Tutorial: The neuroscience of pain, from a signal to suffering

Organizer(s)  Pr. Chantal Berna Renella, MD PhD

Course content  Pain is an aversive signal essential for survival, which if persistent can lead to a pathological condition. Understanding how this physiological signal can lead to pathology is at the heart of the neuroscience of pain, with investigations aiming to provide targets for prevention or early therapy. Furthermore, cognitive and affective processes have been shown to modulate the perception of nociceptive signals, providing higher level targets for research and possible interventions. In this tutorial, after a brief introduction of nociception as a physiological process, 3 research perspectives will be provided and expanded: a) At the neuroanatomical and cellular level, we will describe the peripheral and central nervous circuits involved in the transmission of the nociceptive signal. In addition, we will focus on the critical role of some voltage-gated channels in the onset of sensitization processes, potentially leading to chronic pain conditions. b) At the animal level, we will present the main pre-clinical models and behavioral paradigms used in fundamental research to assess sensory and emotional components of pain pathology. c) At the human cognitive-affective level, we will review mechanisms of pain modulation (e.g. placebo mechanisms), and factors of pain chronification (e.g. reward processing networks).

Learning objectives

Knowledge
1) Anatomy, physiology of pain signaling: nociception, transduction, perception (in animal and human models)
2) Modulation of pain signals (in animal and human context)
3) Physiopathology and neuroplasticity in chronic pain (in animals and humans)
4) Cognitive and emotional factors involved in pain (models, measures and implications)
5) Specificities of the development of a study focused on pain (based on human, mouse, cellular models)

Attitudes
1) Integration of knowledge from basic and clinical research into the understanding of sensory mechanisms and associated pathologies
Skills and know-how
1) Ability to critically analyze scientific articles
2) Ability to critically discuss a study design investigating pain
3) Preparing a journal club presentation

Summary
The tutorial will be comprised of 13 hours in total, providing insights into fundamental neuroscience, cognitive aspects and clinical relevance of pain.

Course schedule 2020
- Session 1 – February 28: 13-16h
- Session 2 – March 6: 13-15h
- Session 3 – March 13: 13-15h
- Session 4 – March 20: 13-15h
- Session 5 – March 27: 13-15h
- Session 6 – April 3: 13h-15h

Location
Lausanne, CHUV, main building, 5th floor, Service d’anesthésiologie, Salle de colloque

Evaluation
The examination will be based on papers to be read and presented by the students. The selected papers are grouped by topics and the presentations by the students directly integrated into the corresponding chapters of the course, starting with the third session of the course.

Participants are requested to attend the at least 80% of the tutorial, this means that you could miss only one course, and this has to be justified in advance by e-mail to the course organizer and the LN coordinator. Also, participants should choose in the beginning of the tutorial which topic (i.e. starting from session 3) they want to present.

Registration
The course is limited to 16 participants. Register before January 31, 2020 by writing a mail to lndscourses@gmail.com (with your supervisor in copy) and stating the course title as subject.