

Dr. Brian Meek joined Advanced Bone & Joint in 2013. He is a board-certified, fellowship-trained pain management physician utilizing the most modern and evidenced-based treatments on a daily basis. Dr. Meek evaluates patients with both acute and chronic pain conditions, including neck and low back injury, pain related to trauma and recent surgery, as well as complex regional pain syndrome. Dr. Meek is precise with accurate diagnosis, understanding of primary prevailing factor, and timely determination of maximum medical improvement. Please welcome Dr. Meek.

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Complex Regional Pain Syndrome



DISCLOSURES

- None
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Objectives

- Define Complex Regional Pain Syndrome (CRPS) - incidence, risk, and diagnosis
 - Recognize the onset & symptoms of CRPS
 - Introduce treatment options for CRPS, including advancements in therapy
 - Understand the role of the interdisciplinary team in CRPS treatment
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Epidemiology

- Incidence is between 5-26/100,000 person-years
 - Risk Factors
 - Females (ratio appears 2:1)
 - Worker's compensation claim
 - Social stressors at time of incident
 - Outcome
 - 1 in 8 will have progressive symptoms
 - 1 in 3 with failure of return to previous employment
 - Upper extremity outcome worse than lower extremity
 - Early treatment tied to successful outcome
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Reported incidence of CRPS following surgical procedures of the upper and lower limb

Region	Operation	Study	Incidence
Upper limb	Shoulder	Chalmers et al. 2014 [9]	11.1% (1:8)
		Arndt et al. 2012 [10]	3.0% (3:97)
		Gonzalez et al. 2011 [11]	0.9% (35:3975)
		Bishop et al. 2005 [127]	1.3% (1:79)
		Borgeat et al. 2001 [12]	1.0% (5:516)
	Carpal tunnel release	Shinya et al. 1995 [13]	1.9 (2:105)
		Litchman et al. 1979 [14]	5.0% (5:95)
		MacDonald et al. 1978 [15]	2.2% (4:182)
	Dupuytren's contracture	Lily and Stern 2010 [16]	2.0% (1:49)
		Bulstrode et al. 2005 [17]	2.4% (6:247)
Lower limb	Tibial	Sarangi et al. 1993 [19]	31% (9:20)
	Ankle and foot	Rewhorn et al. 2014 [18]	4.4% (17:373)



DIAGNOSIS

What may be...

- Prolonged immobility
- Frequent request for more or change in “pain medication”
- Hypersensitivity to touch
- Provider frustration

What is not....

- Suspect of substance abuse
- “This person is crazy”
- Malingering or secondary gain concerns

What is and isn't CRPS?

Budapest Criteria

- **REGIONAL** pain that is disproportionate to the usual course of known trauma or lesion
 - The following criteria must be met:
 - a. Continuing pain disproportionate to the inciting event
 - b. Must REPORT three (3) of the four categories
 - a. Sensory: Hyperesthesia or allodynia
 - b. Vasomotor: Temperature asymmetry and/or skin color asymmetry
 - c. Sudomotor: Edema and/or sweating asymmetry
 - d. Motor/Trophic: Decreased range of motion and/or motor dysfunction; trophic changes (hair, nail, skin)
 - c. Must DISPLAY at least one sign physically at the time of evaluation in two (2) more of the aforementioned categories
 - d. There is no other diagnosis that better explains the signs and symptoms
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CRPS type I (previously known as *Reflex Sympathetic Dystrophy*) indicates ABSENCE of injury to nerve structure

CRPS type I vs. CRPS type II

CRPS type II (previously known as *Causalgia*) indicates PRESENCE of nerve injury followed by regional disturbance to the affected limb



PATHOPHYSIOLOGY

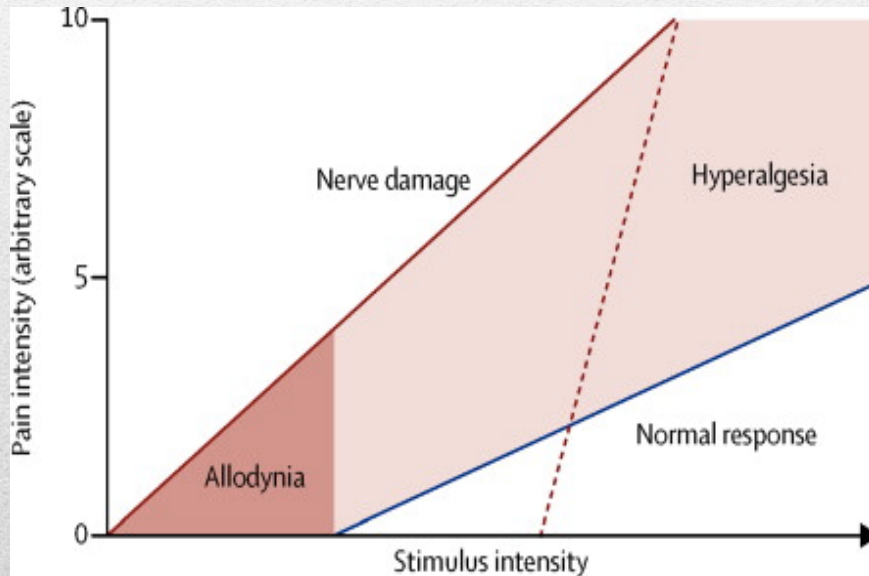
Initial phase



- Inflammation
 - Pain, edema, erythema, increased temperature, and impaired function
 - Production of inflammatory mediators leading to acute phase of CRPS
- Change in cutaneous nerves
 - Decreased A-delta and C-fiber density



Central and Peripheral Sensitization



- Peripheral
 - Usually adaptive
 - Hyperalgesia, withdrawal
- Central (spinal)
 - Increased excitability of secondary central sensory neurons in the spinal cord
 - Enhanced windup

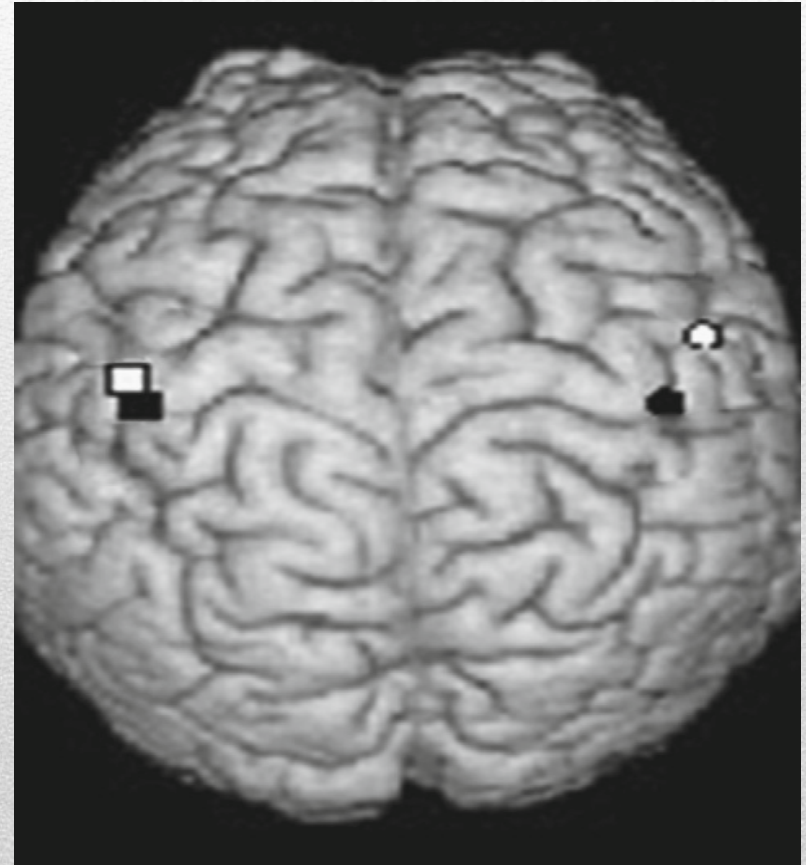


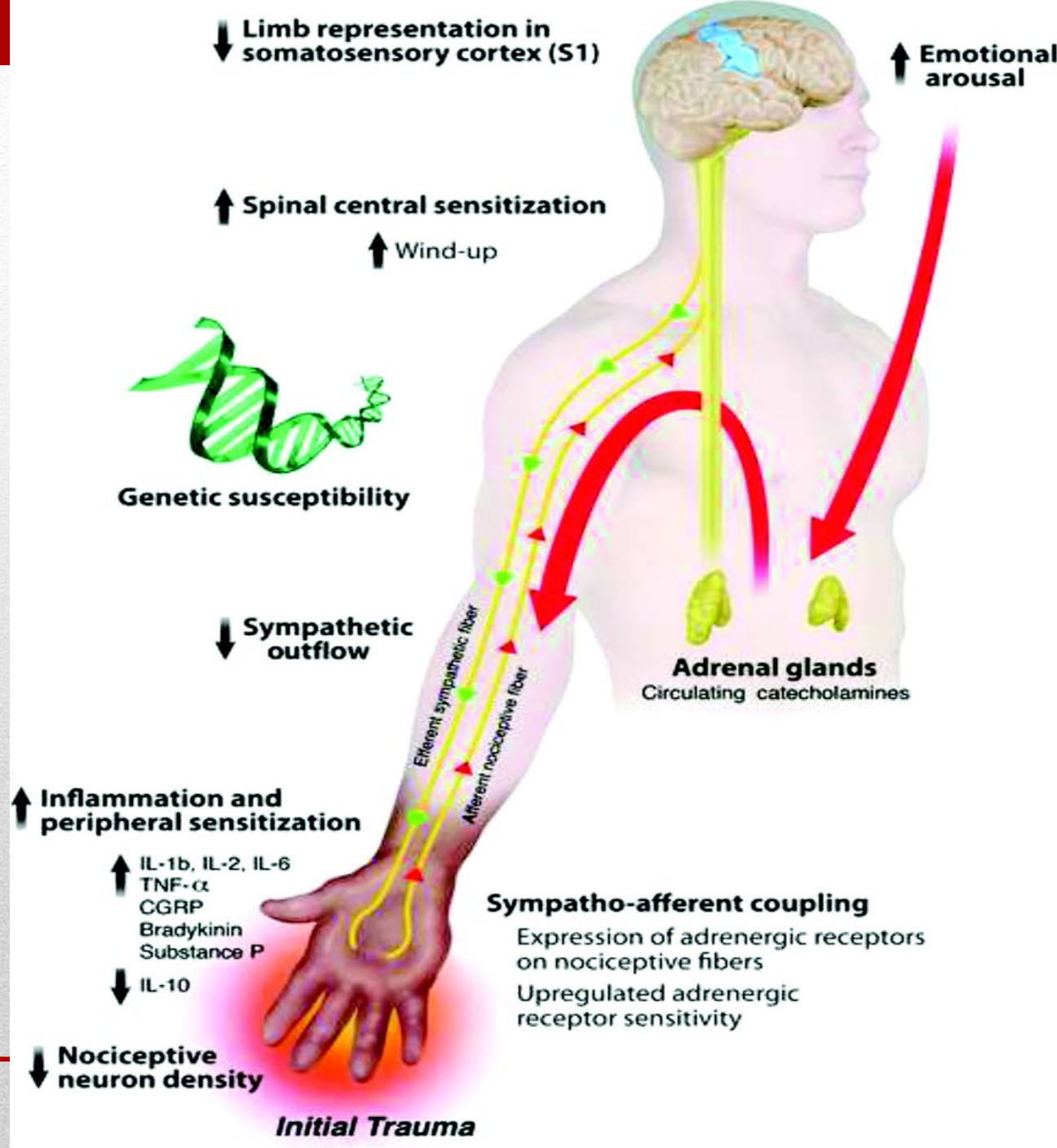
Subacute to chronic phase

- Dysfunction of the sympathetic nervous system
 - Adrenergic receptor expression on pain generating nerve fibers
 - Sympatho-afferent coupling
 - Increased circulating catecholamines
 - Autoimmunity
 - Circulating IgG to surface Ag and autonomic nerve fibers
 - Psychological factors
 - Increased anxiety
 - Loss of purpose
 - Fear-avoidant behavior
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Brain Plasticity

- Decrease in area representing the CRPS-affected limb in the somatosensory cortex
- Altered regional blood flow in pain-relay centers of CNS
- Disinhibition or hyperexcitability of the motor cortex in CRPS patients
- Target for mirror and graded motor imagery (physical therapy)
 - Reverses with resolution of CRPS



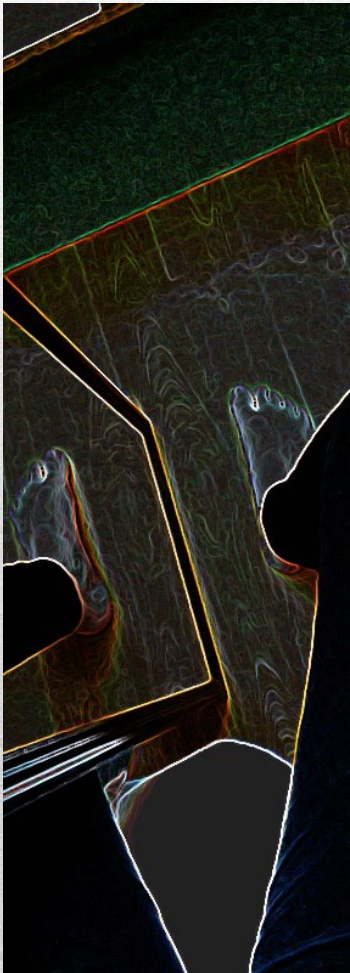




TREATMENT

Treatment

- Begin treatment as soon as possible for best outcome (< 3 months)
- First-line treatment of *physical and occupational therapy* (fear avoidance, advance function)
- Medication management
- Interventional Procedures
- Psychologic counseling if necessary
 - Address underlying depression/anxiety, PTSD
 - Address work concerns/environment





Medication

- Corticosteroids
 - May provide relief in initial acute phase
 - NSAIDs
 - May provide mild to moderate relief
 - Antidepressants
 - TCAs (nortriptyline, desipramine) and SNRIs (i.e. duloxetine)
 - Anticonvulsants
 - Gabapentin, pregabalin (Lyrica)
 - Opioids
 - Seldom or judicious use to facilitate rehabilitation
 - Antioxidants
 - *Vitamin C most common preventative following injury*
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Investigational Medication

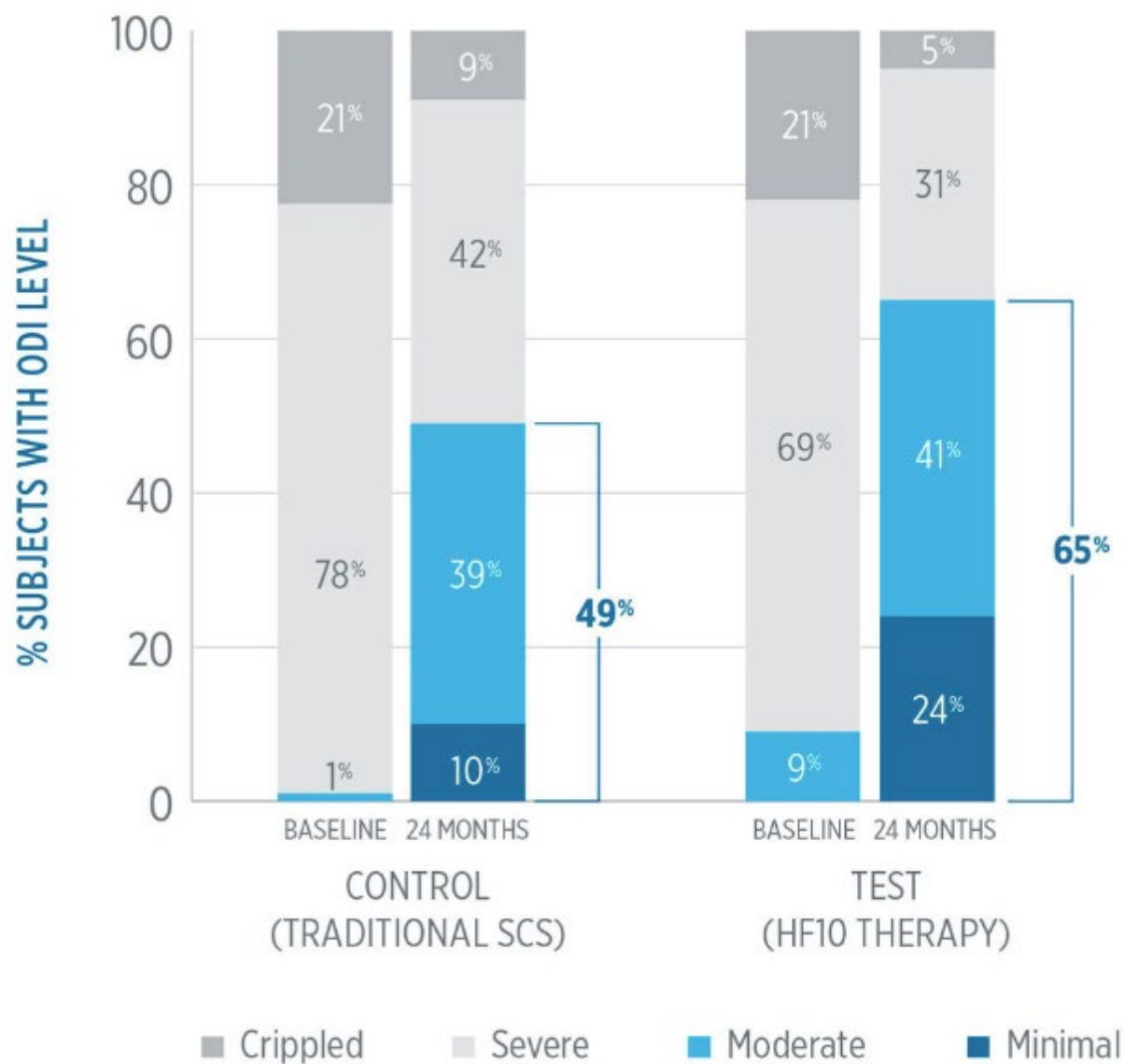
- Ketamine
 - Topical v. intravenous
 - No consensus treatment protocol established
 - Calcitonin
 - May aid bone health
 - Associated endorphin release
 - Bisphosphonates
 - 2-3 months treatment only
 - Cannabinoids
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Interventional Therapies

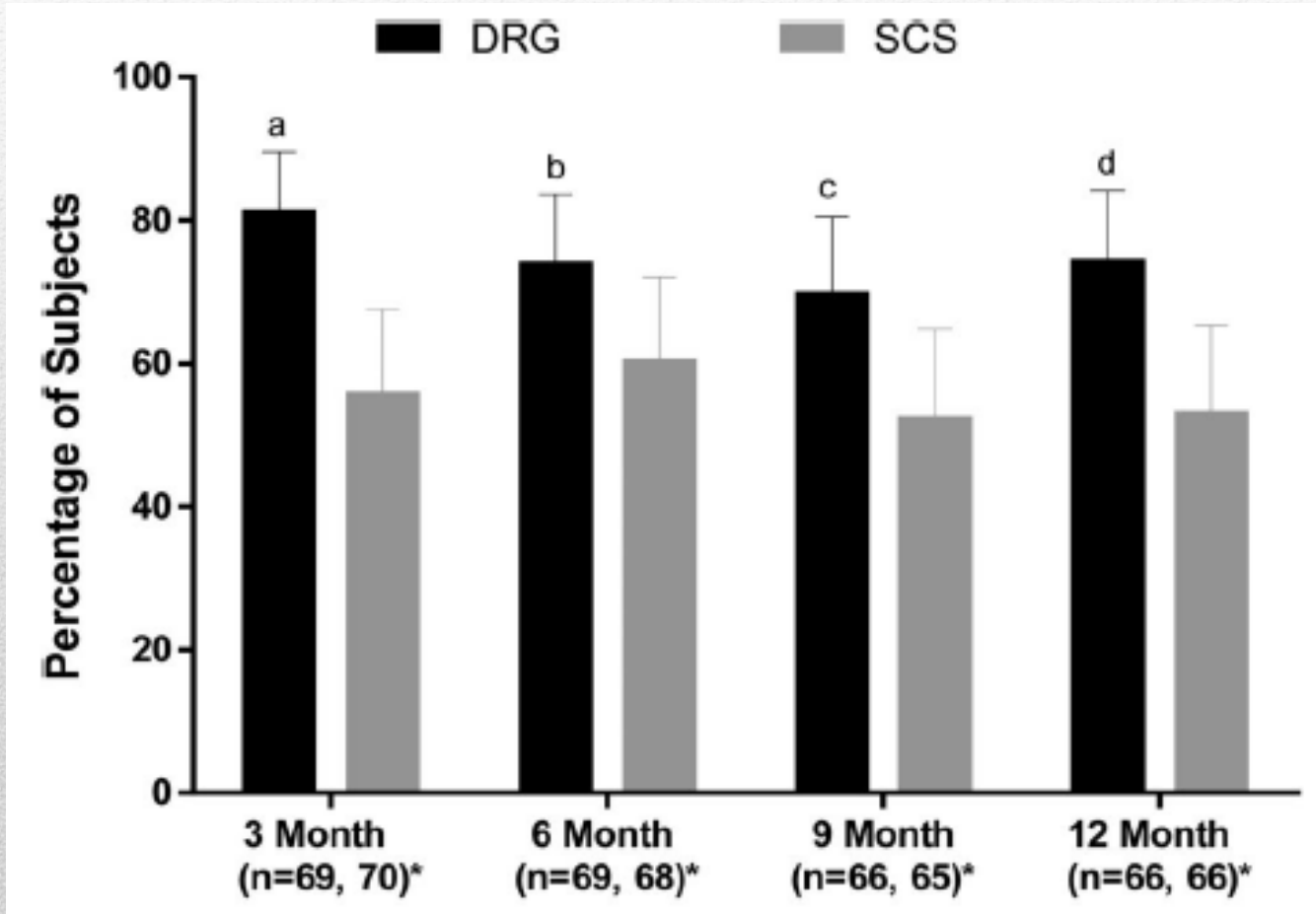
- Sequential Sympathetic Blocks
 - Stellate Ganglion – Upper extremity
 - Lumbar Sympathetic – Lower ext.
 - Can help establish sympathetically mediated pain in acute phase
 - Coupled with physical therapy
 - Spinal Cord Stimulation/Neuromodulation
 - Can be cost effective and superior to PT alone
 - Emerging therapies have demonstrated superiority
 - Intrathecal Drug Delivery
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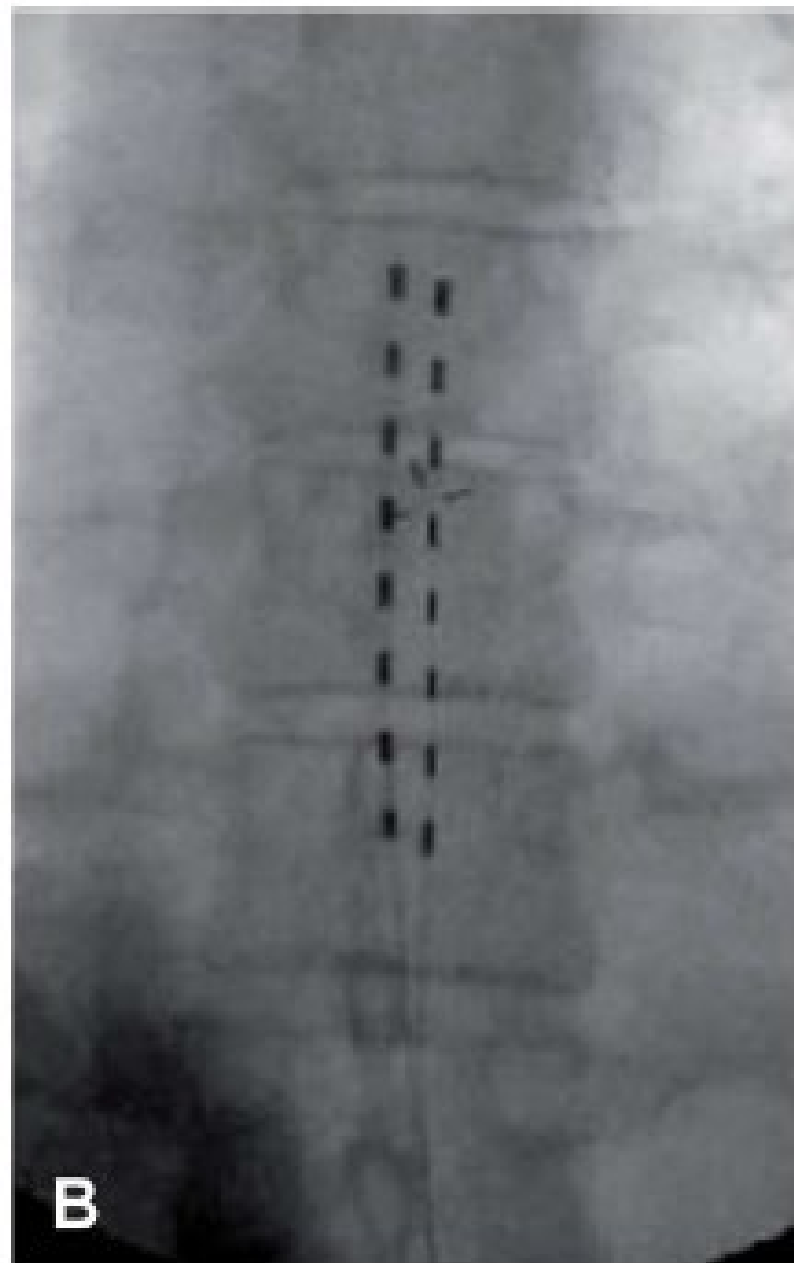
SENZA-RCT: Functional Outcomes¹

SUPERIOR ODI IMPROVEMENT WITH HF10 THERAPY



DRG v. SCS





Take Home

- CRPS is a real physiologic phenomenon that occurs after injury
 - CRPS will occur more often in the work environment
 - Learn to recognize early stages/those at risk
 - Embrace a multimodal strategy to improve outcomes
 - Addresses changes that occur in both the peripheral and central nervous systems
 - Emerging technology demonstrate superiority from previous therapeutics
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QUESTIONS?
