

Le spezie

Salute, alimentazione e ricerca



Rosmarino: aromatico rimedio per la terapia del dolore

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UNIVERSITÀ
DEGLI STUDI
FIRENZE

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Rosmarinus officinalis





Necropoli etrusca di Tarquinia



Manuscript of the *Pseudo-Apuleius*
XI century, St. Augustine's Abbey, Canterbury

"There's rosemary,
that's for remembrance,
pray you love, remember."
Shakespeare, Hamlet



Tractatus de herbis, Italian herbal, XIII
century, British Library



Jacques-Louis David (1748-1825), The Coronation of Empress Josephine by Napoleon

Chardin, "Perfumer of Their Imperial and Royal Majesties," recorded Napoleon's use of 162 bottles of rosemary water in the first three months of 1806.

Rosmarinus officinalis

The hydroalcoholic extracts from *R. officinalis* have been recognized as safe by EFSA (2008) and their use is authorized as natural antioxidant and preservatives of foods.

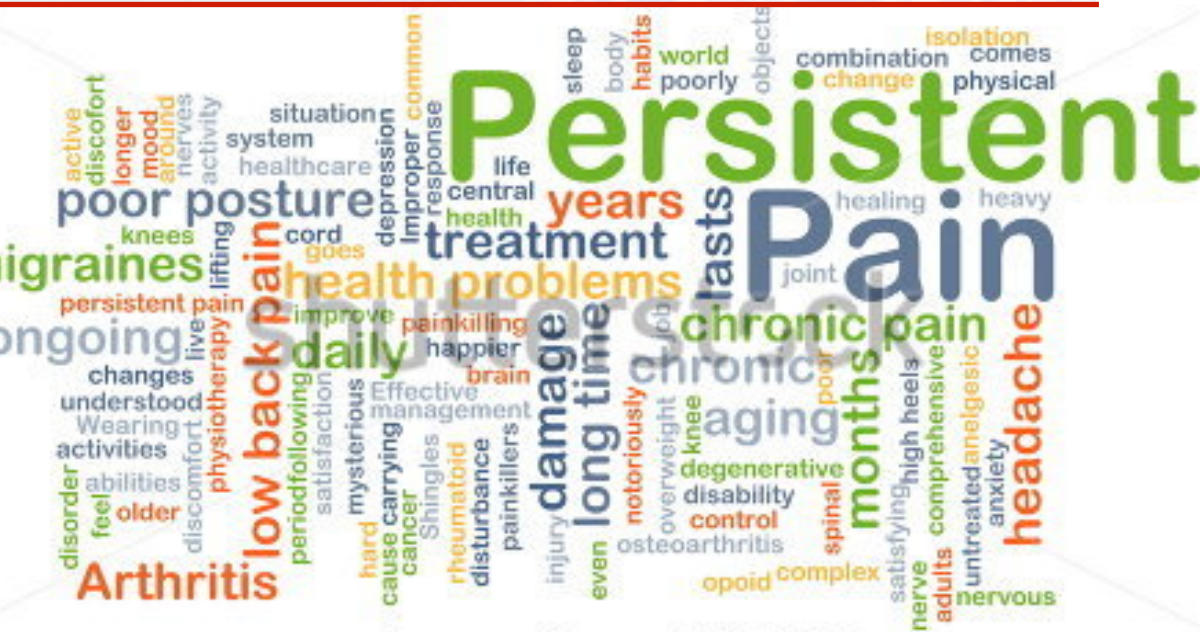


Leaf extracts show:

- inhibition of acetylcholinesterase activity, improving memory impairment in the rat (*Ozarowski et al., 2013*)
- anti-inflammatory effects (*Emami et al., 2013*)
- redox unbalance regulatory properties

pain?

Rosmarinus officinalis & **pain**



Nociceptive vs Neuropathic Pain

Nociceptive Pain

Caused by activity in neural pathways in response to potentially tissue-damaging stimuli

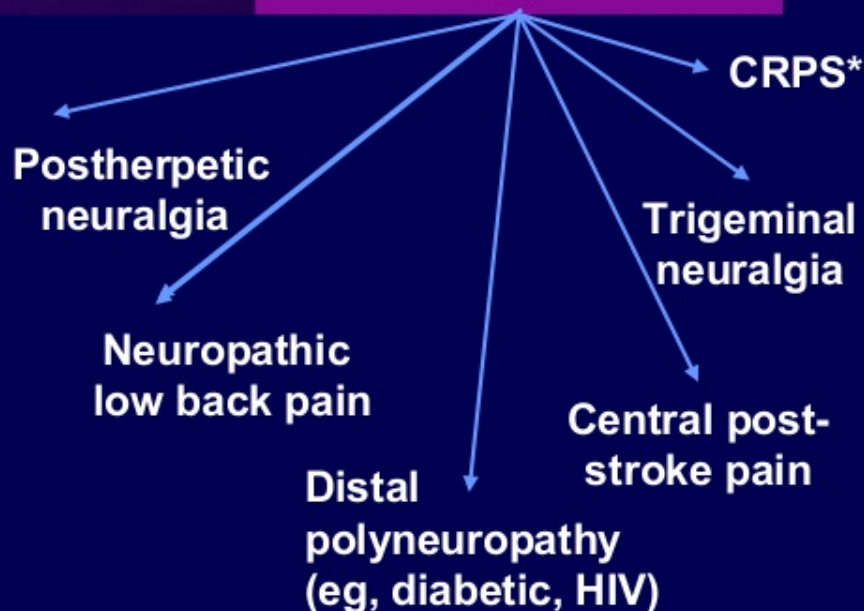


Mixed Type

Caused by a combination of both primary injury and secondary effects

Neuropathic Pain

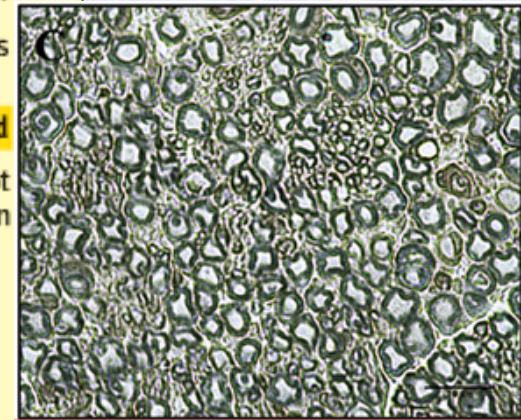
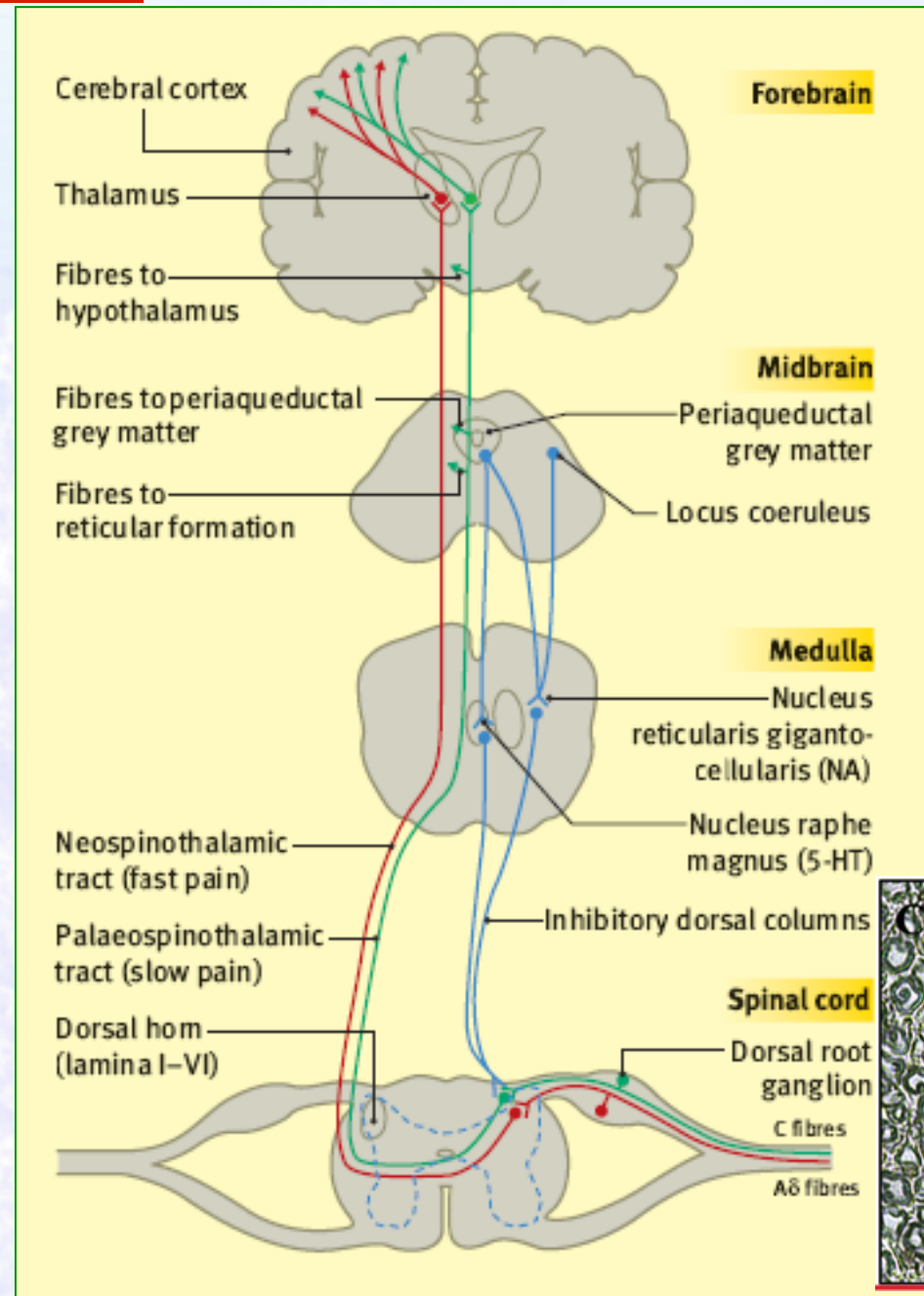
Initiated or caused by primary lesion or dysfunction in the nervous system

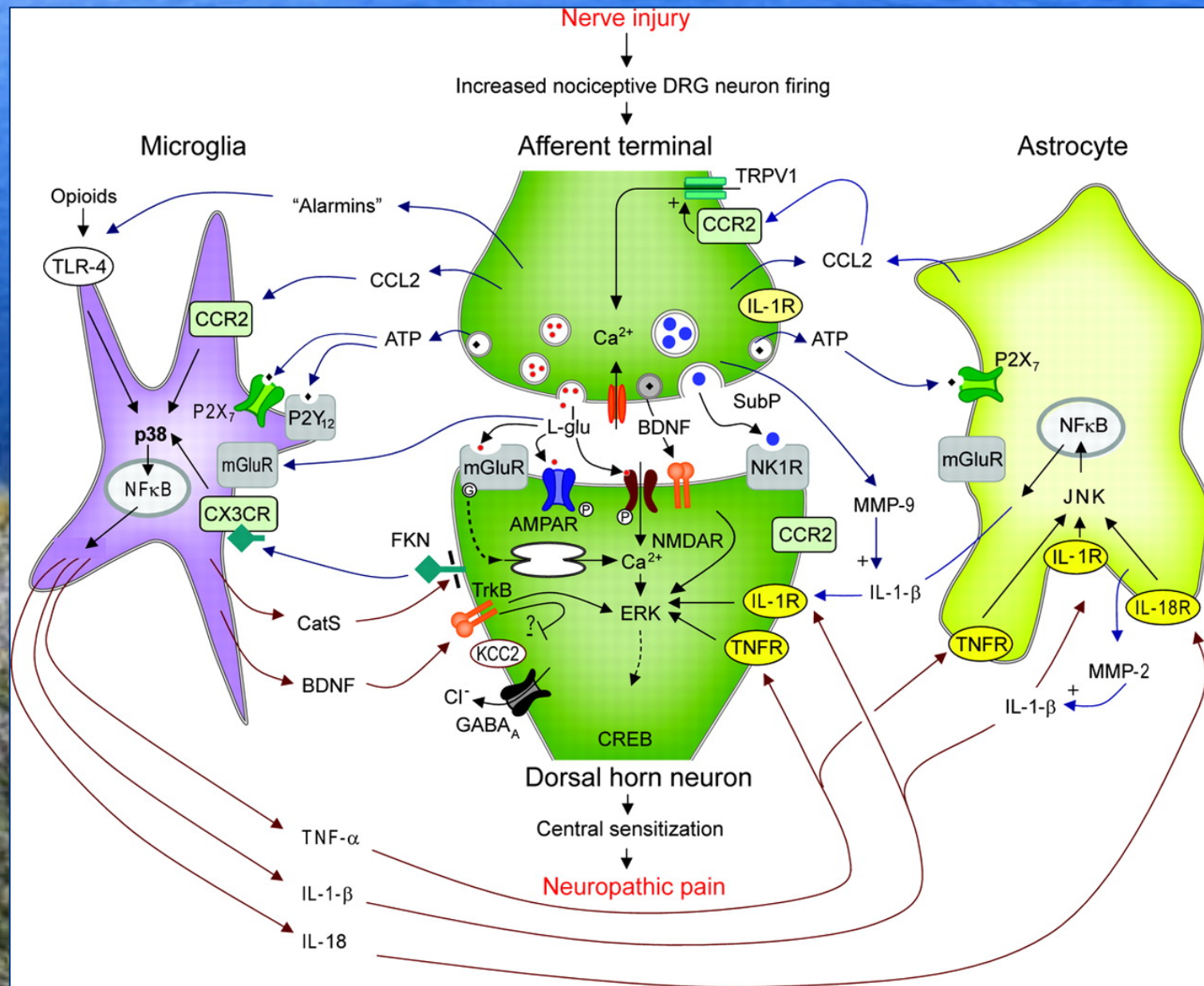


*Complex regional pain syndrome

Pain modulation

The pathological aspects of NP involve a maladaptive response of the nervous system characterized by peripheral and central **sensitization** as well as by **spinal disinhibition**



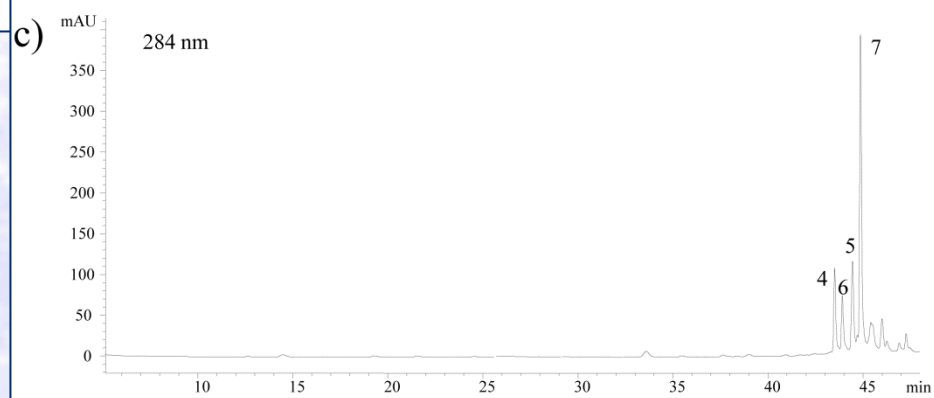
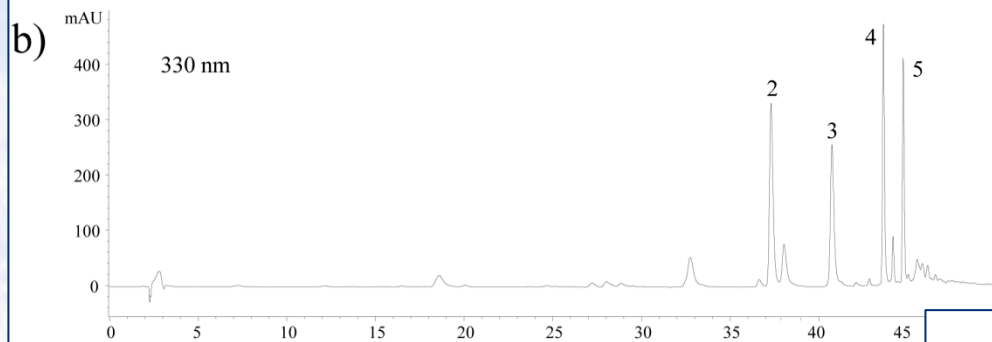
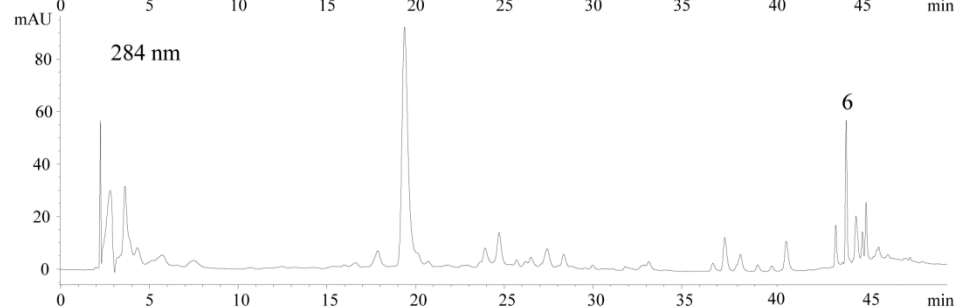
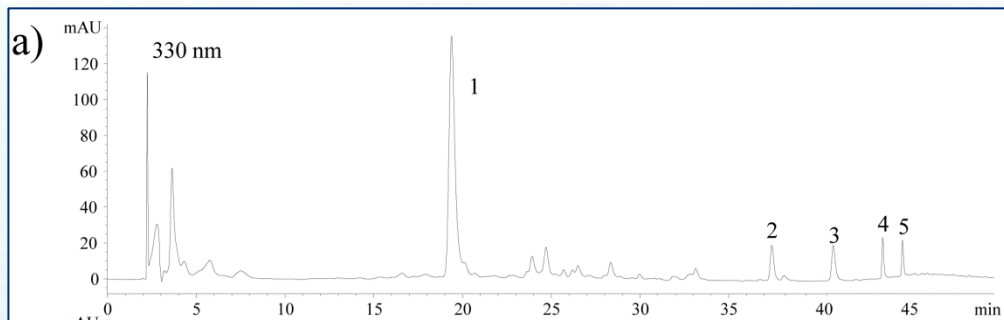


Aim

Evaluation of rosemary extract fractions in a preclinical model of neuropathic pain induced by damage of the sciatic nerve (*Bennett and Xie, 1988*)

- Ethanolic extract (EE)
- Acetone extract (AE)
- *n*-hexane-ultrasound assisted-extraction (URE_{prel} and URE)

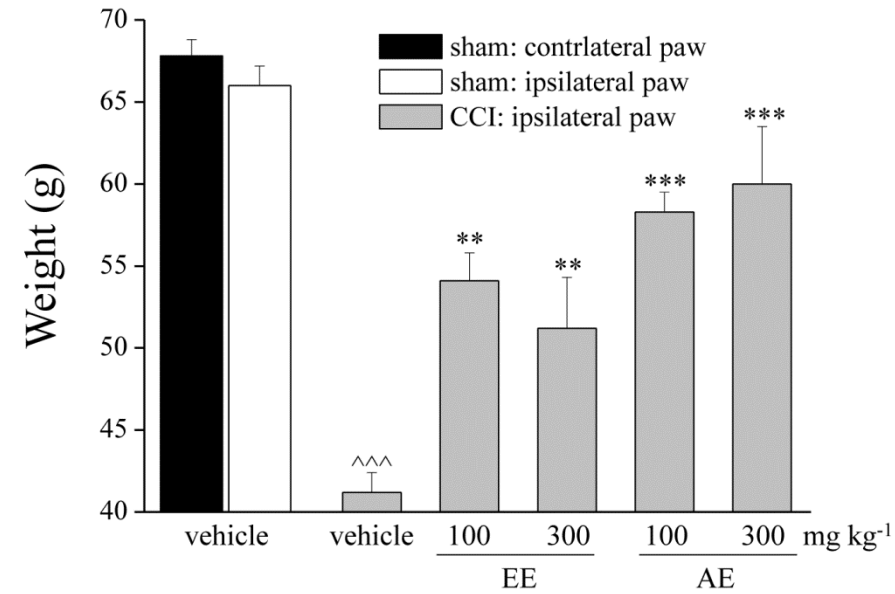




HPLC profiles of:
a) EE at 330 e 284 nm,
b) AE at 330 nm,
c) URE at 284 nm

1, rosmarinic acid
2, cirsimaritin
3, genkwanin
4-5, unknown flavonoids
6, carnosol
7, carnosic acid

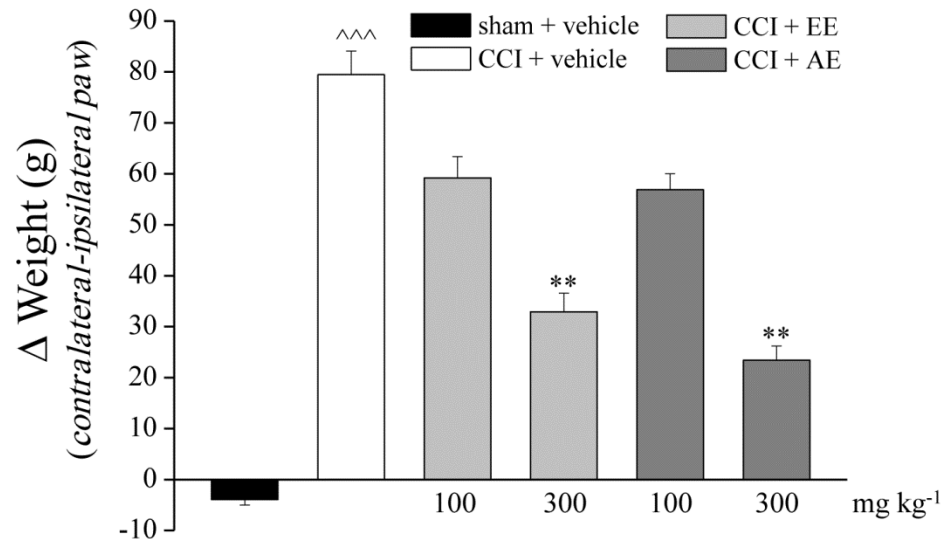
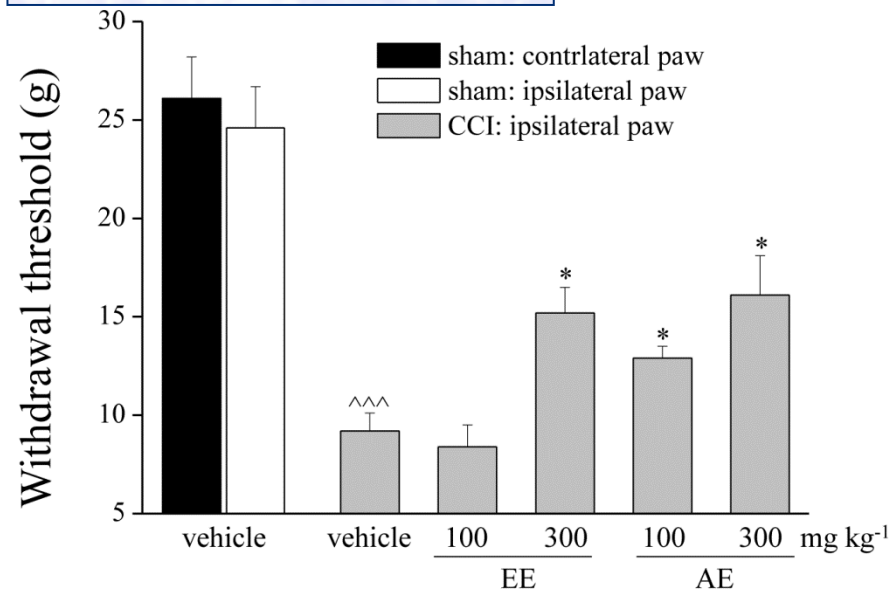
Mechanical hyperalgesia

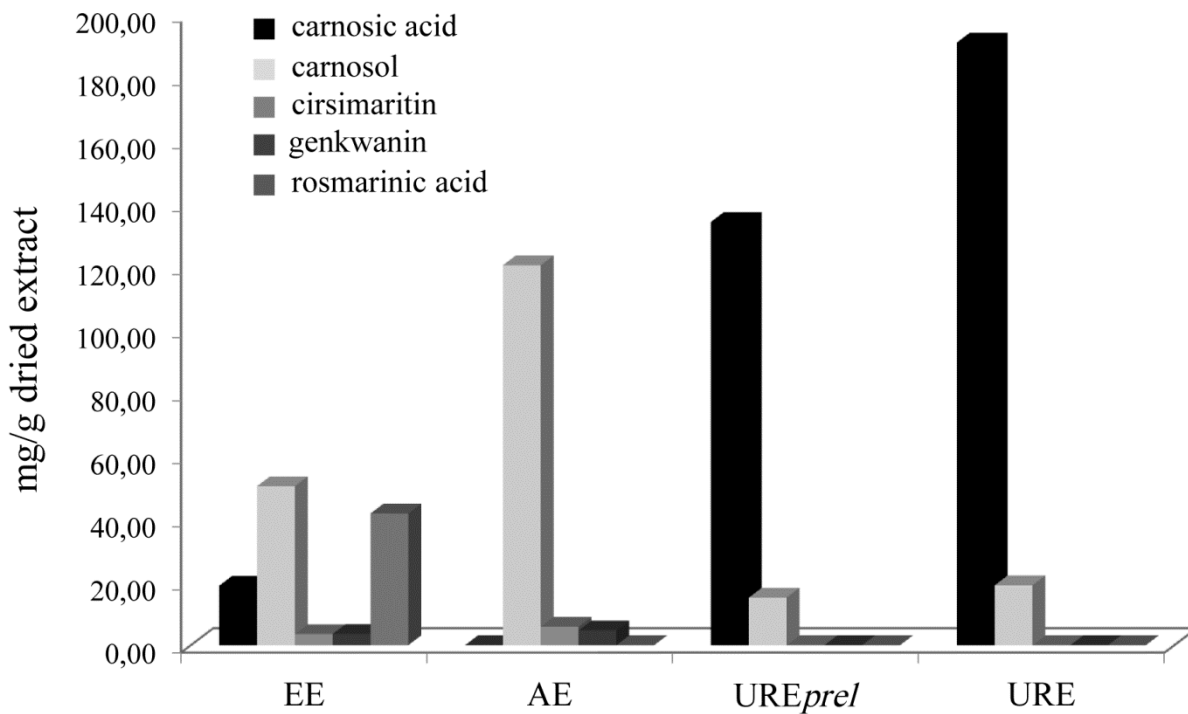
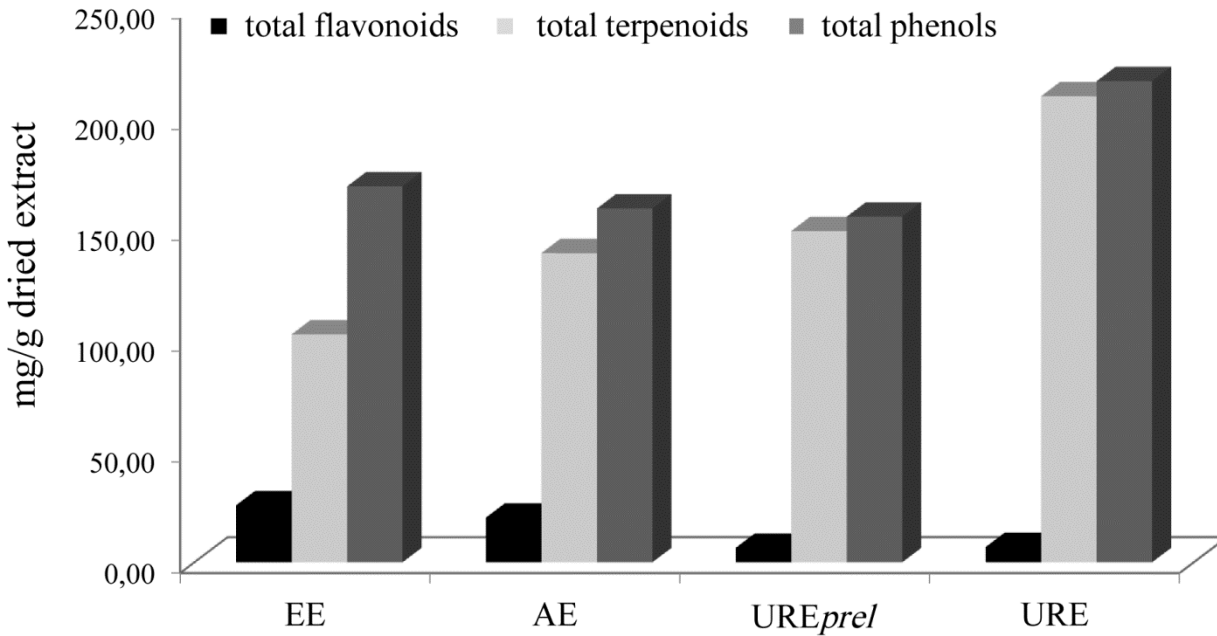


Pain measurements

Spontaneous pain

Mechanical allodynia

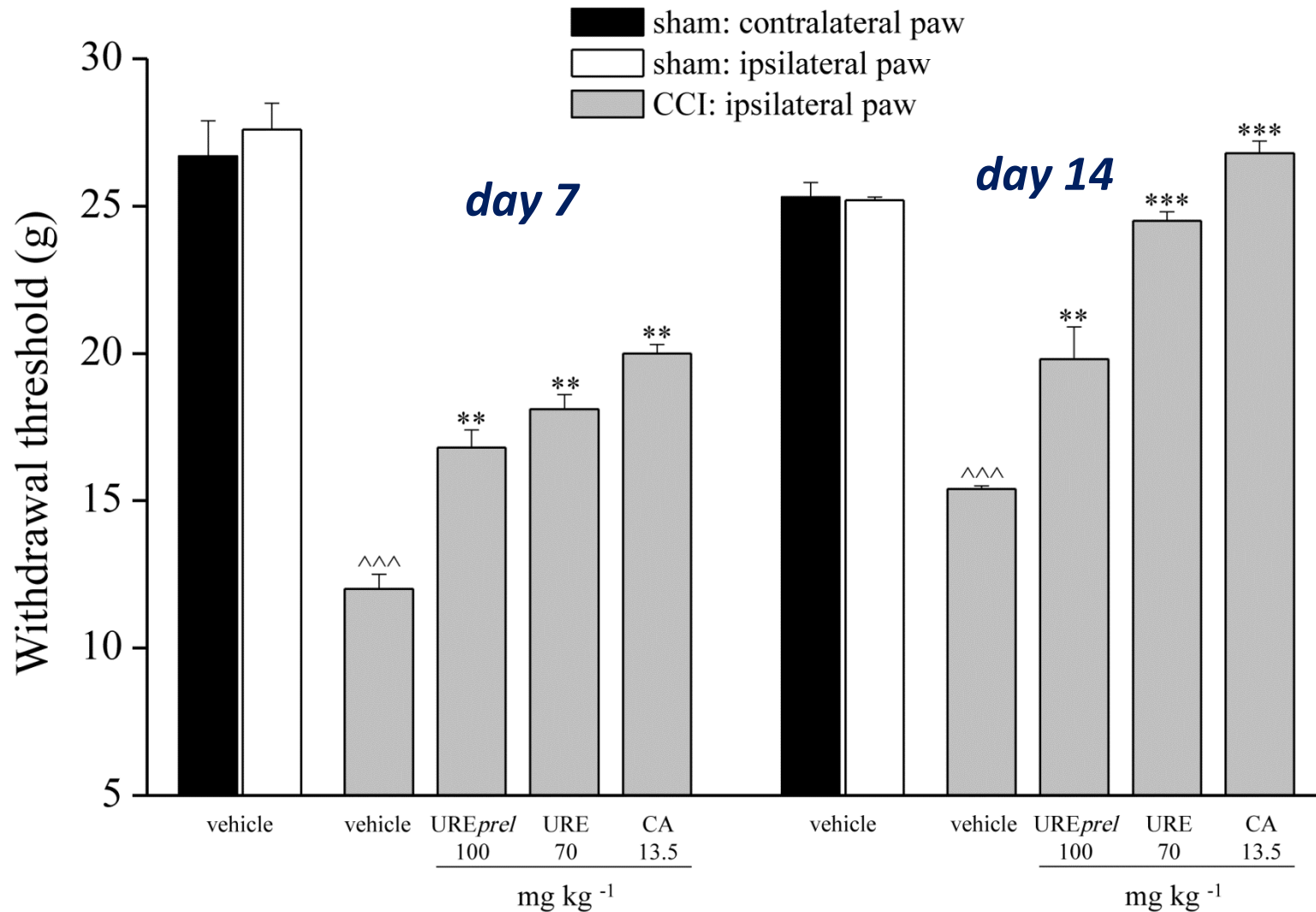




Phytochemical
distribution
in rosemary
extracts

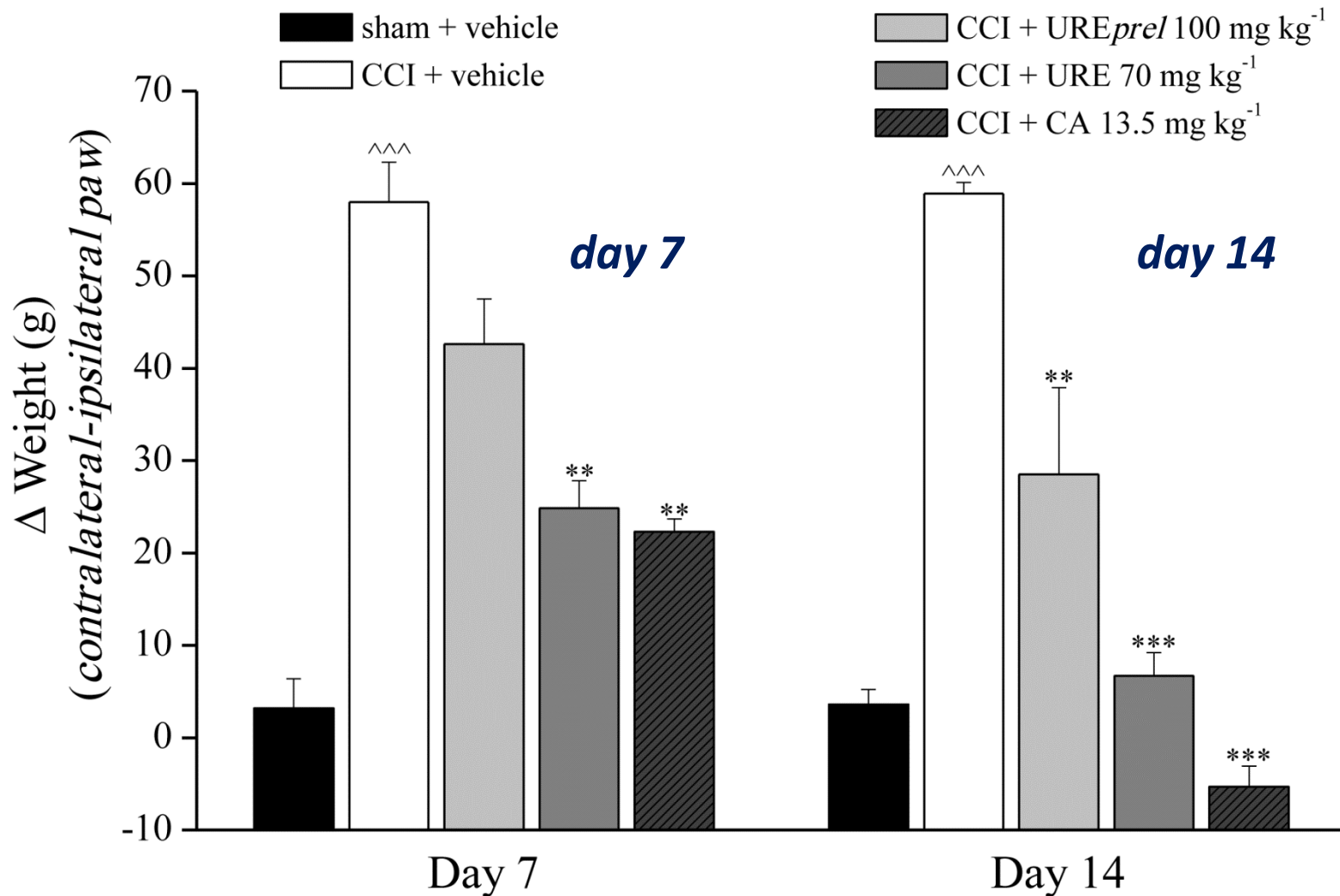
Pain measurements

Mechanical allodynia

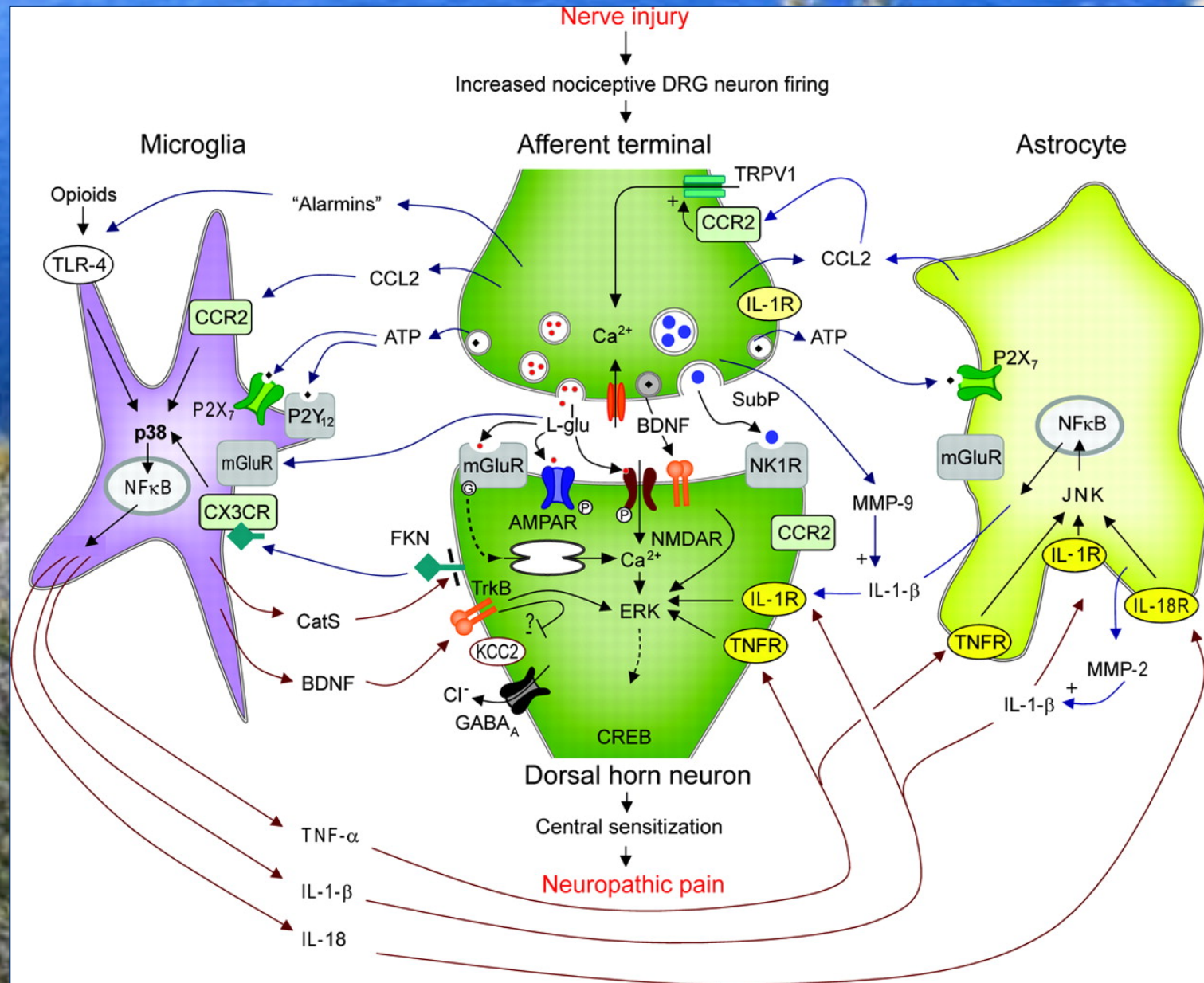


Pain measurements

Spontaneous pain

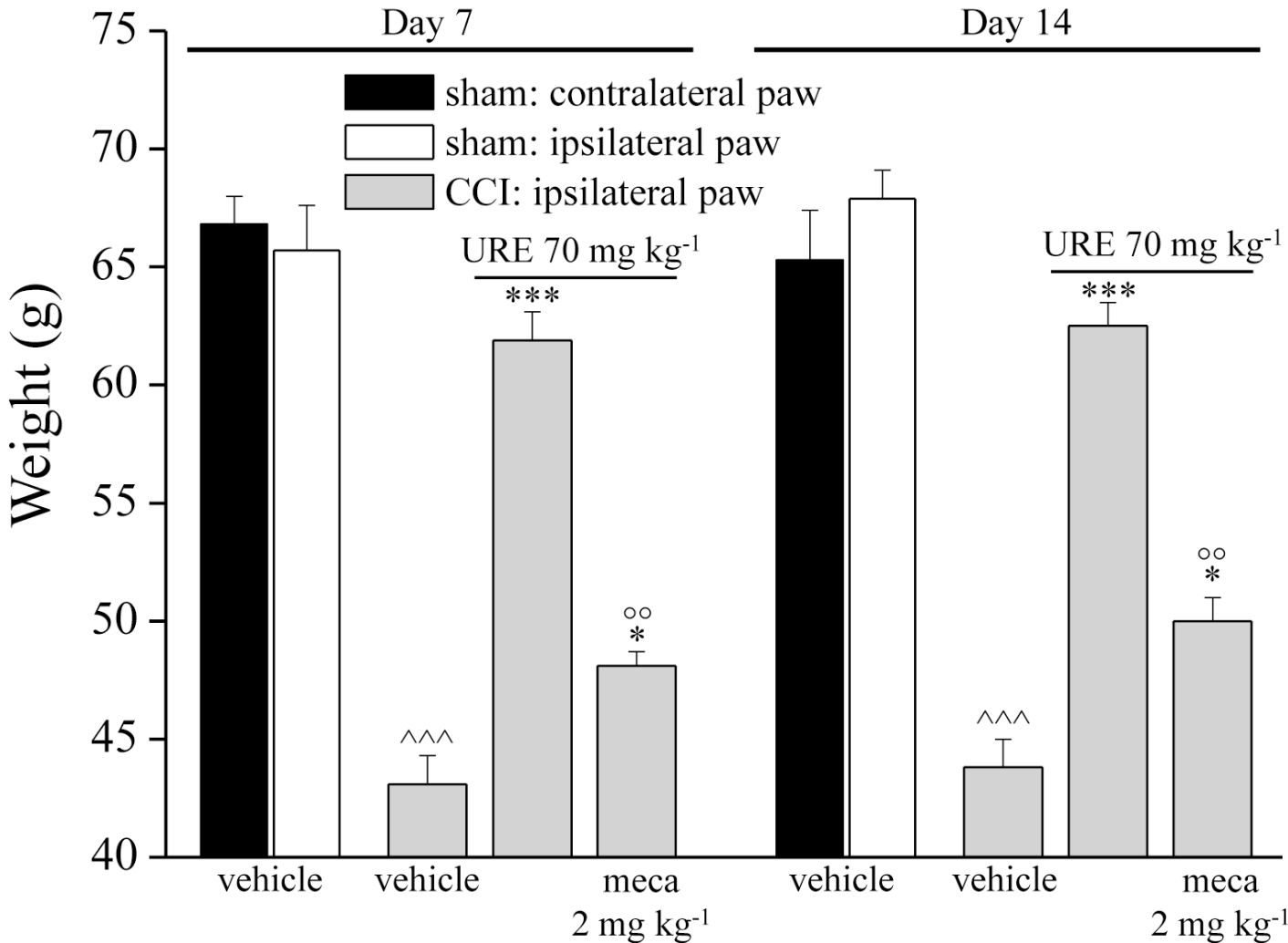


Possible mechanism?

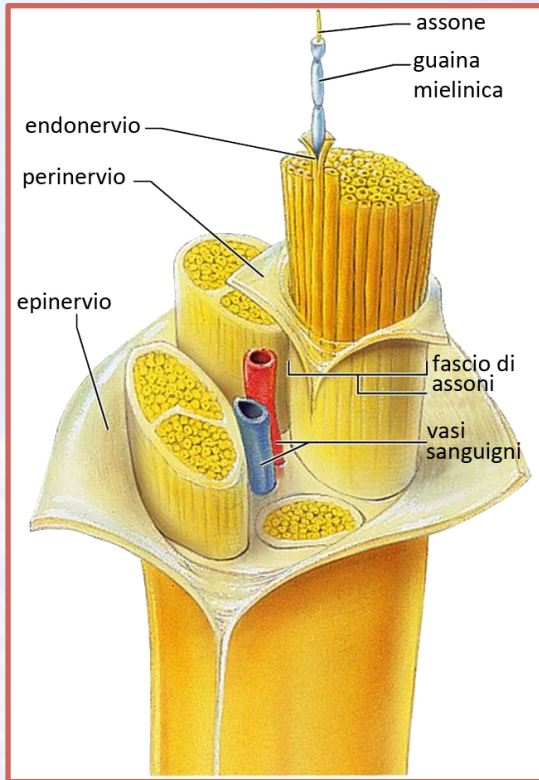


Pain & nAChR

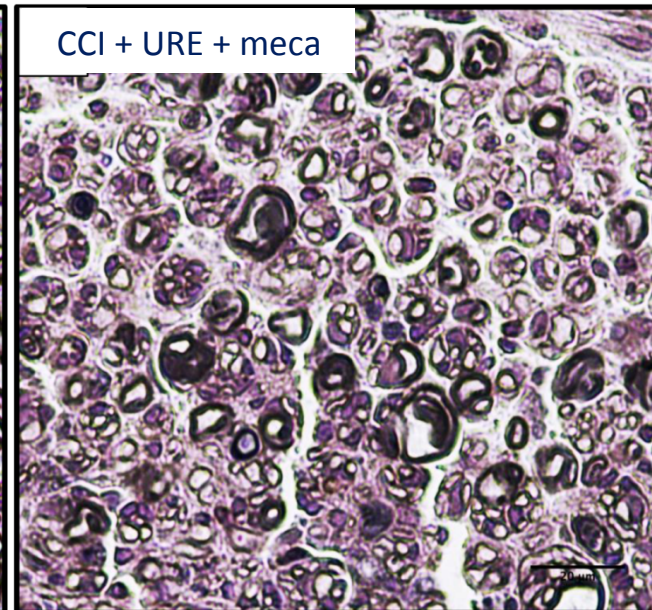
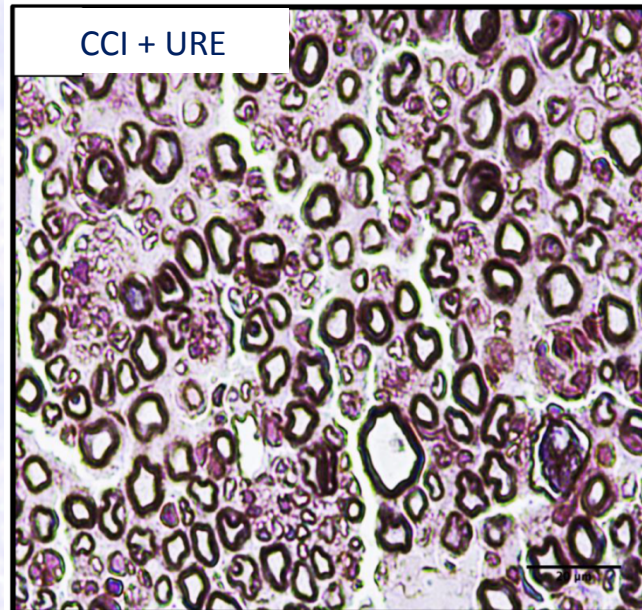
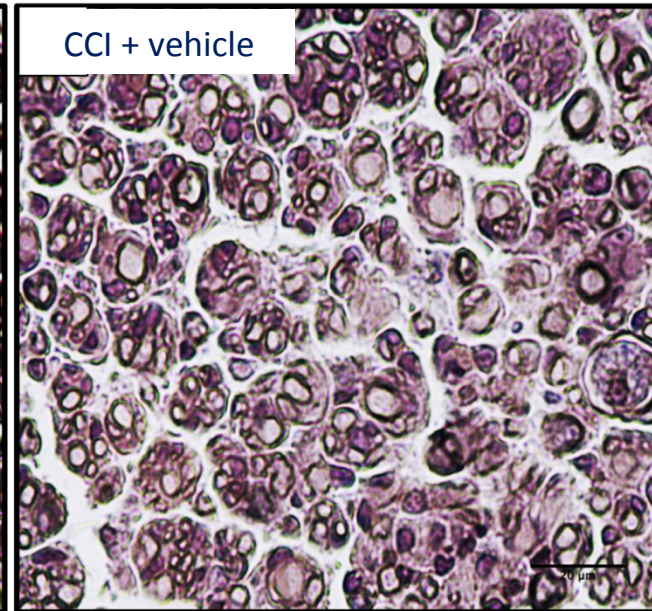
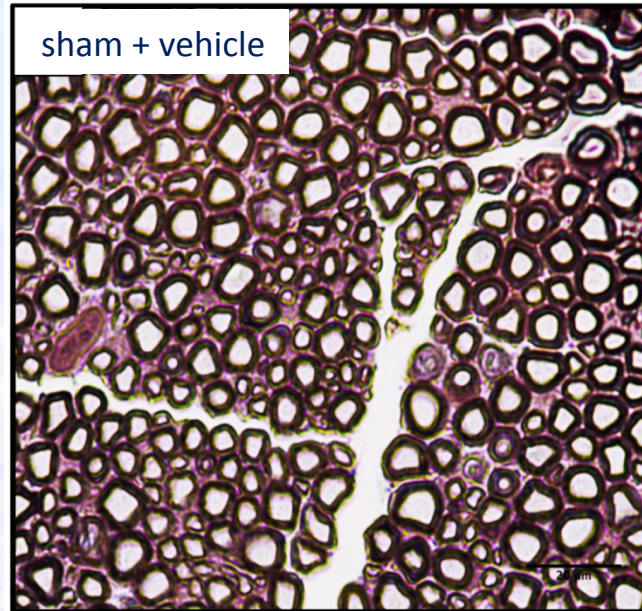
The nicotinic antagonist mecamilamine prevents URE efficacy



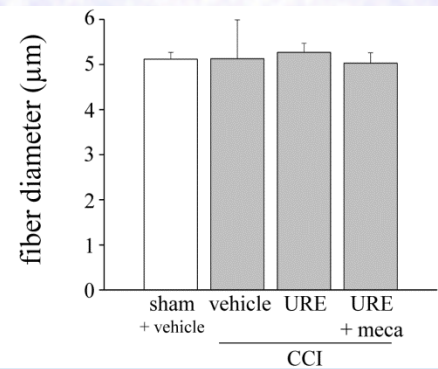
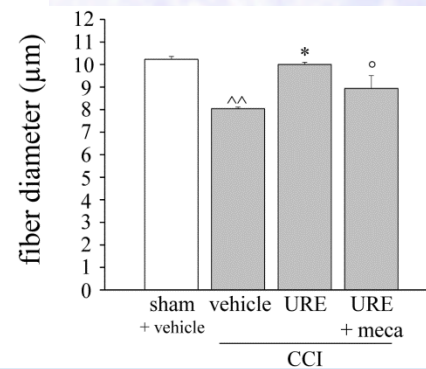
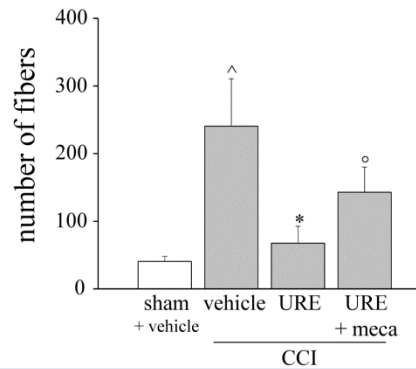
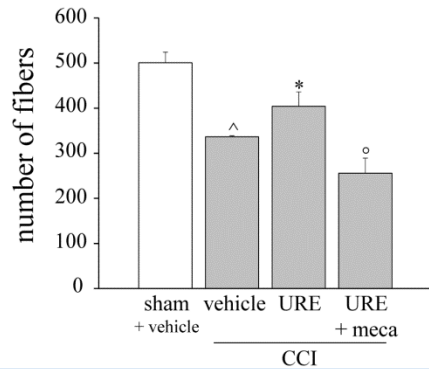
Neuroprotective effect of URE: sciatic nerve



900 μm proximally
to the injury



Neuroprotective effect of URE: sciatic nerve

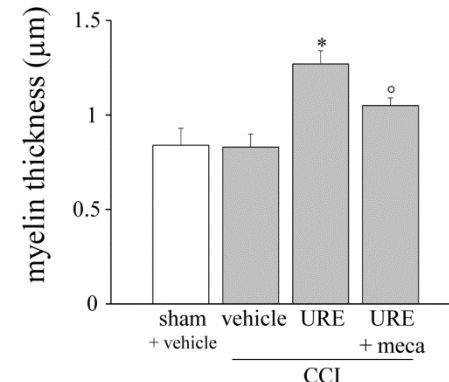
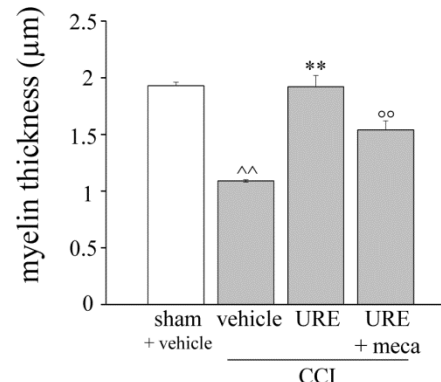
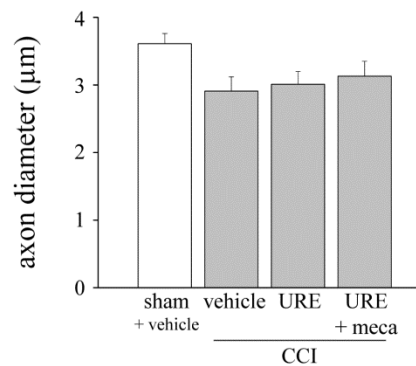
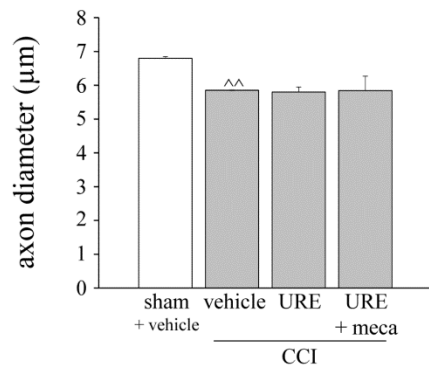


Large fibers

Small fibers

Large fibers

Small fibers



Conclusions

- The hexane-ultrasound extract from *Rosmarinus officinalis* L. (URE) reduces neuropathic hypersensitivity
- URE improves neurorestoration
- URE efficacy is mainly related to the terpenoid fraction
- Nicotinic receptors are involved in the pharmacodynamic mechanism of URE


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A fluorescence microscopy image of neural tissue. The image shows a dense network of green-stained neurons with prominent dendrites and axons. The background is filled with numerous small, red-stained cells, likely representing a different cell population or a specific marker. The overall texture is complex and granular.

Thank you!