

## Pain-induced interleukin expression in rat hippocampus

Authors:

Hau-Jie Yau, Maria V. Centeno, Marco Martina, Hugo O. Besedovsky, Adriana del Rey and A. Vania Apkarian

Neuropathic pain is defined by the fact that pain persists after the healing process of the nerve injury. Inflammation along with nerve injury modulates the periphery sensory neurons and spinal cord to transmit exaggerated responses to neutral or non-noxious stimuli. Alteration of cytokines expression has been shown to play an important role in the induction and maintenance of neuropathic pain. In addition, pain perception involves not only sensorimotor but also affective/emotional and cognitive aspects, suggesting an active role of supraspinal areas in the processing of the nociceptive information. The hippocampus is part of the limbic system, which is instrumental for the emotional aspect of nociception. This prompted us to use a rodent model of neuropathic pain to study whether functional or molecular changes take place in the hippocampus. We employed the real time RT-PCR technique to study the mRNA expression of different cytokines in the rat hippocampus in two models of neuropathic pain, spared nerve injury (SNI) and chronic constriction injury (CCI). Moreover, similar temporal profile of cytokines expression in the hippocampus was also compared between Sprague-Dawley (SD) and Wistar Kyoto rats. We found that, in terms of Von Frey threshold, SNI treatment could induce a long lasting pain in both strains of rats. On the contrary, CCI treatment showed partial recovery in pain with time in SD rats, but failed to induce pain in Wistar-Kyoto rats. Both SNI and CCI treatments induced robust increase of *IL-1 $\beta$* , but the upregulation was sustained in SNI treatment than CCI treatment in SD rats. *IL-6* expression was not affected in either SNI or CCI treatment in SD strain. On the other hand, in Wistar-Kyoto strain, only SNI treatment could induce a short-term upregulation of *IL-1 $\beta$*  as well as *IL-6* in the hippocampus. Interestingly, both SNI and CCI-induced changes in cytokine expression in both rat strains only appeared in the hippocampus contralateral to the side of injury paw, indicating the close correlation between pain sensitivity and cytokines profile in the hippocampus. These data show that modulation of cytokine expression in the hippocampus following peripheral pain injury models depend on the actual pain perception and on the lesion type