



לגעת בכאב Touching the pain

החברה הישראלית לרפואת שריר שלד  
The Israeli Society of Musculoskeletal Medicine



# CRPS and surprising reactivity to dry needling



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# Case Presentation-history

- 41 year-old woman
- Pain in her right palm and forearm
- 5 months after a fracture of her right distal radius
- S/P open reduction and internal fixation



# Case Presentation-history

- After the cast was removed (4 months earlier)...
- She reports
  - Severe burning pain in the affected palm;
  - excessive sweating;
  - unable to use the hand.
- X ray showed full union of the fracture.



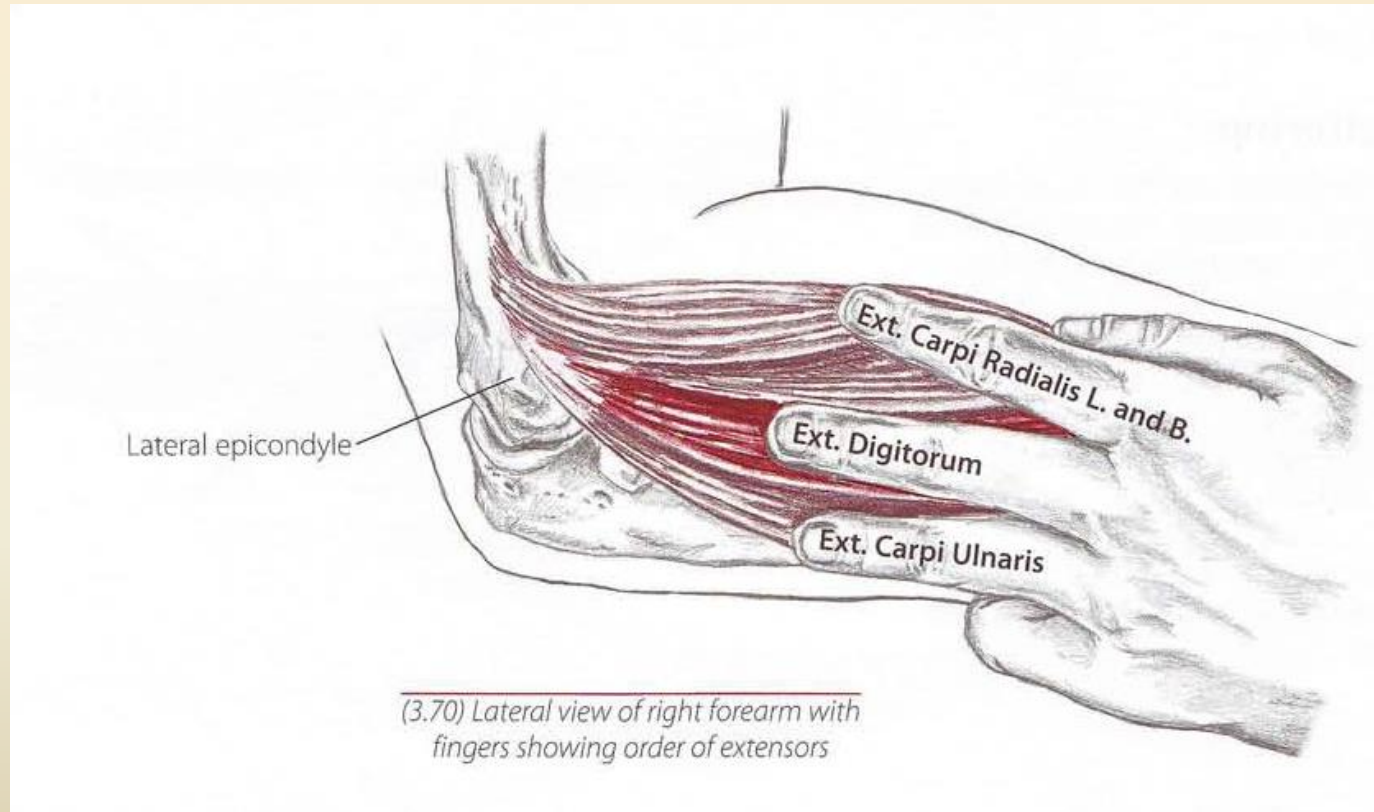
# Case Presentation-examination 1





# Case Presentation-examination 2

- Arm extensor muscles revealed reduced range of motion and severe tenderness on palpation and on resisted movement.



# Case Presentation-diagnosis and plan

## Budapest Diagnostic criteria for CRPS

continuing pain disproportionate to any inciting event



category	signs	symptoms
Sensory		
Vascular		
Edema, sweating		
Motor, trophic		



Symptoms >1 of  $\geq 3$  categories

Signs >1 of  $\geq 2$  categories



# Case Presentation-diagnosis and plan

## Diagnosis

- CRPS of the right upper extremity
- Myofascial pain syndrome of the arm extensors.

## Treatment program plan

- Analgesics, anti-neuropathic agents
- Physical and occupational therapy.
- Course of dry needling for the myofascial
- involvement of the arm extensors

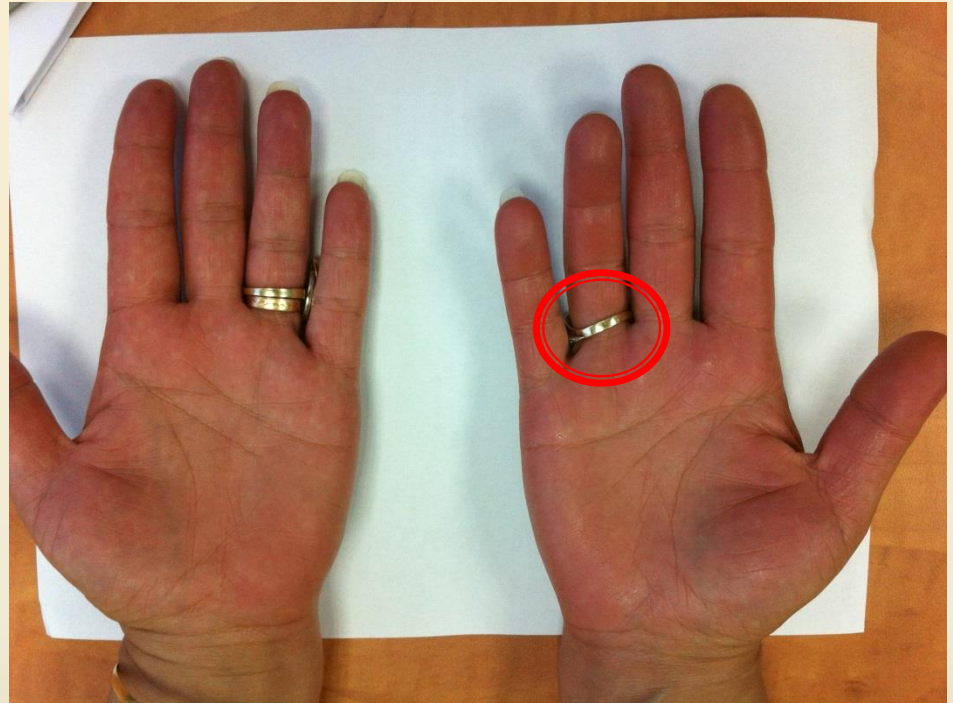


# Case Presentation-treatment 1

## Dry needling

- extensor carpi radialis
- extensor carpi ulnaris
- extensor digitorum

Surprisingly, within minutes after needling, both palmar sweating and allodynia improved significantly



After 1 week



# Case Presentation-treatment 2

- She did not take medications
- 2 more sessions of dry needling
- Follow up after 1 month- pain free



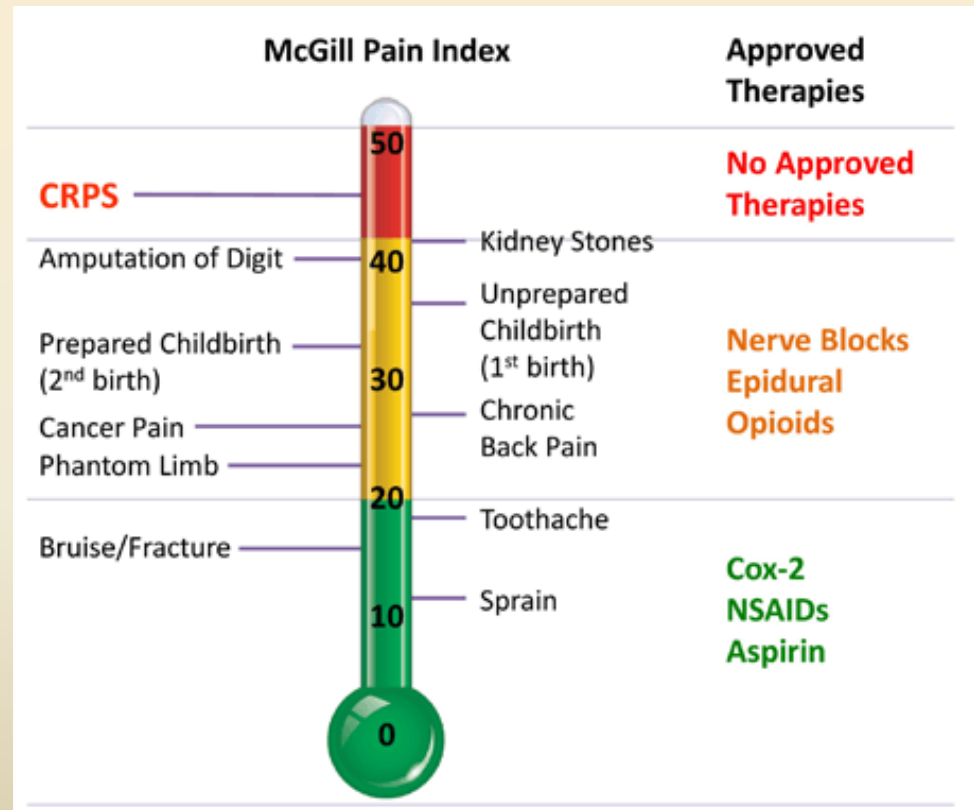
# Other patients

patient	age	gender	Limb involved	Precipitating event	Duration of symptoms	Budapest criteria	Number of dry needling treatments	Degree of improvement
1	43	F	Rt arm	Distal radius fracture	4 months	yes	3	complete
2	35	F	Rt arm	Blunt trauma	12 months	yes	10	moderate
3	51	F	Rt arm	Distal radius and ulna fracture	6 months	yes	6	moderate
4	44	F	Rt arm	Distal radius fracture	3 months	Yes	12	complete
5	34	M	Lt forearm	Fracture scaphoid	45 months	Yes	6	moderate
6	50	F	Rt Hand	Fracture hamate	3 months	Yes	10	none



# What is known about CRPS?

- Complex Regional Pain Syndrome (CRPS) is a severe chronic pain disorder
- Patients with CRPS display an exaggerated nervous system response to injury



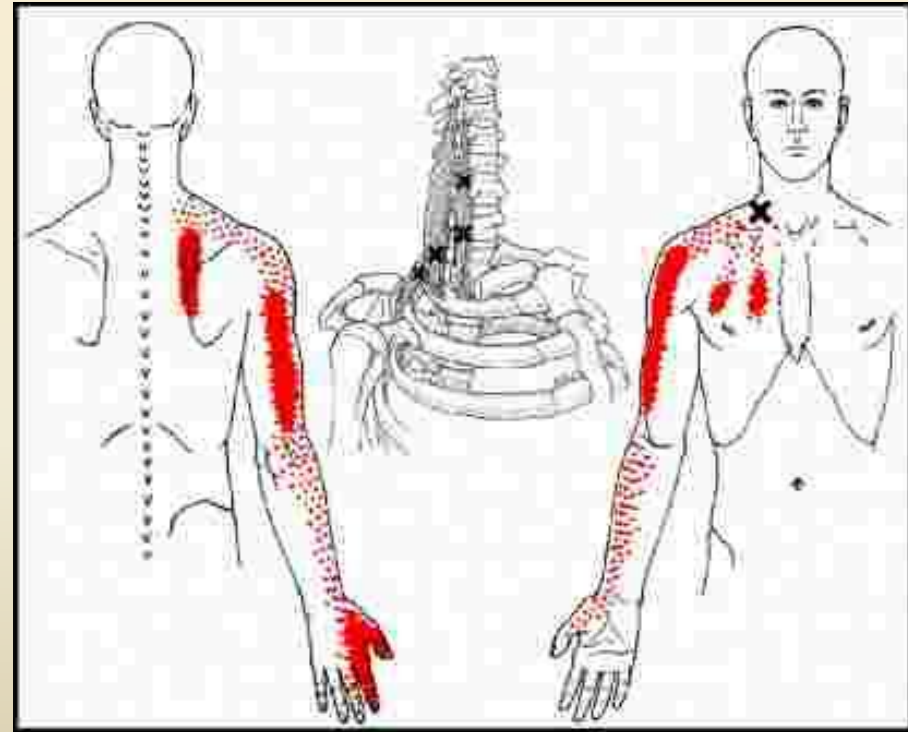
# What is known about CRPS?

- pain and an autonomic nervous system response that is generally disproportionate in degree to the inciting trauma.
- characterized primarily by pain
- manifested by
  - allodynia, hyperesthesia, hyperalgesia and motor dysfunction
  - Swelling, trophic skin changes, sweating and abnormal blood flow



# What is known about MPS?

- Myofascial Pain Syndrome (MPS) is a very common musculoskeletal pain syndrome affecting up to 85% of the population in their lifetime
- Characterized by exquisitely tender trigger points located in a taut or tight band of muscle.
- When stimulated, these trigger points may effect a reflex local twitch response (LTR) resulting in a sharp muscle contraction.





# CRPS patients have MPS

- Trigger points, the hallmark of myofascial pain syndrome, have been described in patient suffering from CRPS.

Study	Patients with TrPs (%)	Upper limb(%)	Lower limb(%)
Rashiq <sup>1</sup>	61	70	40
Allen <sup>2</sup>	56	69	42

1. Rashiq S, Galer BS. Clin J Pain. 1999
2. Allen G, Galer BS, Schwartz L. Pain. 1999



# MPS can induce autonomic changes?

- MTrPs when compressed cause referred pain, local tenderness, and **autonomic changes**<sup>3</sup>
- Introducing a recording electrode adjacent to a trigger point causes pain characteristic of the myofascial pain and often causes associated autonomic symptoms such as **light headedness, diaphoresis and nausea**<sup>4</sup>

3. Simons DG, Travell JG. The trigger point manual. 1999.

4. Hubbard DR. Spine. 1993



# Autonomic responses and MPS?

- Abnormal autonomic responses in the myofascial pain area are either essential to (3.3%) or associated with (51.8%) MPS<sup>5</sup>
- Autonomic changes are essential (3%) and associated with (47%) MPS in 50% of the cases<sup>6</sup>

5. Harden RN. Clin J Pain. 2000

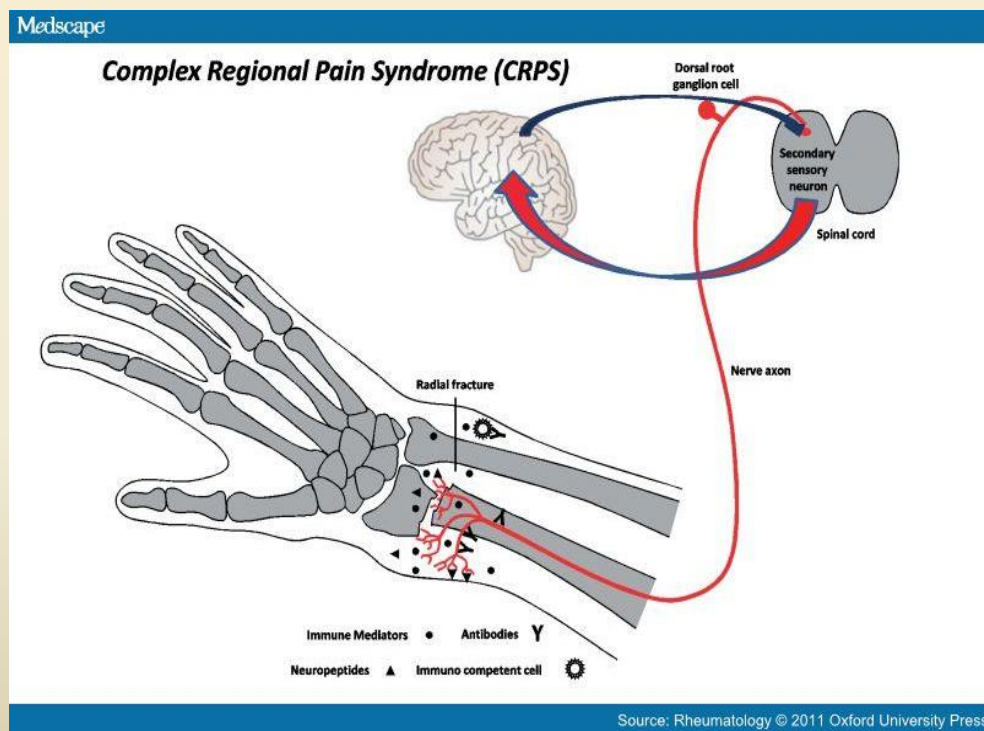
6. Rivers WE. Pain medicine 2015



# The etiology of CRPS?

Three important pathophysiological pathways:

1. aberrant inflammatory mechanisms
2. vasomotor dysfunction
3. maladaptive neuroplasticity



# Immobilization of the injured limb might be a risk factor in the development of CRPS

- immobilization of healthy limbs can induce changes in temperature, mechanosensitivity, and thermosensitivity<sup>7</sup>
- Physician induced limb immobilization has been recognized as a risk factor for the development of CRPS <sup>8</sup>
- Animal models in rats have shown that cast immobilization of limbs induces ischaemia/reperfusion injury

7. Terkelsen AJ. Anesthesiology. 2008

8. Schwartzman RJ. Neurology. 1990





# Immobilization of the injured limb might be a risk factor in the development of CRPS

- Animal models in rats have shown that cast immobilization of limbs induces ischaemia/reperfusion injury<sup>9</sup>
- phenotypic changes occur in calcitonin gene related protein expression in the dorsal root ganglion and spinal deep layers<sup>10</sup>

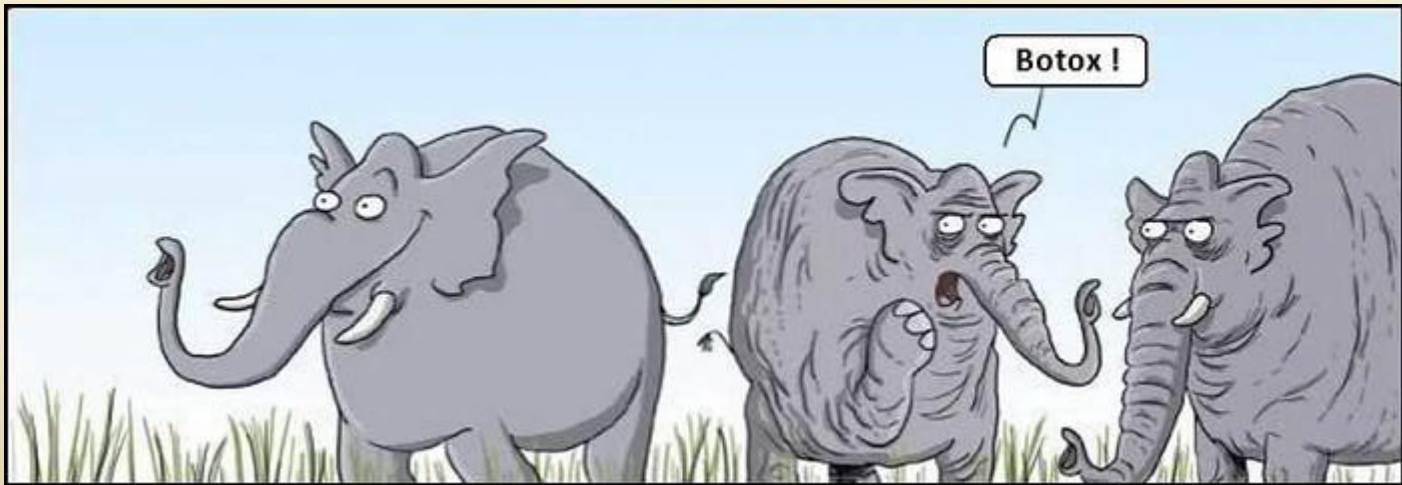
9. Ohmichi Y. Eur J Pain. 2012

10. Nishigami T Neurosci Lett. 2009



# Botox Treatment of MPS reduces CRPS

- Botulinum Toxin injections into proximal muscles displaying MPS phenomena including trigger points.
- Intramuscular and not intradermal botulinum injection into dystonic muscles has an alleviating effect on pain and dystonia in CRPS patients



# Dry needling Treatment of MPS reduces CRPS

Dry needling into proximal muscles displaying MPS phenomena including trigger points.



# Mechanism of Action ?





# Mechanism of Action



• Chance?

Some (perhaps most) CRPS patients recover spontaneously.

• Unlikely:

- Most recovery takes part in the acute phase. Our patients experienced symptoms for months.
- The effect of dry needling was observed minutes after treatment.





# Mechanism of Action



- Improved limb mobility?

- Mobilization of CRPS limbs is a part of every treatment plan and known to be efficacious.



- Improvement observed immediately after treatment, even before mobilization resumed.

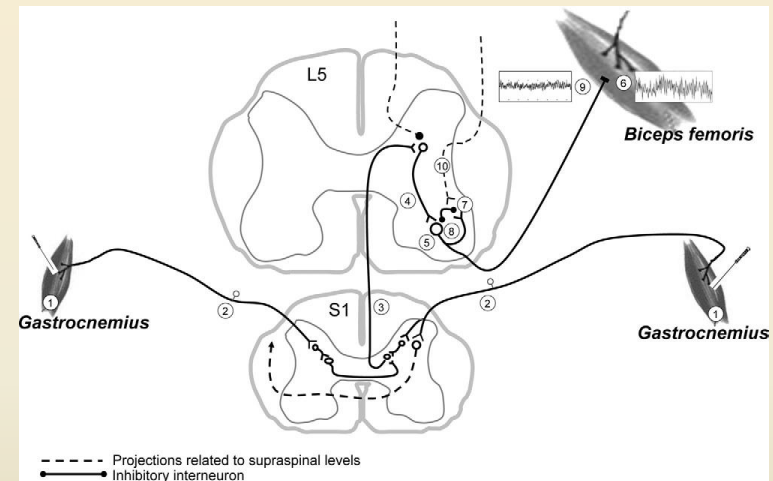
# Mechanism of Action



- Could dry-needling inhibit not only the motor tone but also the sympathetic tone?

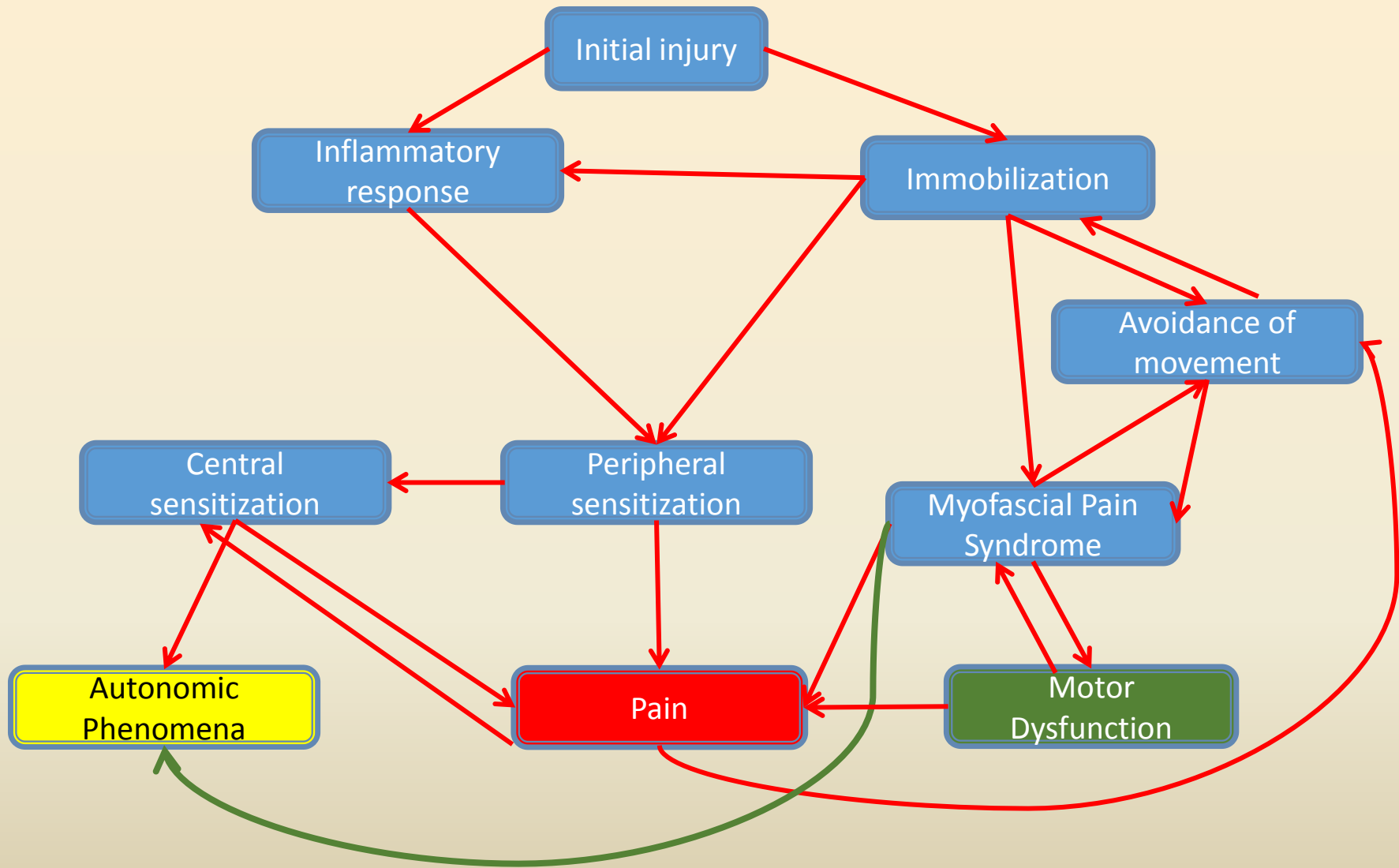
In animal studies dry-needling:

- Drives a reflex arc activating inhibitory interneurons in the spinal cord...
- leading to a decreased firing rate of motor neurons.

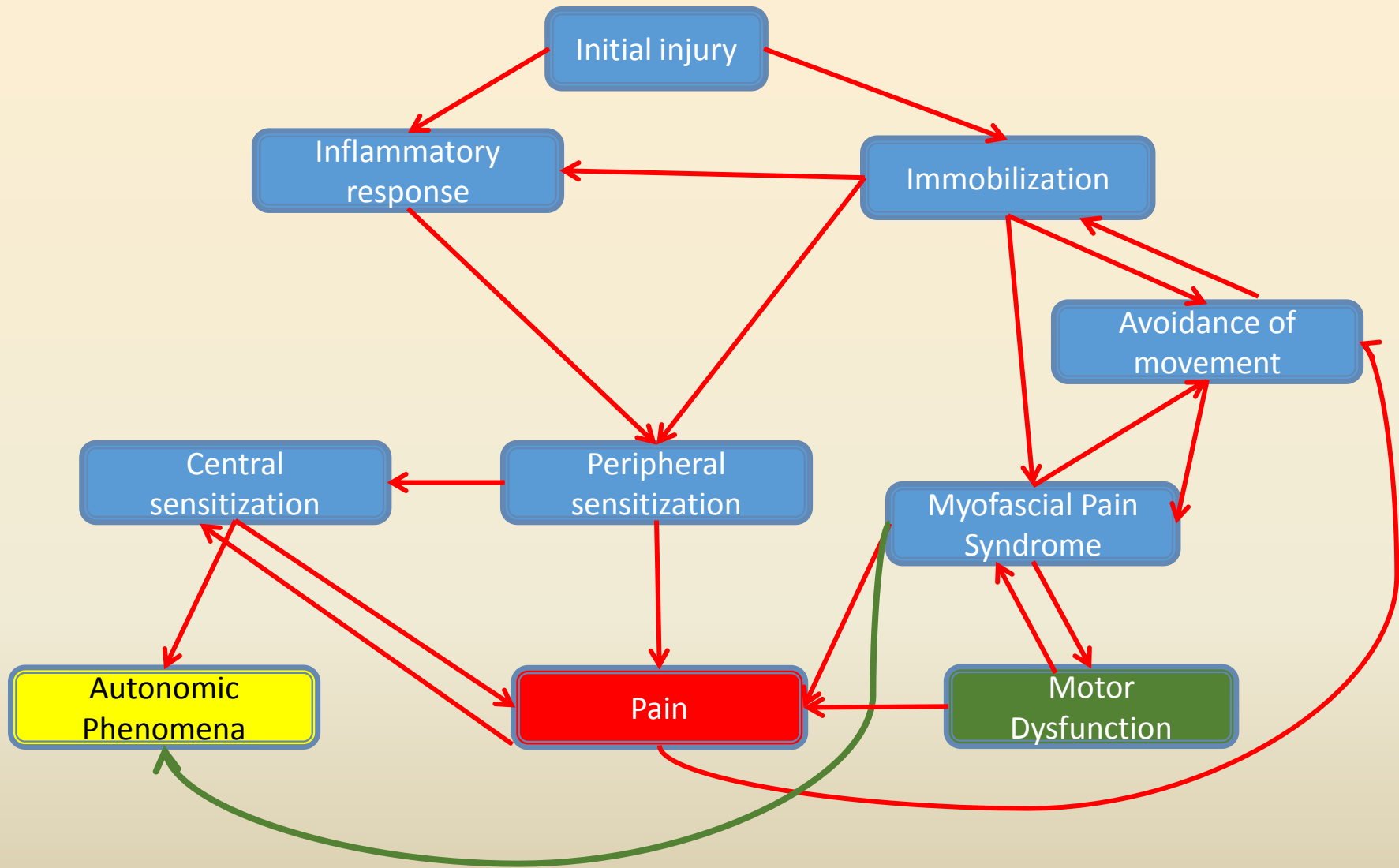


- Could it similarly affect the sympathetic tone and nociceptive pathways?

# A proposed mechanism



# A proposed mechanism



# A proposed mechanism

