotion, body weight and body temperature, and that these effects are modulated by sex and time. **Dr. Streicher** will discuss data showing that the terpenes geraniol, linalool, beta-caryophyllene, beta-pinene, and alpha-humulene provide comparable pain relief to morphine in inflammatory and neuropathic pain models via adenosine A2a receptor actions in spinal cord. His lab has observed that these terpenes are not associated with addiction-like side effects, but instead attenuate opioid reward while simultaneously enhancing opioid pain relief. **Dr. Cooper** will discuss data from an ongoing Phase I double-blind, placebo-controlled study focused on understanding the analgesic, abuse-related, and delta-9-tetrahydrocannabinol (THC)-sparing effects of ecologically relevant doses of the terpenes beta-caryophyllene (BCP) and myrcene. Her lab's data show that low doses of BCP and myrcene impact clinically relevant endpoints related to cannabis- and THC-induced analgesia and abuse liability. Overall, these studies suggest that minor cannabinoids and terpenes could be safe, effective and high-compliance treatments for multiple chronic pain conditions, either alone or in combination with opioid drugs.

Room: Pacific Ballroom

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Meeting Program

5:30pm – 7:00pm

SIG Meetings

Room: Various Locations

Friday, May 2, 2025

8:30am – 9:00am

Announcement of Poster Awards & G.F. Gebhart Journal of Pain Young Investigators Award

Room: Atlantic A

9:00am – 10:00am

Plenary Presentation: Insights into Neuropathic Pain Mechanisms from Studies of Human Dorsal Root Ganglion and Spinal Cord

Speaker: Theodore Price, PhD, (University of Texas at Dallas)

Dr. Price's plenary will focus on his lab's work profiling the human dorsal root ganglion (DRG) and spinal cord using tissues recovered from organ donors and during rare surgeries. He will begin the lecture by covering the state-of-the-art in what is known about different cell types in the human DRG, how they differ from other species, and how they change in people with chronic pain diseases. A major emphasis will be on diabetic neuropathy where his lab has assembled considerable evidence of neurodegeneration in the DRG. He will also discuss his lab's work on the human spinal cord, focusing on single cell sequencing of dorsal horn cells and downregulation of KCC2 in chronic pain states in humans. He will close by discussing how to discover a new generation of pain therapeutics targeting human dorsal horn neurons.

Room: Atlantic A

10:00am – 10:15am

Transition/Break

Symposia Block 5

10:15am – 11:45am

Meeting Program

Innovations in Neural Biobehavioral Phenotypes to Enhance Pain Care Across the Lifespan

Christine Sieberg, PhD, EdM, MA¹, Irina Strigo, PhD², Benedict Alter, MD, PhD³
Massachusetts General Hospital and Harvard Medical School¹, University of California, San Francisco², University of Pittsburgh³

Preclinical research has identified mechanisms thought to underly pain, but measuring these mechanisms in patients has proved challenging. Phenotyping refers to comprehensive measurement of multiple mechanisms in patients. Recent work has shown heterogeneity across patients, such that different phenotypes exist within given pain syndromes. This raises the possibility that a patient with a specific phenotype may respond better to a treatment if that treatment targets the relevant mechanism, potentially leading to personalized pain management. This interdisciplinary symposium will highlight cutting edge research addressing knowledge gaps in phenotyping and present evidence that treatments have a greater chance of success if matched to the relevant brain biobehavioral phenotype. Dr. Benedict Alter will review phenotyping approaches and present recent findings of pain modulatory phenotypes in osteoarthritis in older adults. Dr. Christine Sieberg will discuss stress biomarker, behavioral, and neuroimaging phenotyping related to chronic post-surgical pain across the lifespan. Dr. Irina Strigo will present evidence for brain-based pain processing phenotypes and their relevance to endogenous pain modulation profiles and for treating chronic low back pain. Speakers will cover techniques used in biobehavioral phenotyping including advanced functional brain imaging, quantitative sensory testing, hair steroid hormones, and state-of-the-art psychosocial assessments. The clinical relevance of the phenotyping will be highlighted, presenting clinical trial data demonstrating associations between phenotypes and outcomes. Discussion topics will probe ways that basic, translational, and clinical researchers can synchronize phenotyping efforts such that mechanisms of pain can be measured in patients to classify phenotypes and enhance clinical care through personalized pain management.

Room: Atlantic A

10:15am – 11:45am

Meeting Program

Targeting Peripheral Opioid Receptors: Advancing Precision Medicine with Reduced Side Effects

Luca Posa, PhD¹, Stephanie Puig, PhD², Ream Al-Hasani, PhD³

Weill Cornell Medicine¹, UMass Chan Medical School², Washington University in St. Louis School of Medicine³

This symposium will explore the potential of targeting peripheral opioid receptors (ORs) as a promising strategy for effective pain relief while minimizing central side effects such as respiratory depression and addiction. Unlike traditional opioids that act on ORs in the brain and spinal cord, peripherally restricted opioids provide localized pain relief at the site of injury or inflammation, reducing the risk of adverse effects. The symposium will present recent advances in the development of selective peripheral opioids. Dr. Luca Posa will discuss advances in the design of photochromic peripherally restricted opioids, such as **light-activated "opto-opioids"** that allow precise spatial and temporal control of opioid receptor activation. Dr. Stephanie Puig will present her work on the **role of keratinocytes in peripheral opioid signaling and induction of peripheral opioid tolerance** via epithelia-neural communication via growth factors, offering new insights into managing long-term opioid use at the periphery. Finally, Dr. Ream Al-Hasani will present the **role of peripheral KOR in the modulation of cold hypersensitivity and cold pain** and how this has implications for attenuating disease-induced neuropathies. Additionally, the symposium will explore how targeting peripheral ORs can treat different pain conditions, from acute to chronic pain and present data from preclinical studies supporting the efficacy and safety of this approach. This research seeks to redefine opioid therapy providing safer, more targeted pain management. Attendees will gain valuable insights into the future of opioid therapy and the potential of peripheral opioid receptor modulation as a viable alternative to traditional pain treatments.

Room: Caribbean/Caspian

10:15am – 11:45am

Overcoming AI Challenges for Pain Detection

Susan Horner, PhD¹, Zheyang Zhan, PhD², Diego Klabjan, PhD², Renee CB Manworren, PhD³

Ann & Robert H. Lurie Children's Hospital of Chicago¹, Northwestern University², University of Texas at Arlington³

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Early-life pain is associated with abnormal structural and functional brain development, resulting in adverse neurodevelopmental consequences, including cognitive and memory impairments, emotional dysregulation, and global pain sensitivity. Therefore, timely and accurate detection of pain is crucial for hospitalized infants. Artificial intelligence (AI)-powered approaches that analyze clinical data and facial action videos offer promise for continuous pain monitoring. Given their role and subject matter expertise, nurses were essential in designing and developing our preliminary pain detection machine learning (ML) model. Using the Neonatal Facial Coding System, the only observational pain assessment tool that includes facial actions associated with brain-based evidence of pain, and the iCopevid needle pain dataset, our ML model has 97.7% precision, 98% accuracy, and 98.5% recall. Since a Pain Recognition Automated Monitoring System (PRAMS) is unnecessary for needle pain, we are retraining our model to detect more complex and clinically relevant post-surgical pain. Consequently, post-surgical videos include images in which infants' faces are partially obscured by their own hands or medical equipment, like NG & ET Tubes. To address this challenge, we incorporate a diffusion-based inpainting technique to reconstruct obscured facial regions in video frames, thereby enhancing our AI model's ability to detect and interpret pain-related facial actions by restoring missing details. Furthermore, we will employ hybrid federated learning, a distributed ML approach that enables collaborative model training across multiple hospitals while maintaining HIPAA-compliant data protection. Our approach is a significant advancement in pain assessment, with the potential to transform clinical practice and improve early-life pain outcomes.

Room: Baltic/Bering

10:15am – 11:45am

Treating Pain Takes "Guts": Targeting the Gut Microbiome to Facilitate Pain Care Innovation

*Erin Young, MA, PhD, Arkady Khourosky, DVM, PhD, Kristen Smith-Edwards, PhD
University of Kansas Medical Center, McGill University, Mayo Clinic*

The vast community of "bugs" (bacteria, viruses, and fungi) colonizing the gastrointestinal tract, collectively referred to as the gut microbiome, has been shown to differ between patients with and without chronic pain. The specific nature of the reported

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dysbiosis (differences in microbial colonization) varies significantly between studies and the type of chronic pain condition being examined. As a result, historically, the majority of the studies have focused on characterization and observation of dysbiosis, but in the last few years, the mechanisms by which differential colonization may increase pain sensitivity or facilitate the transition from acute to chronic pain states has garnered more attention. The speakers will present novel findings from three painful conditions (fibromyalgia, visceral hypersensitivity, and pain due to neurogenic bowel), each characterized by alterations in the bacterial colonization of the gut. Presentations will prioritize describing methods for determination of location specific bacterial abundance within the gut and establishing mechanisms by which gut microbes may drive changes in host cell structure and function. Further, each speaker will unpack specific mechanisms of communication between gut bacteria and host cells with a focus on microbiome-neuronal interactions, highlighting the new models and state-of-the-art approaches utilized to move beyond characterization and directly test their hypotheses. Identification of pathogenic changes in the gut thought to contribute to chronic pain development or persistence will provide context for the presentations and discussion of the varied definitions of pain-relevant dysbiosis. The translation potential of precision microbiome manipulations will be outlined along with caveats and considerations going forward.

Room: Pacific Ballroom

12:00-1:30pm

Lunch Panel Discussion: Learn About Engaging People with Lived Experience (PWLE) of Pain into Your Research

Room: Atlantic A

The PWLE Committee, chaired by Chris Veasley and Rob Edwards, has organized this lunch session, titled Engaging People With Lived Experience (PWLE) in pain research, to educate and guide our community in how we can integrate PWLE of pain into our research teams. Engaging individuals and groups with lived experience can be extraordinarily beneficial, both personally and professionally, but most researchers have not received any guidance or training in how to initiate this engagement (as we are learning from a USASP membership survey). This interactive and panel-based session is designed to provide an introduction to the engagement process, and to direct attendees to helpful resources. Following a brief review of current recommendations for

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PWLE engagement, panel discussions with both researchers and PWLE will highlight the “lessons learned” from partnerships in which people with pain have become full members of the interdisciplinary team. Attendees will learn strategies to manage common engagement obstacles, including how to develop relationships with PWLE and how to seek funding for this work. Come with your questions and help the USASP start developing systems that facilitate these relationships.

**This program is included in your full meeting registration*

2:00pm – 5:00pm

Workshop: How to talk to the Press about your Research and Translating Research into Policy: An Introduction

This 3 hour workshop will introduce you to the ways in which you can better explain your research to the press and policy-makers and give you an opportunity to practice doing so. You will be given tips about speaking to journalists and communicating science into language they and the public can understand. Once you’ve learned these basic concepts, you’ll be given time to write a one page memo to your Congressman as to why they should know about your research and how it might, with their help, lead to public policy changes *or* write a one page draft blog post about your research for a lay audience. You’ll then be given an opportunity to share your one-pager with a partner or the group. This will be followed by a brief primer on how to influence policy at the federal and state levels. The last hour will be devoted to a panel presentation of USASP members who have been successful influencing pain policy at the state and federal levels and how they did it.

Room: Pacific Ballroom

**This workshop is included in your full meeting registration*