

KEYSTONE SYMPOSIA

on Molecular and Cellular Biology

Pain: Aligning the Target (J7)

Scientific Organizers: Laura M. Bohn, William K. Schmidt and Allan I. Basbaum

Sponsored by Vertex Pharmaceuticals Incorporated

Somatosensation: From Detection to Perception (J8)

Scientific Organizers: Alexander Chesler, Sarah Ross and Daniel O'Connor

February 2-5, 2020 • Keystone Resort • Keystone, CO, USA

Supported by the Directors' Fund

Discounted Abstract & Scholarship Deadline: October 17, 2019 / Abstract Deadline: November 22, 2019 / Discounted Registration Deadline: December 4, 2019

SUNDAY, FEBRUARY 2

Arrival and Registration

MONDAY, FEBRUARY 3

Welcome and Keynote Address (J7)

- ***Laura M. Bohn**, The Scripps Research Institute, USA
- ***William K. Schmidt**, Helixmith Co., Ltd, Seoul, South Korea, and San Diego, USA
- ***Allan I. Basbaum**, University of California, San Francisco, USA
- Irene Tracey**, University of Oxford, UK
Brain Imaging of Acute and Chronic Human Pain: From Cause to Perception

Opening Remarks (J8)

Learning from Our Patients (J7)

- ***Allan I. Basbaum**, University of California, San Francisco, USA
- Christin Veasley**, Chronic Pain Research Alliance, USA
A Patient's Perspective on the Critical Need to Align the Target
- Lauren Charlotte Heathcote**, Stanford University, USA
Pain and Somatic Sensation as Bodily Threat
- Chas Bountra**, University of Oxford, UK
Using Epigenetics to Discover New Pain Targets
- Deborah Schechtman**, University of São Paulo, Brazil
Short Talk: Genetic Mutations in Patients with Congenital Insensitivity to Pain Guide Development of a New Analgesic

Molecules and Cells for Touch, Temperature and Pain (J8)

- ***Alexander Chesler**, National Institutes of Health, USA
- Ardem Patapoutian**, The Scripps Research Institute, USA
Molecule 4 Touch
- Diana Bautista**, University of California, Berkeley, USA
S1P Signaling in Inflammatory Itch and Pain
- Ellen A. Lumpkin**, University of California, Berkeley, USA
The Epithelial and Neural Connections Mediating Touch
- John King**, University of California, San Francisco, USA
Gating Mechanisms of the Wasabi Receptor, TRPA1—From Atomic Structure to Pain Physiology
- Joriene C. de Nooij**, Columbia University, USA
Short Talk: Transcriptional and Physiological Analysis of Adult Muscle Spindle and Golgi Tendon Organ Sensory Afferents
- Hakan William Olausson**, Linköping University, Sweden
Short Talk: Human Social Touch As Encoded by First-Order A β and C-Tactile Afferents

NIH HEAL Initiative and Efforts (J7)

- Amir Tamiz**, NINDS, National Institutes of Health, USA

NCCIH and BRAIN Funding Opportunities for Circuits Studies (J8)

- Karen K. David**, NINDS, National Institutes of Health, USA
- Merav Sabri**, NCCIH, National Institutes of Health, USA

Workshop: New Resources for Therapeutic Discovery (J7)

- ***William K. Schmidt**, Helixmith Co., Ltd, Seoul, South Korea, and San Diego, USA
- Patricia Labosky**, National Institutes of Health, USA
The NIH Common Fund Acute to Chronic Pain Signatures (A2CPS) Program
- Jennifer Beierlein**, NINDS, National Institutes of Health, USA
NIH HEAL Initiative: National Institute of Neurological Disorders and Stroke's Early Phase Pain Investigation Clinical Network (EPPIC-Net)
- Ilyas Singec**, National Institutes of Health, USA
Scalable Differentiation of Human iPSC-Derived Pseudo-Unipolar Nociceptors With In Vivo-like Properties and Translational Applicability
- Sarah Woller**, NINDS, National Institutes of Health, USA
National Institute of Neurological Disorders and Stroke Preclinical Screening Platform for Pain

Workshop (J8)

- ***Ellen A. Lumpkin**, University of California, Berkeley, USA
- John S. Del Rosario**, Rutgers University, New Jersey Medical School, USA
Gi-Coupled Receptor Activation Potentiates Piezo2 Currents via G β
- Sonali S. Mali**, University of California, Berkeley, USA
The Role of Epidermal Cells in Drosophila Melanogaster Nociception
- Fred Schwaller**, Max Delbrück Centrum, Germany
USH2A Is a Skin End-Organ Protein Necessary for Vibration Sensing in Mice and Humans
- Nivanthika K. Wimalasena**, Harvard University, USA
Scratching and Sensory Deficits in an Nav1.7 Gain-of-Function Mouse Model
- Shanni Yamaki**, University of Southern California, USA
Phenotyping of TRPA1 Afferents Suggests the Channel Induces Cold Pain Upstream of the Neurotrophin Receptor GFR α 3 and TRPM8
- Xin Zhang**, Duke University, USA
The Role of Keratinocyte β 2ARs in Mechanical Pain Sensation

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Panel Discussion (J7)

***Amir Tamiz**, NINDS, National Institutes of Health, USA

Patricia Labosky, National Institutes of Health, USA

Jennifer Beierlein, NINDS, National Institutes of Health, USA

Ilyas Singec, National Institutes of Health, USA

New Stem Cell Models for Pain Research and the NIH HEAL Initiative

Sarah Woller, NINDS, National Institutes of Health, USA

Preclinical Screening Platform for Pain

Smriti Iyengar, National Institute of Neurological Disorders and

Stroke, USA

Developing More Informative Pain Models (J7)

***Cheryl L. Stucky**, Medical College of Wisconsin, USA

Allan I. Basbaum, University of California, San Francisco, USA

General Anesthetic Influences on Neuronal Activity Provide Insight into Cortical Pain Processing

Jose Moron-Concepcion, Washington University School of Medicine, USA

Dissecting the Neural Circuits Driving Pain-Induced Negative Affect

Annemieke Kavelaars, University of Texas MD Anderson Cancer

Center, USA

Fibroblasts Control Vascular Permeability, Leukocyte Infiltration and Chronic Pain

Levi P. Sowers, University of Iowa, USA

Short Talk: Development and Use of Automated Facial Pain Detection to Explore the Role of CGRP and Amylin in a Preclinical Mouse

Model of Migraine

Ishmail John Abdus-Saboor, University of Pennsylvania, USA

Short Talk: Automated Measurement of Pain at Millisecond Resolution

Spinal Cord (J8)

***Sarah Ross**, University of Pittsburgh, USA

Patrik Ernfors, Karolinska Institutet, Sweden

The Cellular Basis for Somatosensation and Pain

Rebecca Seal, University of Pittsburgh, USA

Cross Species Analysis of the Molecular and Cellular Organization of the Mammalian Dorsal Horn: Functional Implications and Future Directions

David D. Ginty, HHMI/Harvard Medical School, USA

Mechanosensory Neuron Subtypes and the Central Representation of Touch

Eric V. Brown, Thomas Jefferson University, USA

Short Talk: Differential Activation of Dorsal Horn Neuron Subtypes in a Mouse Model of Spinal Cord Injury Induced Neuropathic Pain

Wenqin Luo, University of Pennsylvania, USA

Short Talk: Synaptic Transmission of MrgprA3+ Itch-sensing Afferents in the Spinal Cord

Poster Session 1

TUESDAY, FEBRUARY 4

New Tech for Managing Pain (J7)

***Jose Moron-Concepcion**, Washington University School of Medicine, USA

Robert W. Gereau, Washington University Pain Center, USA

Optogenetic Silencing of Nociceptors

Karen Wagner, EicOsis, USA

A Novel Target for Analgesia: Small Molecule Inhibition of the Soluble Epoxide Hydrolase

Sunyoung Kim, Helixmith Co., Ltd., South Korea

New Concept Regenerative Medicine for Neuropathic Pain Using Plasmid DNA Encoding Human Hepatocyte Growth Factor (HGF), Engensis® (VM202): Scientific Basis and Results from Clinical Studies

Gregory Nachtrab, Stanford University, USA

Short Talk: Role of Descending μ -Opioid Receptor Neurons in Nociception and Chronic Pain

Dustin Green, Johns Hopkins, USA

Short Talk: The Mast Cell Receptor Mrgprb2 Mediates Neurogenic Inflammation and Pain

Bryan Copits, Washington University School of Medicine, USA

Short Talk: A Photoswitchable GPCR-Based Opsin for Presynaptic Inhibition

Bethany Fitzsimmons, Ionis Pharmaceuticals, USA

Short Talk: Antisense Oligonucleotides Selectively Suppress Target RNA in DRG and Can Ameliorate Mechanical Pain

Subcortical Circuits (J8)

***Jan Siemens**, University of Heidelberg, Germany

Sarah Ross, University of Pittsburgh, USA

Neural Circuits for Itch

Alexander Chesler, National Institutes of Health, USA

Cells and Circuits for Touch and Pain

Yarimar Carrasquillo, National Institutes of Health, USA

Dialing Pain Up and Down in the Amygdala

Victoria Abaira, Rutgers University, USA

Wired for Touch: The Neurons and Circuits of the Somatosensory System

Chen Ran, Harvard University, USA

Short Talk: The Coding of Internal Senses in the Brainstem

Panel Discussion: Inclusivity and Diversity in the Field: What Works and How to Do Better (Joint)

***Ishmail John Abdus-Saboor**, University of Pennsylvania, USA

Michael D. Burton, University of Texas at Dallas, USA

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John S. Del Rosario, Rutgers University, New Jersey Medical School, USA

Yarimar Carrasquillo, National Institutes of Health, USA

Diana Bautista, University of California, Berkeley, USA

Celine Santiago, Harvard Medical School, USA

New Approaches to Modulating Known Targets (J7)

Wendy L. Imlach, Monash University, Australia
Targeting Spinal Adenosine Signaling to Treat Neuropathic Pain

Laura M. Bohn, The Scripps Research Institute, USA
Using Biased Agonism to Refine Pain Therapeutics

Venetia Zachariou, Icahn School of Medicine at Mount Sinai, USA
The "Complex" Role of RGS Proteins in Chronic Pain and Opioid Analgesia

Evangelia Semizoglou, King's College London, UK
Short Talk: Kappa Opioid Receptors Mediate the Analgesic Effects of TRPA1 Inactivation

Scott A. Scarneo, Duke University School of Medicine, USA
Short Talk: Pharmacological Inhibition of TAK1 Reduces TNF-Mediated Pain and Inflammation

Internal States (J8)

***Rebecca Seal**, University of Pittsburgh, USA

Richard D. Palmiter, HHMI/University of Washington, USA
Parabrachial CGRP-Expressing Neurons Establish and Maintain Threat Memories

Jan Siemens, University of Heidelberg, Germany
Deep Brain vs. Ambient Temperature Detection: Who Has the Say in Thermoregulation?

Yuki Oka, California Institute of Technology, USA
Neural Mechanisms of Body Fluid Regulation

Ricardo Paricio Montesinos, Max Delbruck Center For Molecular Medicine, Germany
Short Talk: The Sensory Encoding of Warm Perception

Kara Marshall, The Scripps Research Institute, USA
Short Talk: Under Pressure: The Role of PIEZO2 in Urination

Poster Session 2

WEDNESDAY, FEBRUARY 5

New Targets (J7)

***Venetia Zachariou**, Icahn School of Medicine at Mount Sinai, USA

Nikita Gamper, University of Leeds, UK
GABAergic Signaling within Dorsal Root Ganglia

Biafra Ahanonu, University of California, San Francisco, USA
An Amygdalar Neural Ensemble that Encodes the Unpleasantness of Pain

Daniela Salvemini, Saint Louis University, USA
Adenosine Receptors Modulating Neuropathic Pain

Cheryl L. Stucky, Medical College of Wisconsin, USA
Transient Receptor Potential Canonical 5 (TRPC5): A Novel Target for Inflammatory and Migraine Pain

Somatosensory Cortex (J8)

Carl CH Petersen, École Polytechnique Fédérale de Lausanne, Switzerland
Neural Circuits for Goal-Directed Sensorimotor Transformation

Daniel O'Connor, Johns Hopkins University, USA
A Functional Cortical Network for Sensorimotor Sequence Generation

James Poulet, Max-Planck-Centrum für Molekulare Medizin, Germany
Cortical Circuits of Thermal Perception

Jeff Yau, Baylor College of Medicine, USA
Short Talk: Bimanual Touch and Cortical Encoding Models of Sensory Cue Integration

John Tuthill, University of Washington, USA
Short Talk: Neural Coding of Leg Proprioception in Central Circuits of Drosophila

Cannabis for Managing Pain? (J7)

***William K. Schmidt**, Helixmith Co., Ltd, Seoul, South Korea, and San Diego, USA

Aron H. Lichtman, Virginia Commonwealth University, USA
Targeting Endocannabinoid-Regulating Enzymes in Mouse Models of Neuropathic Pain: The 2-AG Paradox

Andrea Hohmann, Indiana University, USA
CB2 Cannabinoid Receptor as a Therapeutic Target

David Shurtleff, NCCIH, National Institutes of Health, USA
Natural Products for the Treatment of Chronic Pain

Cortical Processes for Somatosensation (J8)

***Daniel O'Connor**, Johns Hopkins University, USA

Michael Brecht, Humboldt University Berlin, Germany
Tickling, Self-Touch and Mirroring

Sliman J. Bensmaia, University of Chicago, USA
The Neural Basis of Touch and Proprioception in Non-Human Primates

***Soohyun Lee**, NIMH, National Institutes of Health, USA
Functional Connectivity of Diverse Long-Range Inputs to the Primary Somatosensory Cortex

Alan J. Emanuel, Harvard Medical School, USA
Short Talk: Subcortical Integration of Signals from Peripheral Mechanoreceptor Subtypes

Panel Discussion: Future Directions (J7)

Meeting Wrap-Up (J7)

Laura M. Bohn, The Scripps Research Institute, USA

William K. Schmidt, Helixmith Co., Ltd, Seoul, South Korea, and San Diego, USA

Meeting Wrap-Up: Outcomes and Future Directions (Organizers) (J8)

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THURSDAY, FEBRUARY 6

Departure