WORLD FEDERATION OF NEUROLOGY
XXVII WORLD CONGRESS OF NEUROLOGY (WCN 2025)
12-15 OCTOBER 2025 | SEOUL, SOUTH KOREA
KOREAN NEUROLOGICAL ASSOCIATION
SEOUL

Nociceptor physiology & mechanisms of pain sensitization

Prof. Yann Péréon, MD, PhD
Department of Clinical Neurophysiology
Reference Centre for Rare Neuromuscular Diseases
University Hospital, Nantes, France

Filnemus Filière Neuromusculaire
Nantes Université
Oniris École Nationale Vétérinaire, Agroalimentaire et de l'Alimentation Nantes Atlantique
CHU NANTES
Centre de référence nerf muscle Atlantique - Occitanie - Caraïbes
centre de référence maladies rares
European Reference Network for rare or low prevalence complex diseases
Network Neuromuscular Diseases (ERN EURO-NMD)
Member CHU de Nantes — France

Disclosures

X	No, Nothing to disclose
	Yes, please specify

Learning objectives

A large number of channels linked to sensory transduction including nociception have been discovered in recent years.

This presentation aims to review the different ion channels that are implicated in ***generating pain*** signal in nociceptors.

In some circumstances, pain signal can be amplified – or reduced. In the first case, it relies upon sensitization mechanisms: ***amplifying pain*** can be related to peripheral sensitization or central sensitization (or to both).

New sensitization mechanisms (e.g. relationships between sensory and immune systems) have been deciphered, which open the track for new pain treatments: some of these mechanisms will be reviewed.

The objective of this presentation is to make the participant at ease with all these exciting physiological processes

Key messages

- Transient receptor potential (TRP) channels are the primary tool for generating pain signal in nociceptors. Some of them respond to thermal and chemical stimuli, suggesting the polymodal nature of their response

- Although TRP channels are those that have been studied most extensively, they are not the only ones involved in nociception: P2X/P2Y channels, ASIC-1 channels, TTX insensitive voltage gated sodium channels contribute to pain generation

- Newly identified PIEZO channels, mainly activated by mechanical stimuli, and TACAN channels may also contribute

Key messages

- The mechanisms of pain sensitization are complex and involve changes in nociceptor neurons at both the molecular and cellular level
- Peripheral sensitization is mainly driven by neurogenic inflammation and the « inflammatory soup ». The sensory and immune systems interact with one another in this process
- Central sensitization mainly relies upon synaptic plasticity at the spinal cord level, involving among others glutamate long term potentiation. Microglia and T cells also mediate central sensitization of pain in the spinal cord
- Improved knowledge in pain mechanisms may help in identifying new treatments for pain relief

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