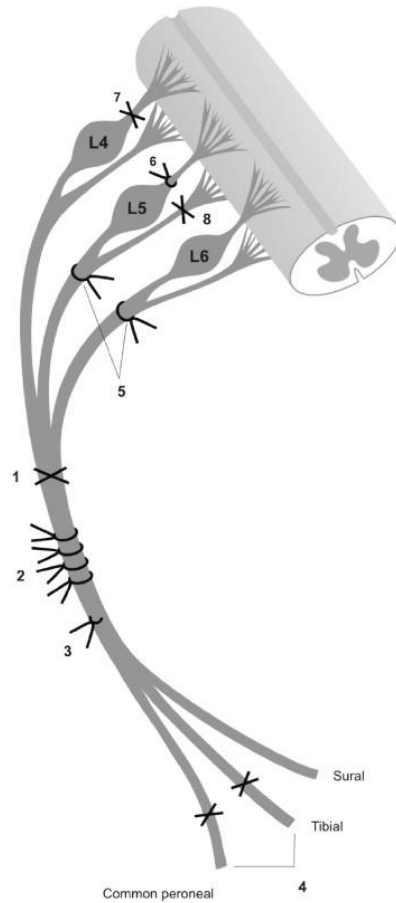


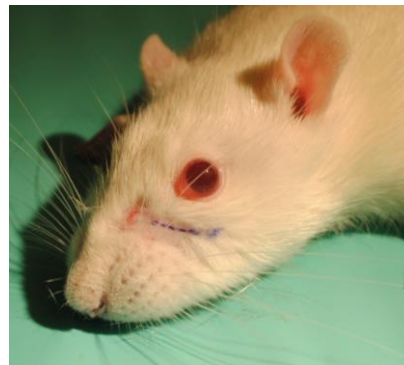
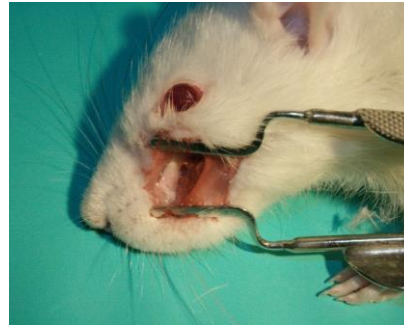
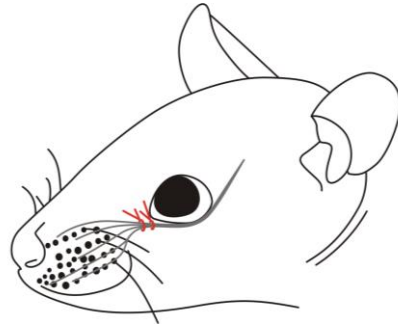
## Experimental models of neuropathic pain

### Spinal nerve injury



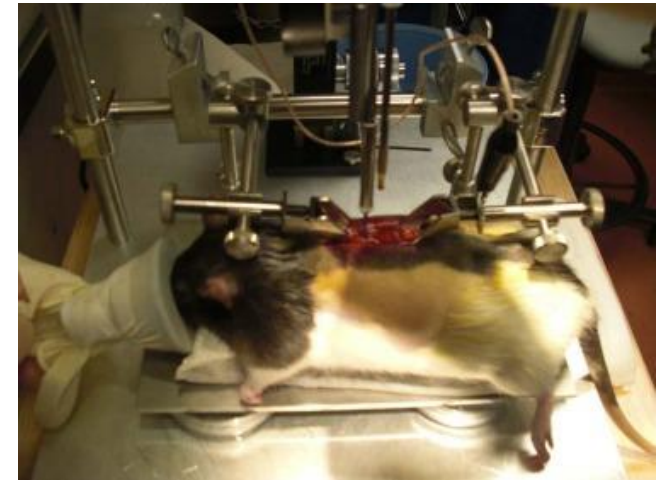
Klusáková, I. and P. Dubový, 2009

### Trigeminal nerve injury



Voss et al., 1994; Mei Xu, 2008

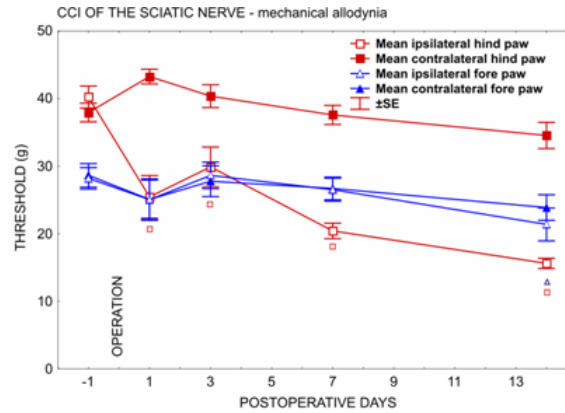
### Spinal cord injury-contusion



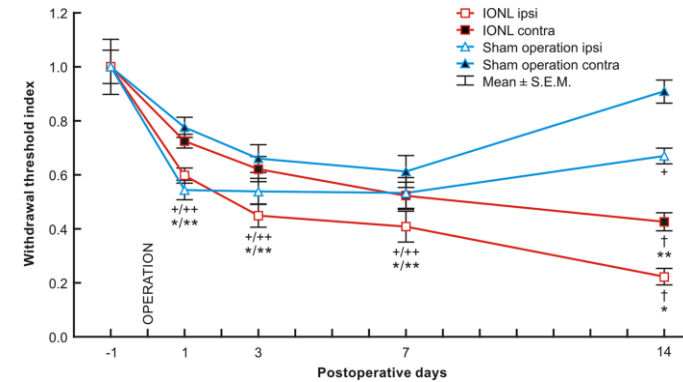
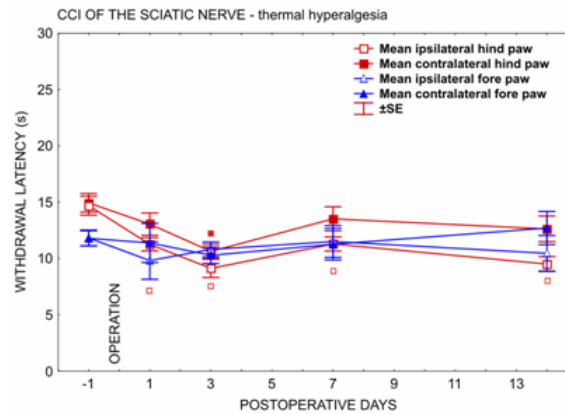
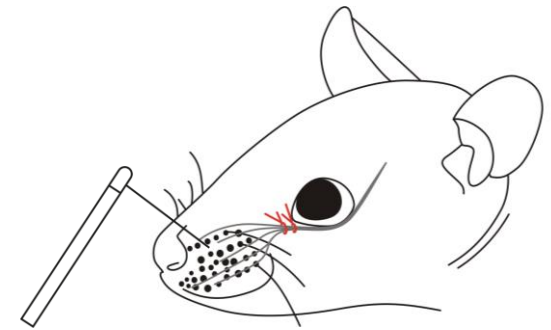
**Dorsal laminectomy T8-T9**  
**Weight drop (2g, 25mm)**

# Experimental models of neuropathic pain – behavioral tests

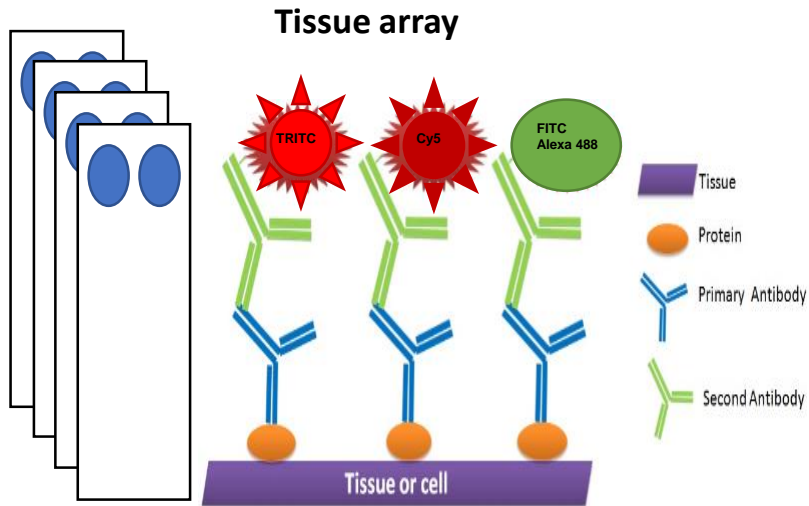
## Mechanical and thermal hypersensitivity



## Mechanical hypersensitivity

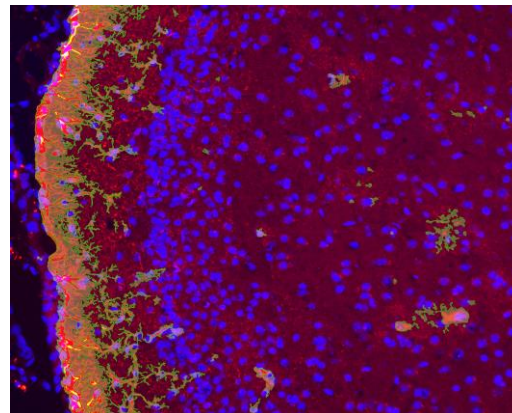
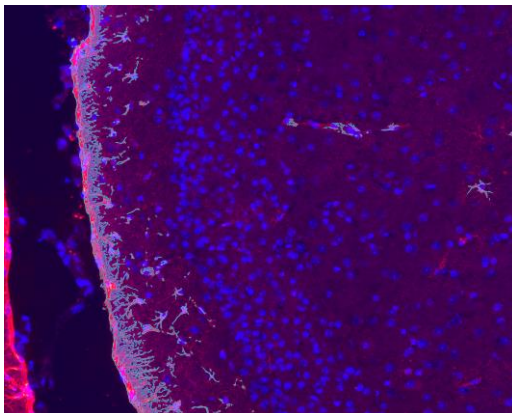


## Quantitative *in situ* proteomics



Simultaneous immunohistochemical detection of proteins in the CNS sections of naive, sham- and injury-operated animals

## Anterior cingulate cortex-activation of astrocytes



Cellular localization of protein and its quantification by image analysis

## Quantitative *in situ* proteomics – example of results

### *Results of immunostaining proportion measured by image analysis*

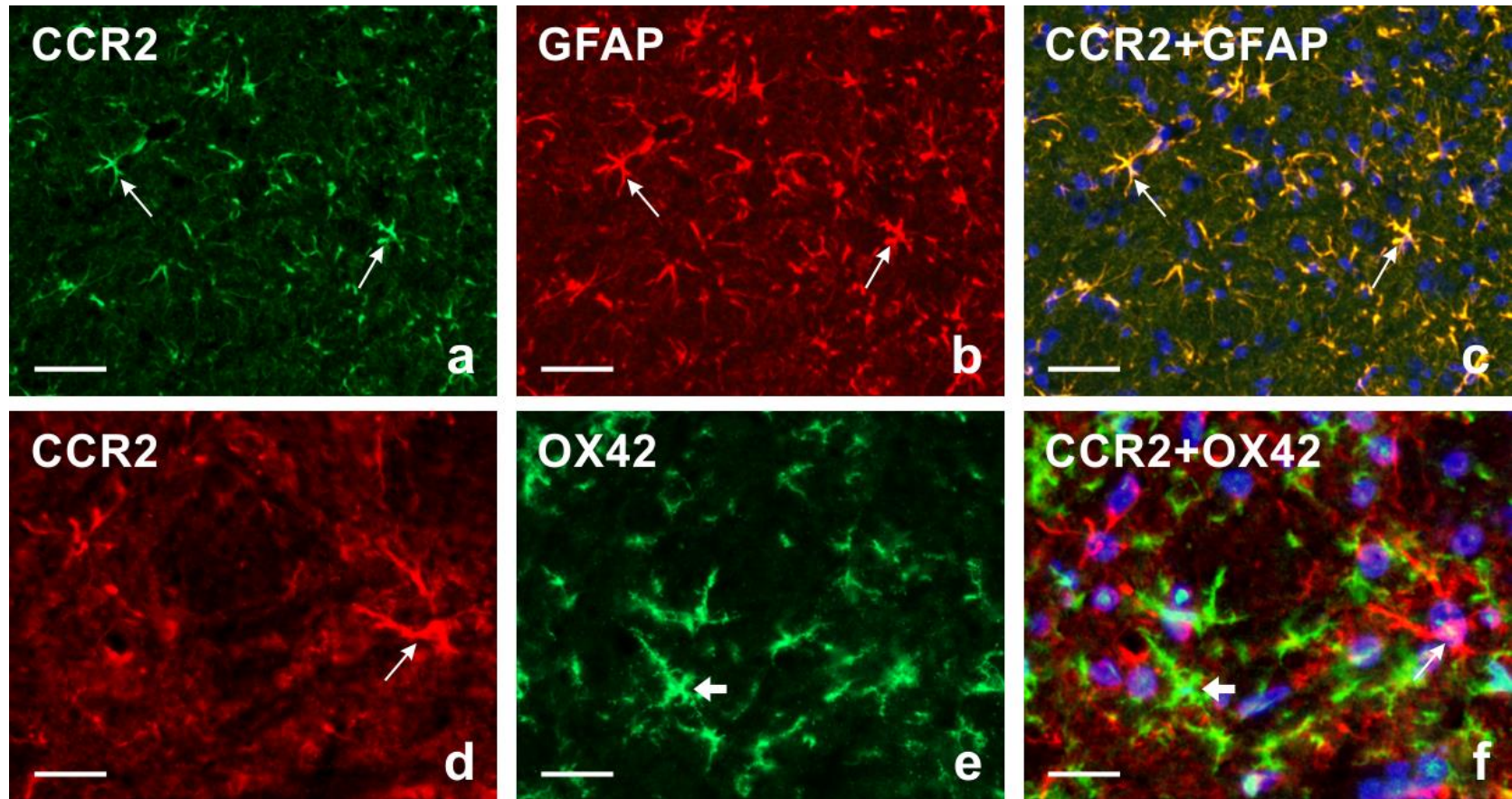
	D1	D2/3	V1	V2/3
Naivní	0,144 ± 0,070	0,068 ± 0,04	0,112 ± 0,072	0,050 ± 0,017
CCI3D	0,211 ± 0,076**	0,076 ± 0,027	0,188 ± 0,037**	0,062 ± 0,019
Sham3D	0,160 ± 0,039	0,075 ± 0,034	0,149 ± 0,052+	0,065 ± 0,025+
CCI7D	0,179 ± 0,041***	0,104 ± 0,033	0,177 ± 0,024*	0,082 ± 0,018
Sham7D	0,150 ± 0,044	0,087 ± 0,036	0,153 ± 0,047++	0,074 ± 0,037+
CCI14D	0,195 ± 0,023***	0,100 ± 0,017	0,190 ± 0,041*	0,083 ± 0,017
Sham14D	0,145 ± 0,060	0,080 ± 0,044	0,169 ± 0,028+++	0,083 ± 0,034+++
CCI21D	<b>0,247 ± 0,077**</b>	<b>0,135 ± 0,041***</b>	<b>0,267 ± 0,051***</b>	<b>0,143 ± 0,024***</b>
Sham21D	<b>0,202 ± 0,067+++</b>	<b>0,092 ± 0,036+</b>	<b>0,168 ± 0,053+++</b>	<b>0,089 ± 0,046+++</b>

Dynamic activation of astrocytes in the dorsal and ventral segments of lamina I (D1, V1) and lamina II/III (D2/3, V2/3) of the anterior cingulate cortex after various time from sham-operation and the sciatic nerve injury (CCI).



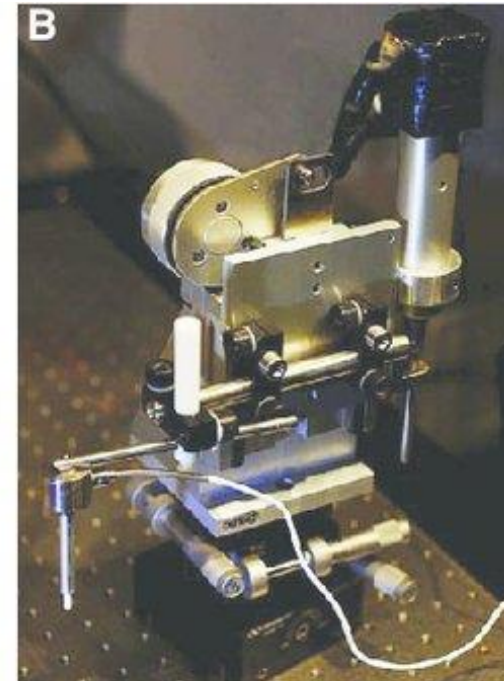
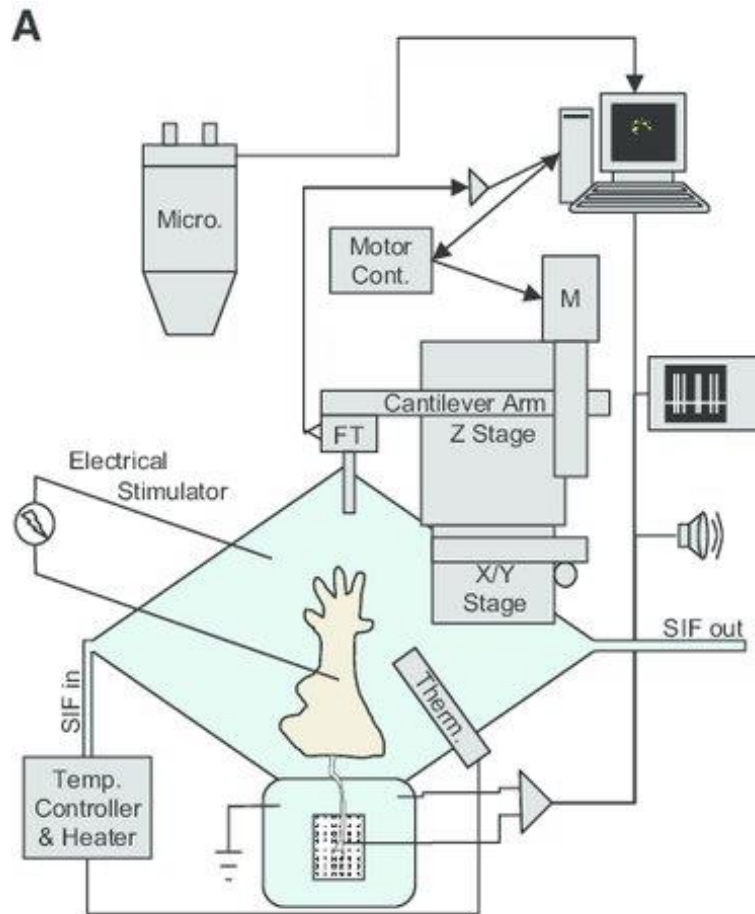
# In situ proteomics

## Double immunostaining for correct cellular localization of protein

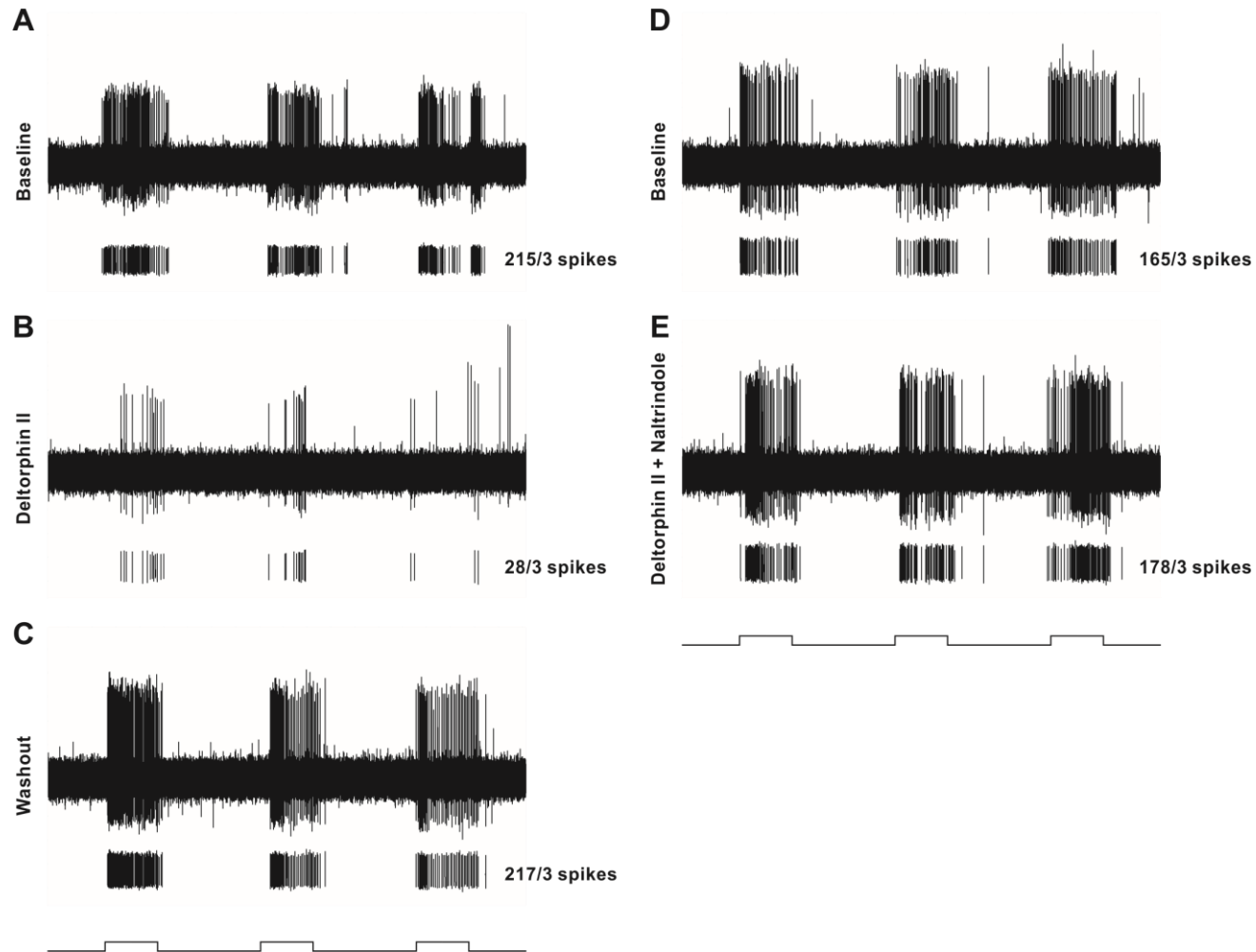


Double immunostaining with rabbit polyclonal anti-CCR2 and chicken polyclonal anti-GFAP or mouse monoclonal anti-OX42 antibodies. Merged pictures (c, f) demonstrate that chemokine receptor CCR2 was detected in GFAP+ activated astrocytes, but not in OX42+ microglial cells of the rat trigeminal spinal nucleus after the infraorbital nerve ligation.

## *Ex vivo* electrophysiological measurement of skin-nerve preparation



# Ex vivo electrophysiological measurement of skin-nerve preparation



Representative example of responses of individual mechanical nociceptors before and after localized administration of test drugs. Baseline response before drug (A), response 2 min after 300 nM deltorphin II (B), and response after 20 min of washout (C). After washout, a new baseline was established (D) before application of 300 nM deltorphin II plus 300 nM naltrindole (E).




## Selected Papers

Histochemistry and Cell Biology (2019) 152:109–117  
https://doi.org/10.1007/s00418-019-01779-3

ORIGINAL PAPER

IF=3.418 Q1

**Interleukin-6 contributes to initiation of neuronal regeneration program in the remote dorsal root ganglia neurons after sciatic nerve injury**

Petr Dubový<sup>1</sup> · Ivana Hradilová-Sviženská<sup>1</sup> · Ilona Klusáková<sup>1</sup> · Václav Brázda<sup>1</sup> · Marek Joukal<sup>1</sup> 


Histochemistry and Cell Biology (2020) 153:239–255  
https://doi.org/10.1007/s00418-020-01850-4

ORIGINAL PAPER



**Bilateral activation of glial cells and cellular distribution of the chemokine CCL2 and its receptor CCR2 in the trigeminal subnucleus caudalis of trigeminal neuropathic pain model**

IF=3.418 Q1

Lucie Kubičková<sup>1</sup> · Ilona Klusáková<sup>1</sup> · Petr Dubový<sup>1</sup> 

Hernangómez et al. *Journal of Neuroinflammation* (2016) 13:43  
DOI 10.1186/s12974-016-0508-8

Journal of Neuroinflammation

RESEARCH

Open Access



**CD200R1 agonist attenuates glial activation, inflammatory reactions, and hypersensitivity immediately after its intrathecal application in a rat neuropathic pain model**

IF=5.793 Q1

Miriam Hernangómez<sup>1</sup>, Ilona Klusáková<sup>1,2\*</sup>, Marek Joukal<sup>2</sup>, Ivana Hradilová-Sviženská<sup>1,2\*</sup>, Carmen Guaza<sup>3</sup> and Petr Dubový<sup>2,3\*</sup>

frontiers  
in Cellular Neuroscience

ORIGINAL RESEARCH  
published: 04 February 2019  
doi: 10.3389/fncel.2019.00011



**A Conditioning Sciatic Nerve Lesion Triggers a Pro-regenerative State in Primary Sensory Neurons Also of Dorsal Root Ganglia Non-associated With the Damaged Nerve**

IF=3.921 Q2

Petr Dubový<sup>1</sup>, Ilona Klusáková<sup>1</sup>, Ivana Hradilová-Sviženská<sup>1</sup>, Václav Brázda<sup>1</sup>, Marcela Kohoutková<sup>1</sup> and Marek Joukal<sup>1</sup>

<sup>1</sup> Department of Anatomy, Laboratory of Cellular and Molecular Neurobiology, Faculty of Medicine, Masaryk University, Brno, Czechia

frontiers  
in Cellular Neuroscience

ORIGINAL RESEARCH  
published: 10 February 2018  
doi: 10.3389/fncel.2018.00040



**Activation of Astrocytes and Microglial Cells and CCL2/CCR2 Upregulation in the Dorsolateral and Ventrolateral Nuclei of Periaqueductal Gray and Rostral Ventromedial Medulla Following Different Types of Sciatic Nerve Injury**

IF=3.921 Q2

Petr Dubový<sup>1</sup>, Ilona Klusáková<sup>1\*</sup>, Ivana Hradilová-Sviženská<sup>1\*</sup>, Marek Joukal<sup>1\*</sup> and Pere Boadas-Vaello<sup>1,2\*</sup>

<sup>1</sup> Department of Anatomy, Division of Neuroanatomy, Faculty of Medicine, Masaryk University, Brno, Czechia; <sup>2</sup> Research Group of Clinical Anatomy, Embryology and Neuroscience (ANOMER), Department of Medical Sciences, Universitat de Girona, Girona, Spain

Dubový et al. *Journal of Neuroinflammation* 2013, 10:55  
http://www.jneuroinflammation.com/content/10/1/55

JNI JOURNAL OF  
NEUROINFLAMMATION

RESEARCH

Open Access

**Bilateral elevation of interleukin-6 protein and mRNA in both lumbar and cervical dorsal root ganglia following unilateral chronic compression injury of the sciatic nerve**

IF=5.793 Q1

Petr Dubový<sup>1,2\*</sup>, Václav Brázda<sup>1,3\*</sup>, Ilona Klusáková<sup>1,2\*</sup> and Ivana Hradilová-Sviženská<sup>1,2\*</sup>

frontiers  
in Cellular Neuroscience

ORIGINAL RESEARCH  
published: 11 February 2020  
doi: 10.3389/fncel.2020.00018



**Subarachnoid Hemorrhage Induces Dynamic Immune Cell Reactions in the Choroid Plexus**

IF=3.921 Q2

Peter Solár<sup>1,2</sup>, Ilona Klusáková<sup>1</sup>, Radim Jančálek<sup>2</sup>, Petr Dubový<sup>1</sup> and Marek Joukal<sup>1\*</sup>

<sup>1</sup> Department of Anatomy, Cellular and Molecular Neurobiology Research Group, Faculty of Medicine, Masaryk University, Brno, Czechia; <sup>2</sup> Department of Neurosurgery, Faculty of Medicine, Masaryk University and St. Anno's University Hospital Brno, Brno, Czechia

frontiers  
in Pharmacology

ORIGINAL RESEARCH  
published: 31 July 2020  
doi: 10.3389/fphar.2020.01151



**Peripheral Deltorphin II Inhibits Nociceptors Following Nerve Injury**

IF=4.225 Q1

Marek Joukal<sup>1</sup>, Lucy Vůlchanová<sup>2</sup>, Cecilia Huffman<sup>2</sup>, Petr Dubový<sup>1</sup> and Christopher N. Honda<sup>2\*</sup>

<sup>1</sup> Department of Anatomy, Cellular and Molecular Neurobiology Research Group, Faculty of Medicine, Masaryk University, Brno, Czechia; <sup>2</sup> Department of Neuroscience, University of Minnesota, Minneapolis, MN, United States



## *Topics for international cooperation*

Study of cellular distribution of new molecular pathways in peripheral and central nervous system of neuropathic pain models

A role of activated glial cells and their inflammatory profiling in the experimental models of neuropathic pain

Testing of molecules with potential to reduce activation and inflammatory profiling of glial cells associated with neuropathic pain

Neuroinflammatory mediators and priming of delta-opioid receptors in the mechanonociceptors of neuropathic pain models

Modulation of blood-cerebrospinal fluid barrier permeability and regulation of the tight junction proteins by the peripheral nerve injury

Choroid plexus and the blood–cerebrospinal fluid barrier in neuropathic pain and other diseases

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