

# PAIN MECHANISMS AND THERAPEUTICS CONFERENCE

Hotel Due Torri, Verona, Italy

Sunday, 29 May- Friday, 3 June, 2022

## SCIENTIFIC PROGRAM

### SUNDAY, 29 May, 2022

7:30 am- Registration

8:30 am Welcome and Announcements

Frank Porreca and Kirsty Bannister

9:00-10:15 am Session 1: "Higher brain centre and brainstem influences on descending modulatory controls"

Kirsty Bannister, Chair

- Bridget Lumb (University of Bristol, UK)  
"PAG-cerebellar interactions in fear and pain"
- David Finn (National University of Ireland Galway)  
"Sex and strain differences in descending modulation of pain: role of the endocannabinoid system"
- Kirsty Bannister (King's College London, UK)  
"Descending modulatory controls; molecular mechanisms and translational value"
- Thomas Graven-Nielsen (University of Aalborg, Denmark)  
"The effects of affective/attentional factors and transcranial brain stimulation on conditioning pain modulation"
- Diana Torta (KU Leuven, Belgium)  
"Spinal and supra-spinal mechanisms modulating CPM; can we distinguish them in humans?"

10:15 - 11:15 am Coffee break (longer coffee break on first day)

11:15- 12:00 pm Session 2: "Neurons and circuits for cold nociception"

Uli Zeilhofer, Chair

- Katharina Zimmermann (University of Erlangen, Germany)  
"Cold sensing mechanisms of primary sensory neurons"
- Hanns Ulrich Zeilhofer (University of Zurich, Switzerland)  
"A population of dorsal horn neurons regulating cold sensitivity"
- Junichi Hachisuka (University of Glasgow, UK)  
"A selective pathway for cold in the spinal cord projection neurons"

**12:00 – 12:30 pm Data Blitz 1**

- Yu Shin Kim (University of Texas San Antonio, USA)  
“Imaging in vivo trigeminal ganglion with TMJ inflammation”
- Michelle Roche (National University of Ireland Galway, Ireland)  
“Pain in Autism: is the opioid system to blame?”
- Xavier Gasull (Universitat de Barcelona, Spain)  
“Modulation of non-histaminergic itch by K2P potassium channels”

**12:30 - 2:30 pm Free for Lunch (long lunch on first day)**

**2:30 - 3:30 pm Session 3: "Cortical circuits Part 1"**

**Rohini Kuner, Chair**

- Rohini Kuner (University of Heidelberg, Germany)  
“Prefrontal mechanisms of interactions between pain and fear”
- Phillipe Séguéla (McGill University, Canada)  
“A role for prefrontal dopamine in neuropathic pain”
- Thomas Nevian (University of Bern, Switzerland)  
“Principles of nociceptive coding in the anterior cingulate cortex”
- Jing Wang (New York University, USA)  
“Building a brain-machine interface for the study and treatment of pain”

**3:30 – 4:15 pm Coffee break**

**4:15- 5:30 pm Session 4: “Cortical circuits Part 2”**

**Rohini Kuner, Chair**

- Ipek Yalcin (The European Neuroscience Institute at Strasbourg, France)  
“Basolateral amygdala-prefrontal cortex circuit controls emotional aspects of chronic pain”
- Carl Saab (Cleveland Clinic, OH, USA)  
“Large-scale neural recording in SI in the context of sub-second nociceptive self-report in mice”
- Giandomenico Iannetti (University College London, UK)  
“Pain-related gamma band oscillations”
- Markus Ploner (Technical University of Munich, Germany)  
“Measuring and modulating brain rhythms of pain”
- A. Vania Apkarian (Northwestern University, Chicago, USA)  
“Role of the hippocampus in the transition and maintenance of chronic pain”

**6:00 -6:45 pm Aperitivo (cocktail party)**

## MONDAY, 30 May, 2022

8:30- 9:45 am Session 5: "Peptidergic modulation of pain circuits"

Marc Landry, Chair

- Thibault Dhellemmes (University of Bordeaux, Bordeaux, France)  
"Novel roles for the relaxin family peptides in the modulation of inflammatory pain"
- Pascal Darbon (Institut des Neurosciences cellulaires et intégratives, Strasbourg, France)  
"Oxytocin-induced modulation of pain and emotions"
- Kieran Boyle (University of Glasgow, Glasgow, UK)  
"The role of NPY-expressing inhibitory interneurons in spinal pain and itch mechanisms"
- Brad Taylor (University of Pittsburgh, Pittsburgh, USA)  
"Chronic pain control by endogenous NPY and spinal Y1R-expressing neurons"
- Greg Weir (University of Glasgow, Scotland, UK)  
"Dissecting the contributions of distinct primary afferent populations to neuropathic pain"

9:45- 10:30 am Data Blitz 2

- Leire Almandoz Gil (UMC Utrecht, Netherlands)  
"A Synerkine of IL4 and IL13 for treatment of chemotherapy-induced peripheral neuropathy"
- Cédric Lenoir (Université catholique de Louvain, Belgium)  
"EEG markers of the development of postoperative pain"
- Cristina Gil Ávila (Technical University of Munich, Germany)  
"From data to knowledge: an open, fully-automated EEG pipeline for pain biomarker discovery"
- Margot Maurer (King's College London, UK)  
" Functional consequences of passive transfer of fibromyalgia from patients to mice"

10:30 - 11:15 am Coffee break

11:15 - 12:15 am Session 6: "New insights into placebo analgesia"

Herta Flor, Chair

- Christian Büchel (Institute für Systemische Neurowissenschaften, Hamburg, Germany)  
"Spino-cortical mechanisms of expectation-induced pain modulation"
- Ulrike Bingel (Universitätsklinikum Essen, Germany)  
"The impact of expectation on analgesic treatment outcome"
- Tor Wager (Dartmouth College, USA)  
"Brain mediators of social and psychological context effects on pain"
- Herta Flor (CIMH, University of Heidelberg, Germany)  
"Predicting chronic pain from associative learning"

12:15-12:30 pm

- Andre Ghetti (AnaBios, San Diego, USA) Dr. Ghetti will highlight AnaBios' unique expertise in ex vivo studies of human pharmacology in normal and pathological states. He will also discuss how AnaBios' unique human tissue platform can be used in the context of drug discovery targeting pain and itch.

12:30 - 2:00 pm Free for Lunch

2:00 - 3:00 pm Session 7: “Cellular and molecular changes in the superficial dorsal horn underlying development and resolution of pathological pain”

Robert Bonin, Chair

- Arkady Khoutorsky (McGill University, Montreal, Canada)  
“Microglia-mediated removal of perineuronal nets on lamina I projection neurons in the development of neuropathic pain”
- Noosha Yousefpour (McGill University, Canada)  
“A complement-microglia pathway drives spinal synapse loss in neuropathic pain”
- Reza Sharif (McGill University, Montreal, Canada)  
“Spinal cord circuits underlying mechanical pain”
- Robert Bonin (University of Toronto, Canada)  
“Activity-dependent reversal of hyperalgesia by non-ionotropic NMDA signaling”

3:00- 3:15 pm Data Blitz 3

- Shannon Tansley (McGill University, Montreal, Canada)  
“Single-cell RNA sequencing defines a heterogenous population of microglia in the spinal cord after peripheral nerve injury”
- Peter Zygmunt (Lund University, Sweden)  
“TRP channel redox regulation”

3:15- 4:00 pm Coffee break

4:00- 4:30 pm Session 8: “TRP channels and pain”

Stuart Bevan, Chair

- Romina Nassini (University of Florence, Italy)  
“The role of Schwann cell TRPA1 in sustaining cancer-evoked neuroinflammation and pain”
- Stuart Bevan (King’s College London, UK)  
“TRPA1-mediated analgesia: a role for opioid receptors”

4:30- 5:30 pm Session 9: “Sex differences in pain mechanisms”

Edita Navratilova, Chair

- Mike Salter (University of Toronto, Canada)  
“Defining the epigenetic landscape of sex differences in pain”
- Edita Navratilova (University of Arizona, USA)  
“Prolactin promotes female selective hyperalgesia”
- Jeff Mogil (McGill University, Canada)  
“Pain, sex, and death”
- Mike Hildebrand (Carleton University, Ottawa, Canada)  
“Sex-specific dysregulation of dorsal horn NMDA receptors in rodent and human models of pathological pain”

## TUESDAY, 31 May, 2022

8:30- 10:30 am Session 10: "Neuroimmune interactions"

Shafaq Sikandar, Chair

- Alexander Davies (University of Oxford, UK)  
"Stressed sensory neurons as targets for killer immune cell interactions"
- Thiago Cunha (University of São Paulo, Brazil)  
"Meningeal immune cells: novel players in neuropathic pain development"
- Andrew Shepherd (University of Texas MD Anderson, Houston, USA)  
"Angiotensin signaling and neuroimmune interactions in chronic pain states"
- Iain Chessell (AstraZeneca, UK)  
"Progress in the clinic with a novel bi-specific therapy"
- Sebastien Talbot (University of Montreal, Canada)  
"Pain neurons control cancer immunosurveillance"
- Alexander Binshok (The Hebrew University of Jerusalem, Israel)  
"Efferent signaling along the afferent terminals"
- Shafaq Sikandar (William Harvey Institute, London, UK)  
"An immunological basis for chronic widespread pain in mice and men"

10:30 - 11:15 am Coffee break

11:15- 12:30 am Session 11: "Visceral pain mechanisms"

Nick Spencer, Chair

- Nathalie Vergnolle (University of Toulouse, France)  
"Search for protease Inhibitors to treat visceral pain; news from the microbiota"
- Stuart Brierley (Flinders University, Australia)  
"New mechanisms contributing to chronic visceral hypersensitivity"
- Jennifer DeBerry (University of Alabama at Birmingham, USA)  
"Peripheral regulation of bladder sensation and function"
- Nick Spencer (Flinders University, Australia)  
"What happens to visceral sensation and pain in mice with DRGs surgically removed?"
- Christophe Altier (University of Calgary, Canada)  
"Gut-innervating TRPV1+ nociceptors control central mechanisms of chronic visceral pain"

12:30 - 2:00 pm Free for Lunch

2:00 - 2:45 pm Session 12: "Sodium channels and neuropathic pain"

Håkan Olausson, Chair

- Håkan Olausson (Linköping University, Sweden)  
"Nav1.7 is required for human affective touch"
- Steve Middleton (Oxford University, UK)  
"Nav1.7 is required for C-LTMR function in mice"
- Jimena Perez-Sanchez (Oxford University, UK)  
"A humanised silencing tool for the inhibition of pain"

2:45 - 3:30 pm Data Blitz 4

- Nikita Ruparel (University of Texas San Antonio, USA)  
"Mechanisms of stem cell-mediated analgesia"
- Ichrak Drissi (Cambridge University, UK)  
"Potassium channel Kv6.4 impacts human labor pain by altering nociceptor activity that innervates the uterus"
- Eric Bellefroid (University of Brussels (ULB), Belgium)  
"Role of of the epigenetic regulator Prdm12 in nociceptors"
- Shivani Ruparel (University of Texas San Antonio, USA)  
"Curbing oral cancer pain"
- Annabelle Réaux-Le Goazigo (INSERM / CNRS / Sorbonne Université, Paris, France)  
"Neuroinflammation and central sensitization in chronic corneal pain"
- Hanneke Willemen (University Medical Center Utrecht, The Netherlands)  
"Mitochondria control the transition from acute to chronic pain"

3:30-4:15 pm Coffee break

4:15 – 5:30 pm Data Blitz 5

- Juana Gallar (Universidad Miguel Hernández de Elche, Spain)  
"Sensory processing of TRPM8-dependent activity contributes to both reflex and spontaneous blink"
- Valeria Mussetto (Medical University of Vienna, Austria)  
"A potential role for the parabrachial nucleus in opioid withdrawal; in vitro electrophysiological characterization of drug-induced synaptic plasticity"
- Arthur Courtin (Université catholique de Louvain, Belgium)  
"Frequency tagging of scalp EEG responses elicited by innocuous cold, noxious heat and vibrotactile stimulations"
- Dominika Šulcová (Université catholique de Louvain, Belgium)  
"Changes in CNS excitability during capsaicin-induced pain: a TMS-EEG study"
- Eder Gambeta (University of Calgary, Canada)  
"Dysregulation of Cav3.2 channel in trigeminal pain"
- Alex Serafini (Mount Sinai School of Medicine, New York, USA)  
"SARS-CoV-2 impact on neuropathic pain pathways"
- Artur Kania (IRCM/McGill University, Canada)  
"A function of Phox2a spinal projection neurons in the supraspinal transmission of chronic nociception"
- Francesca Guida (Università degli Studi della Campania, Naples, Italy)  
"Altered gut microbiota and endocannabinoid system tone in vitamin D deficiency-mediated chronic pain"

## WEDNESDAY, 1 June, 2022

### 8:30-10:00 am Session 13: "Amygdala and pain"

Volker Neugebauer, Chair

- Volker Neugebauer (Texas Tech University Health Sciences Center, USA)  
"Amygdala CRF neurons and pain modulation"
- Michael Burman (University of New England, USA)  
"Amygdala CRF cells mediate a neonatal trauma-induced pain vulnerability in a sex-specific manner"
- Yarimar Carrasquillo (NIH, USA)  
"Cell-type-specific circuits for pain modulation in the amygdala"
- Patrick Sheets (Indiana University School of Medicine, USA)  
"Dissecting cell-type and region-specific alterations to central amygdala circuits in mouse models of pain"
- Fusao Kato (Jikei University School of Medicine, Tokyo, Japan)  
"Robust synaptic transmission from pain-activated neurons in the parabrachial nucleus to those in the central amygdala"
- Rob Gereau (Washington University, St. Louis, USA)  
"Central amygdala neurons mediating sensory and affective aspects of pain"

### 10:00- 10:30 am Data Blitz 6

- Katy Braden (Saint Louis University School of Medicine, USA)  
"Novel role for GPR183-oxysterol signaling in chronic pain"
- Emanuel van den Broeke (Université catholique de Louvain, Belgium)  
"The recording of pinprick-evoked EEG gamma-band activity in the context of secondary hyperalgesia; a feasibility study"
- Candler Paige (Doloromics Inc, Menlo Park, CA, USA)  
"Unique insights from single nucleus sequencing of the human spinal cord"

### 10:30 - 11:15 am Coffee break

### 11:15-12:15 pm Session 14: "Imaging pain processing; different paths forward"

Allan Basbaum, Chair

- Feng Wang (University Laval, Quebec, Canada)  
"Mapping afferent coding strategies"
- Joyce Teixeira da Silva (University of Maryland Dental School, Baltimore, USA)  
"Using functional MRI to assess pain processing at the whole-brain level"
- Jose Moron-Concepcion (Washington University, St. Louis, USA)  
"Role for VTA DA neuron activity in pain-induced anhedonia-like behavior"
- Allan Basbaum (University of California San Francisco, USA)  
"Long term neuronal and non-neuronal imaging in the spinal cord of the awake behaving mouse"

### 12:15 - 2:00 pm Free for Lunch

2:00 – 2:45 pm Session 15: "Nociception"

Patrik Ernfors, Chair

- Bertrand Coste (CNRS/AMU, Marseille, France) "Patch-seq profiling of mechanosensitive somatosensory neurons"
- Patrik Ernfors (Karolinska Institutet, Sweden) "Nociception one cell type at a time"
- Daniela Menichella (Northwestern University, Chicago, USA) "Single-cell RNA sequencing of peripheral somatosensory neurons aids the discovery of targets for painful diabetic neuropathy"

2:45- 3:15 pm Session 16: "GPCRs and pain"

Andrea Hohmann, Chair

- Andrea Hohmann (University of Indiana, USA)  
"CB<sub>2</sub> cannabinoid mechanisms for suppressing anti-retroviral-induced neuropathic nociception"
- Daniela Salvemini (Saint Louis University, USA)  
"De-orphanization of GPR160 reveals novel signaling in spinal cord in neuropathic pain"

3:15-4:00 pm Coffee break

4:00 – 5:45 pm Session 16 continued: "GPCRs and pain"

Andrea Hohmann, Chair

- Vanna Zachariou (Mount Sinai School of Medicine, New York, USA)  
"RGS4 maintains chronic pain symptoms in rodent models"
- Frank Rice (Integrated Tissue Dynamics LLC, Rensselaer, NY)  
"Upstream neurovascular pathologies with downstream implication for chronic pain: A comparison of human fibromyalgia and type 2 Diabetic neuropathy"
- Cyril Rivat (Université de Montpellier, France)  
"Morphine tolerance and hyperalgesia depend on a functional interaction between the  $\mu$  opioid receptor and FLT3 in the sensory neurons of the DRG"
- Wendy Imlach (Monash University, Australia)  
"Adenosine A1 modulators for pain"
- Sabatino Maione (Università degli studi della Campania "Luigi Vanvitelli," Napoli, Italy)  
"The endovanilloid/cannabinoid entorhinal cortex-dentate gyrus path in chronic pain memory impairment"
- Hisakatsu Ito (University of Toyama, Japan)  
"Kappa opioid receptors and pain"
- Rocco Latorre (NYU, USA)  
"Endosomal platforms for signaling pain"

## THURSDAY, 2 June, 2022

8:30-10:00 am Session 17: “Peripheral pain: neuroimmune interactions and inflammatory mediators“

Franziska Denk, Chair

- Emerson Krock (Karolinska Institute, Sweden)  
“A potential role for satellite glia cells in fibromyalgia-like, antibody-driven pain”
- Ewan St John Smith (Cambridge University, UK)  
“Joint pain: what drives it and can we control it?”
- Franziska Denk (King’s College London, UK)  
“Persistent inflammation in models of neuropathic pain”
- Armen Akopian (University of Texas San Antonio, USA)  
“The good, the bad, and the ugly of inflammation; is it in control of pain chronicity?”
- David Andersson (King’s College London, UK)  
“Transfer of sensory abnormalities from fibromyalgia patients to mice”
- Marco Loggia (Harvard Medical School, Boston, USA)  
“TSPO as an imaging marker for both central and peripheral inflammation in human chronic pain”

10:00- 10:30 am Data Blitz 7

- Hendrik Wildner (University of Zürich, Switzerland)  
“Expression of immunoglobulin genes in mouse spinal cord neurons”
- Saad Nagi (Linköping University, Sweden)  
“Piezo2-dependent ultrafast pain signaling in humans”
- Simon Beggs (University College London, UK)  
“Microglial refinement of spinal cord sensory circuitry regulates normal maturation of dynamic touch”

10:30 - 11:15 am Coffee break

11:15 - 12:15 pm Session 18: “Calcium channels”

Gerald Zamponi, Chair

- Emmanuel Bourinet (CNRS, Montpellier, France)  
“Cav3.2 T-type calcium channels in spinal pain circuits”
- Slobodan M. Todorovic (University of Colorado, USA)  
“Cav3.2 channels as new targets for perioperative pain therapies”
- Gerald Zamponi (University of Calgary, Canada)  
“T-type calcium channel dysregulation during chronic pain”
- Rajesh Khanna (NYU, New York, USA)  
“Unlocking CaV2.2’s pain potential”

12:30 - 2:00 pm Free for Lunch

2:00 - 3:15 pm Session 19: "Circuits driving different strings of behaviors"

Asaf Keller, Chair

- Greg Scherrer (University of North Carolina, USA)  
"Neural circuits for pain unpleasantness and its cognitive appraisal and modulation"
- Nathan Cramer (University of Maryland, Baltimore, USA)  
"The parabrachial complex and the perception of aversion and pain"
- Zheng Gan (University of Heidelberg, Germany)  
"Delineating motor cortex circuits modulating sensory and aversive qualities of pain"
- Sung Han (Salk Institute, La Jolla, USA)  
"Divergent brainstem opioidergic pathways that mediate pain-breathing interaction"
- Daniel Castro (University of Washington, USA)  
"Biased signaling modifies the rewarding properties of mu-opioid receptors"

3:15 - 4:00 pm Coffee break

4:00 - 5:00 pm Session 20: "Mechanisms of bone pain"

Niels Eijkelkamp, Chair

- Anne-Marie Heegaard (University of Copenhagen, Denmark)  
"Translational research in cancer-induced bone pain"
- Camilla Svensson (Karolinska Institutet, Sweden)  
"Beyond inflammation; role of osteoclasts in persistent pain in rheumatoid arthritis?"
- Niels Eijkelkamp (University Medical Center Utrecht, The Netherlands)  
"Neuron-macrophage crosstalk in control of persistent osteoarthritis pain"
- Mateusz Kucharczyk (King's College London, UK)  
"Mechanosensation in bone cancer pain"

5:00- 5:45 pm Session 21: "Pain in childhood and adolescence: mechanisms and long-term impacts"

Bob Coghill, Chair

- Sandrine Géranton (University College London, UK)  
"Does epigenetic memory of stress predispose to chronic pain?"
- Marina López-Solà (University of Barcelona, Spain)  
"Pain in adolescence; insights from the brain"
- Bob Coghill (Cincinnati Children's, USA)  
"Functional connectivity of the amygdala during pediatric chronic pain"

## FRIDAY, 3 June, 2020

8:30- 10:15 am      Session 22: "Insights to pain mechanisms in studies using human and rodent tissues"

Ted Price, Chair

- Ted Price (University of Texas, Dallas, USA)  
"Unique pain targets and mechanisms emerging from single cell and spatial sequencing of the human DRG"
- Tim Hucho (University of Cologne, Germany)  
"Depolarization does not equal depolarization; specificity in depolarization-induced PKA sensitization of nociceptive neurons"
- Becky Seal (University of Pittsburgh, USA)  
"Organization of the dorsal horn based on a cross species analysis"
- Manuela Schmidt (University of Vienna, Austria)  
"From mouse to humans; translational insights into post-incision pain by deep proteome profiling"
- Angelika Lampert (University Hospital RWTH Aachen, Germany)  
"Human iPSC-derived nociceptors for the study of Nav channel-related pain syndromes"
- Michaela Kress (Medizinische Universität Innsbruck, Austria)  
"Regulatory long and short non-coding RNAs in the pain pathway"
- Luda Diatchenko (McGill University, Canada)  
"Genome-wide human and mouse transcriptomics for mapping of pain states"

10:30 - 11:15 am    Coffee break

11:15 - 12:00 pm    Data Blitz 8

- Peyton Presto (Texas Tech University Health Sciences Center, USA)  
"Hmgb1 modulation in the amygdala in neuropathic pain"
- Mariacristina Mazzitelli (Texas Tech University Health Sciences Center, USA)  
"Group II metabotropic glutamate receptors modulate synaptic transmission in CRF-CeA neurons in arthritic pain"
- Giulia Liberati (Université catholique de Louvain, Belgium)  
"Using intracerebral EEG to frequency-tag ongoing oscillations elicited by thermonociceptive and cool sustained stimulation"
- E. Javier López Soto (North Carolina State University, USA)  
"Cell-specific epigenetic control of calcium ion channel splicing and function"

12:00 - 2:00 pm    Free for Lunch

2:00-3:15 pm Session 23: "Peripheral non-neuronal cells; new roles in pain and somatosensation"

Cheryl Stucky, Chair

- Cheryl Stucky (Medical College of Wisconsin, USA)  
"Keratinocytes contribute to injury induced mechanical allodynia"
- Michael Jankowski (University of Cincinnati, USA)  
"Modulating nociception through Schwann cells"
- Piero Geppetti (University of Florence, Italy)  
"Schwann cell endosome CGRP signals elicit periorbital mechanical allodynia in mice: relevance for migraine pain"
- Geoffroy Laumet (Michigan State University, USA)  
"Interleukin-10 upregulates delta-opioid receptor in the DRG to prevent the relapse of pain"
- Isaac Chiu (Harvard University, USA)  
"Anthrax toxins as a molecular platform to target nociceptors and pain"

3:15- 4:15 pm Session 24: "Sensory gating: new insights into an old concept"

Yves de Koninck, Chair

- Yves De Koninck (CERVO Brain Research Centre; Université Laval, Québec, Canada)  
"Pain; the chloride gate"
- Pascal Fossat (Université de Bordeaux, France)  
"A new twist at explaining failed descending inhibition in neuropathic pain"
- Matilde Cordero-Erausquin (CNRS, Institut des neurosciences cellulaires et intégratives, Strasbourg, France)  
"The pyramidal tract; not for motor, but for sensory gating!"
- Francesco Ferrini (Università degli Studi di Torino, Italy)  
"Spinal inhibition gating pain modalities: if *hot* lasts more than *hit*"

5:00 pm      **Aperitivo and farewell**

END OF CONFERENCE