Physiology of Chronic Pain

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Eastern Oregon Coordinated Care Organization Community Forum on Chronic Non-cancer Pain Management

Pendleton, OR

February 23, 2017

GOALS

- What is Pain?
- Physiology of Pain.
- Why do we have Pain?
- What turns Acute Pain into Chronic Pain?

Many Americans Suffer from Chronic Pain

- 86 million Americans suffer from chronic pain
- 66 million are partially or totally disabled
- 8 million are permanently disabled by back pain
- There are 65,000 new cases of permanent disability diagnosed each year

Pain: What is it?

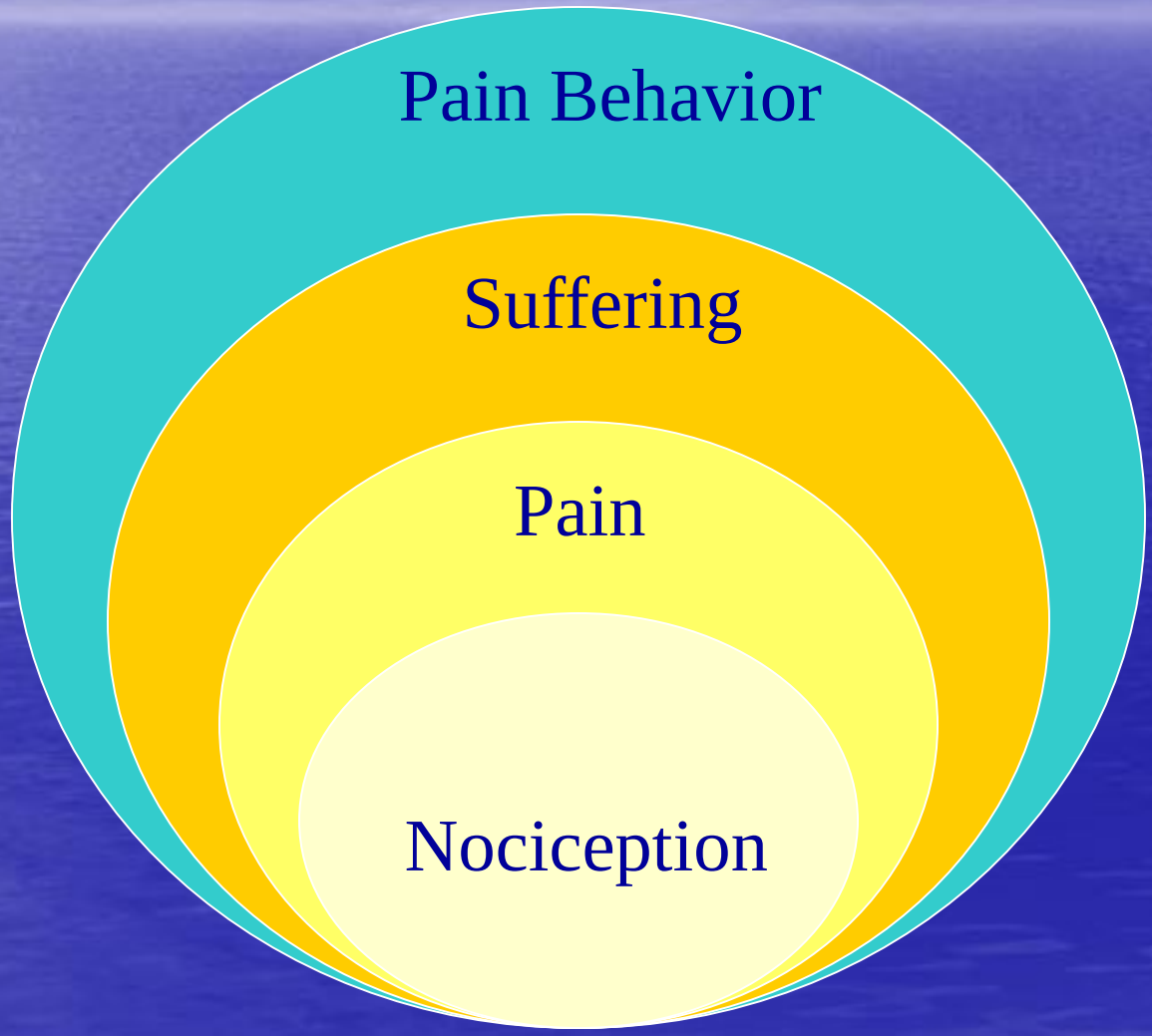
Pain: What is it?

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage.

-The International Association for the Study of Pain. 1979

The Complexity of Pain

Bonica's Management of Pain 3rd Edition

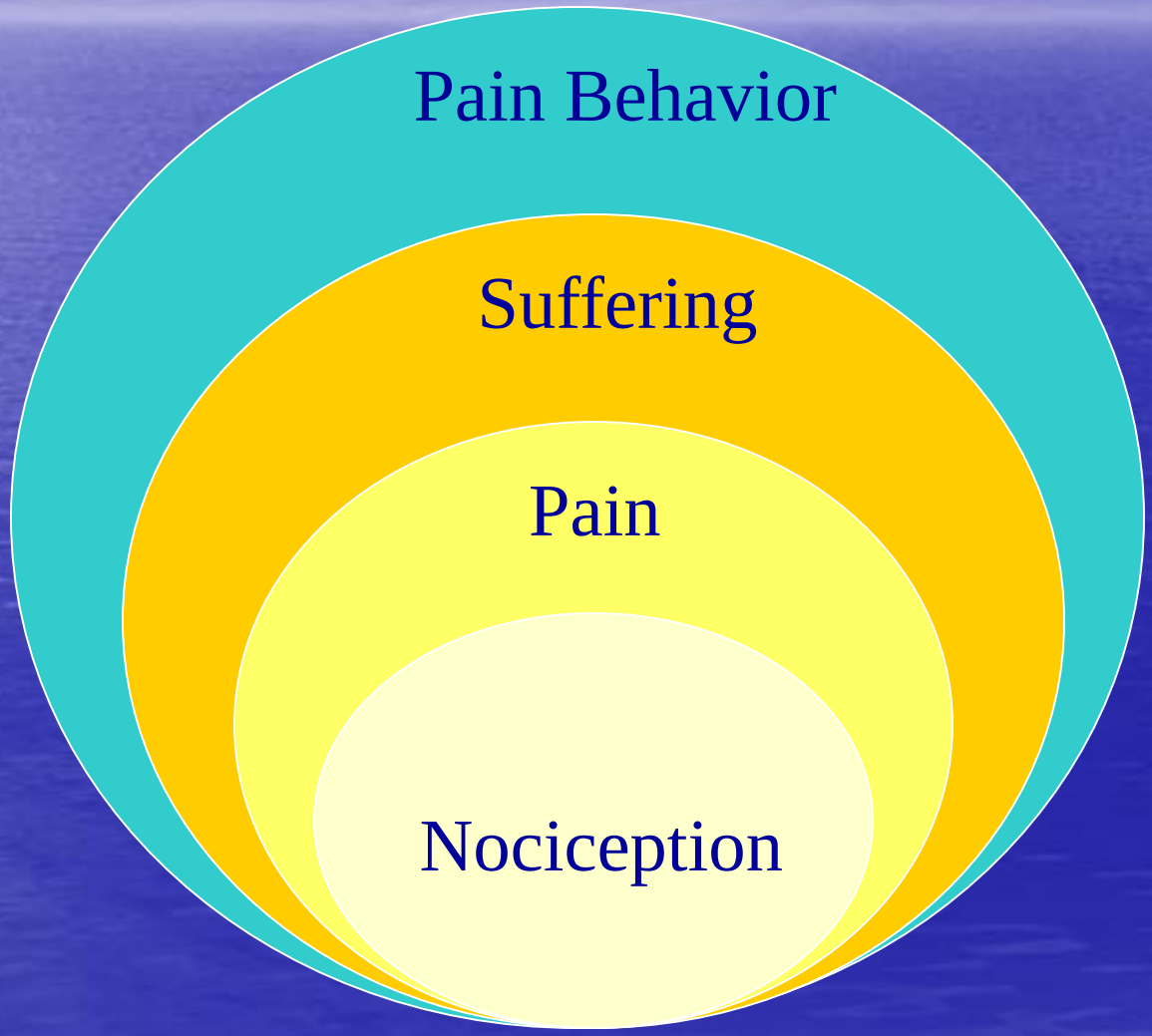


What is Nociception?

- Signal from nerves to brain. "DANGER!"

- Protective mechanism
  - Warn us that damage is being done.
  - Let us know how long to rest until damage is repaired

Complexity of Pain

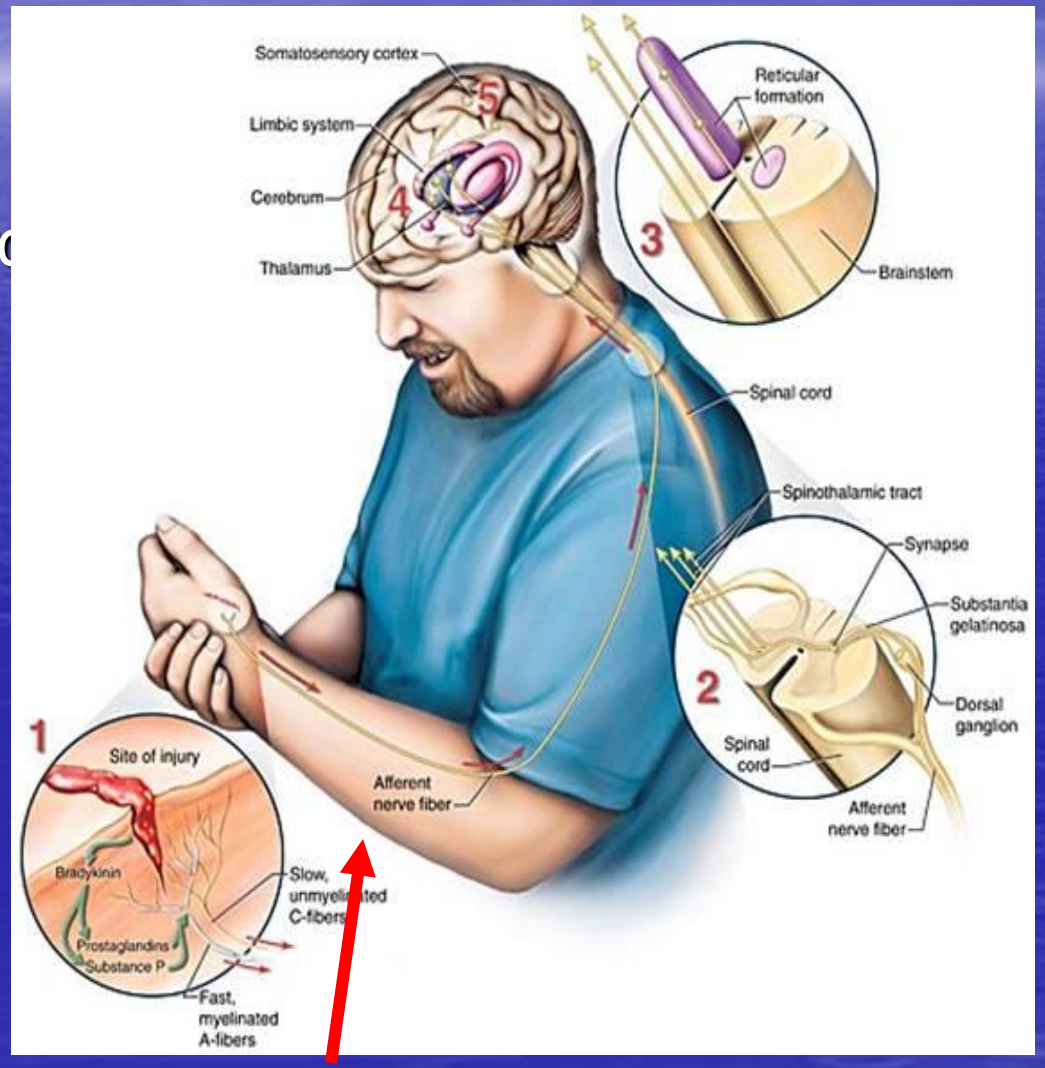


Nociception Vs Pain

- Pain, in contrast to nociception, is a Conscious Experience

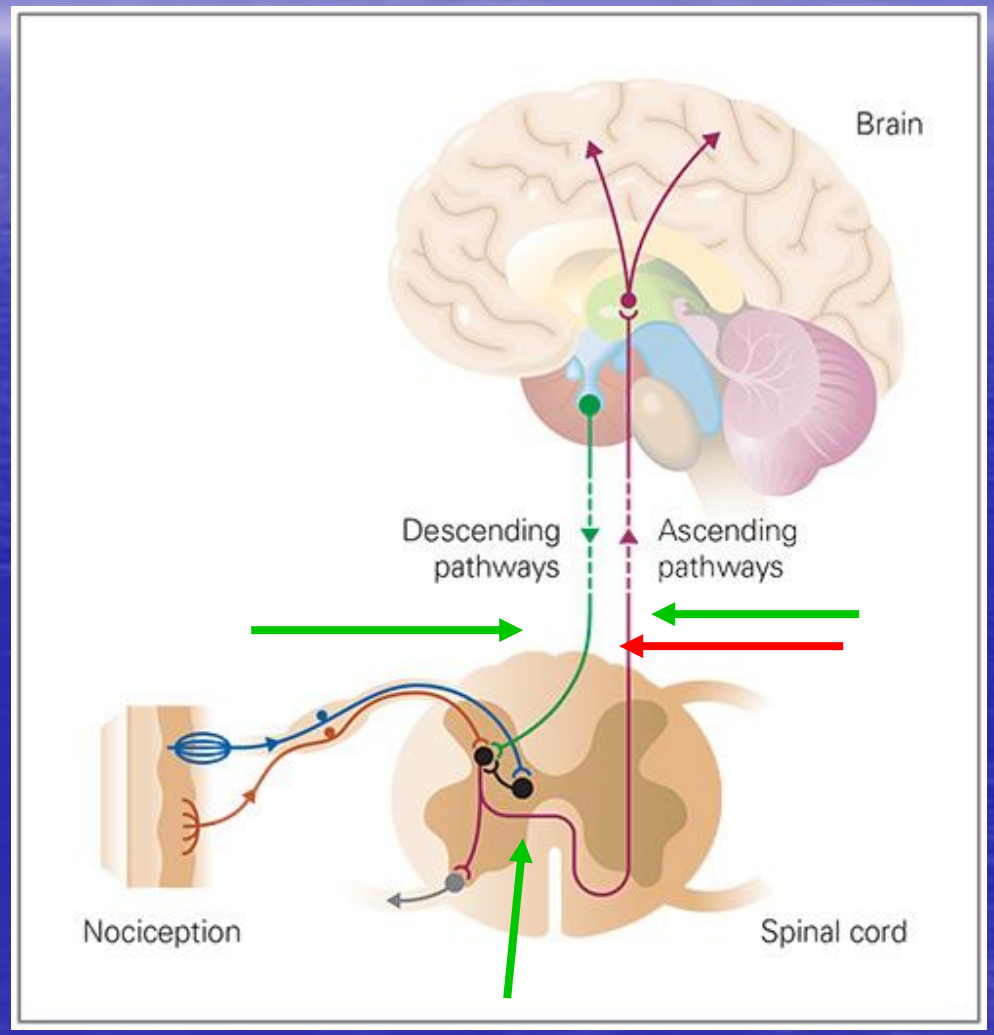
The Perception of "Pain"

- First process is transduction.
  - Signal from injured tissue toward spinal cord
  - Nerves (A-delta/C) transmitting signal to spinal cord



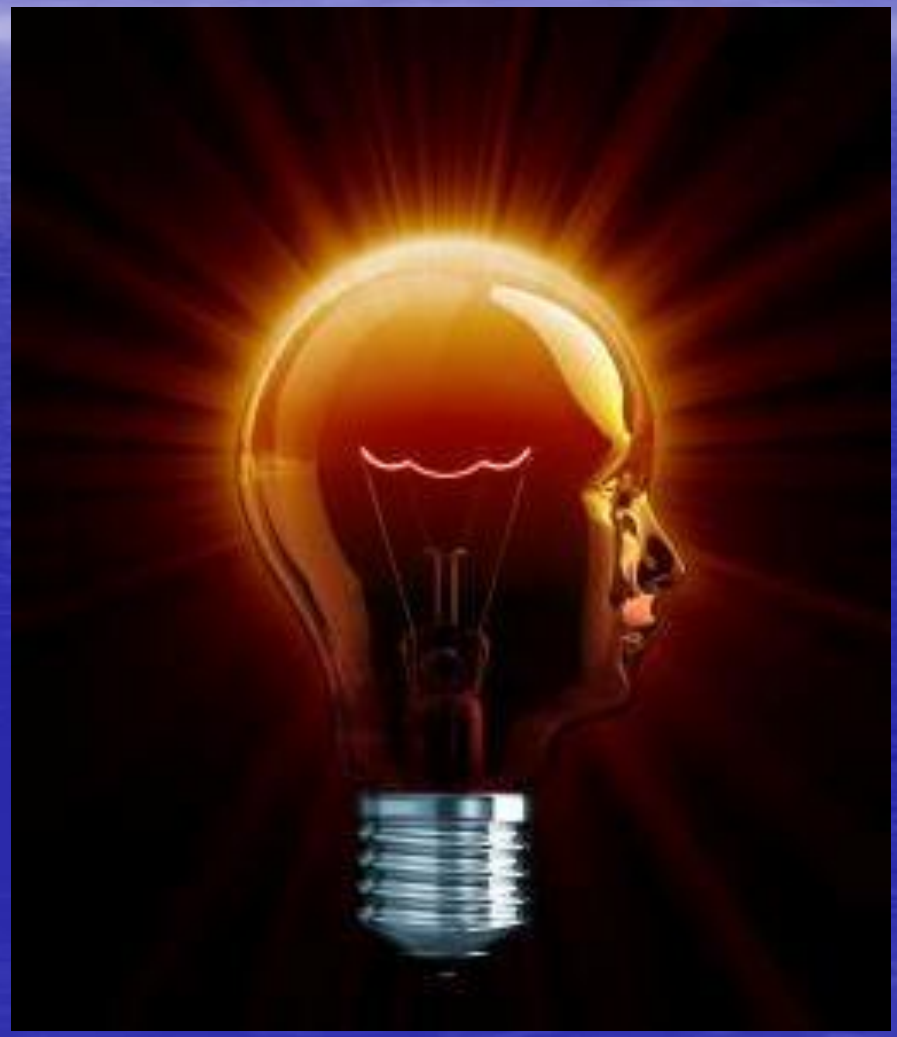
Perception of Pain (2)

- Second process is **Transmission.**
  - Signal from cord to brain
  - Modulation: Ability to up/down regulate signal. Volume!
    - Thresholds for signals increase/decrease
    - Recruitment of other nerves (WDR neurons)



Perception of Pain (3)

- Finale: Perception
  - Combined effects excitatory and inhibitory systems that determine final message delivered.



-Melzack and Wall 1965

Why does Acute Pain turn into Chronic Pain?

Perception of Pain (2)

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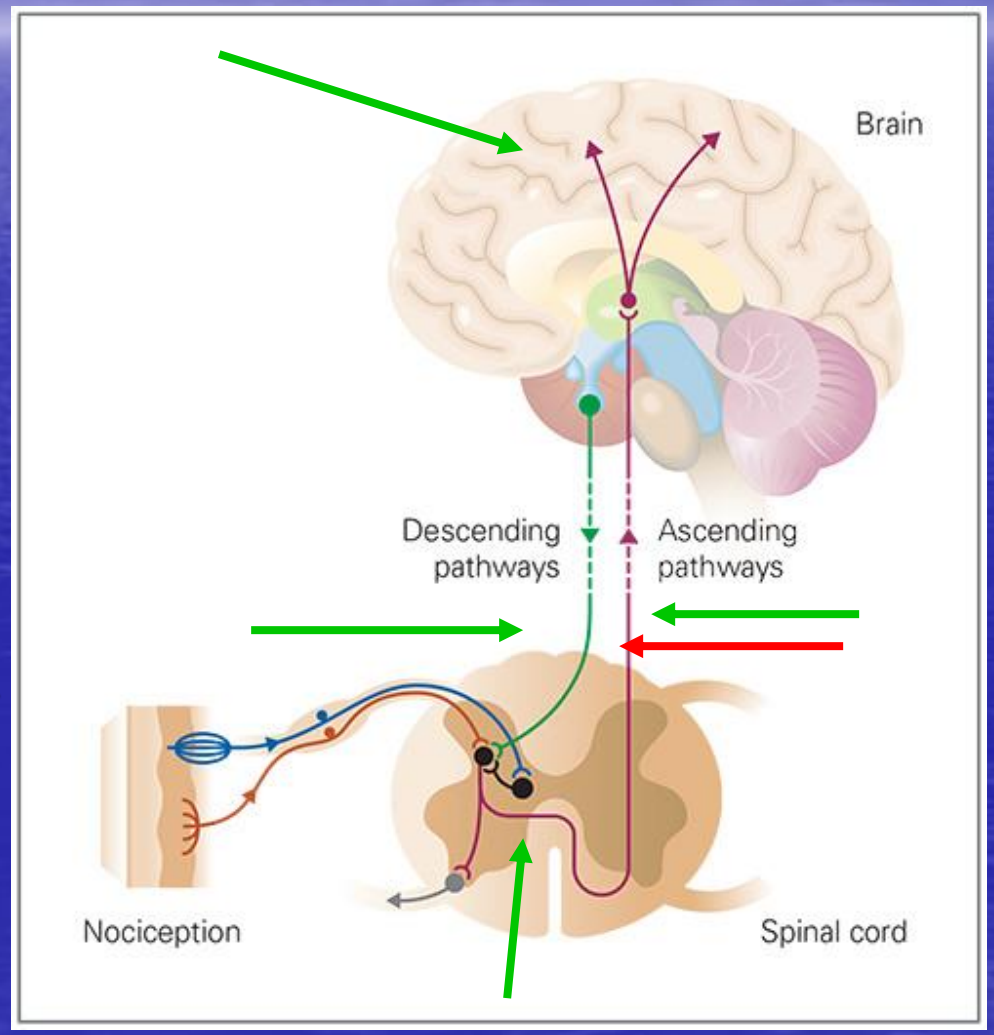
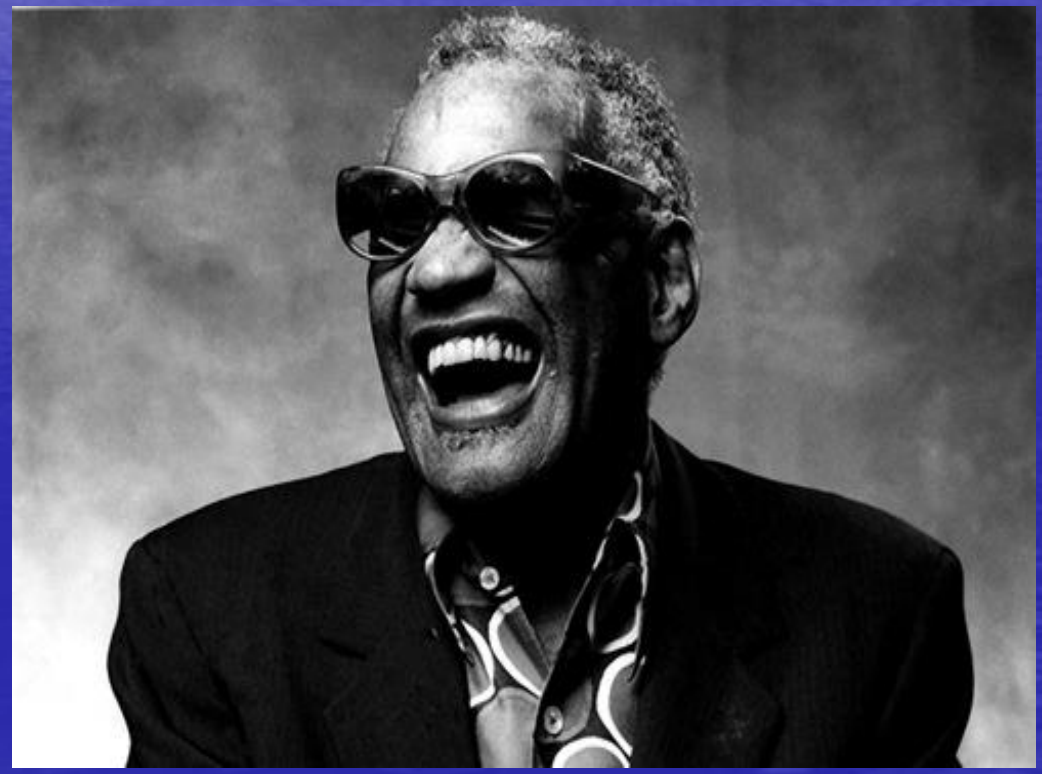


Modulation

- **"Neural Plasticity":** The brain's ability to reorganize itself by forming new neural connections throughout life.
- Dr Lee; "Ray Charles Effect"

-The Institute for Chronic Pain 2012

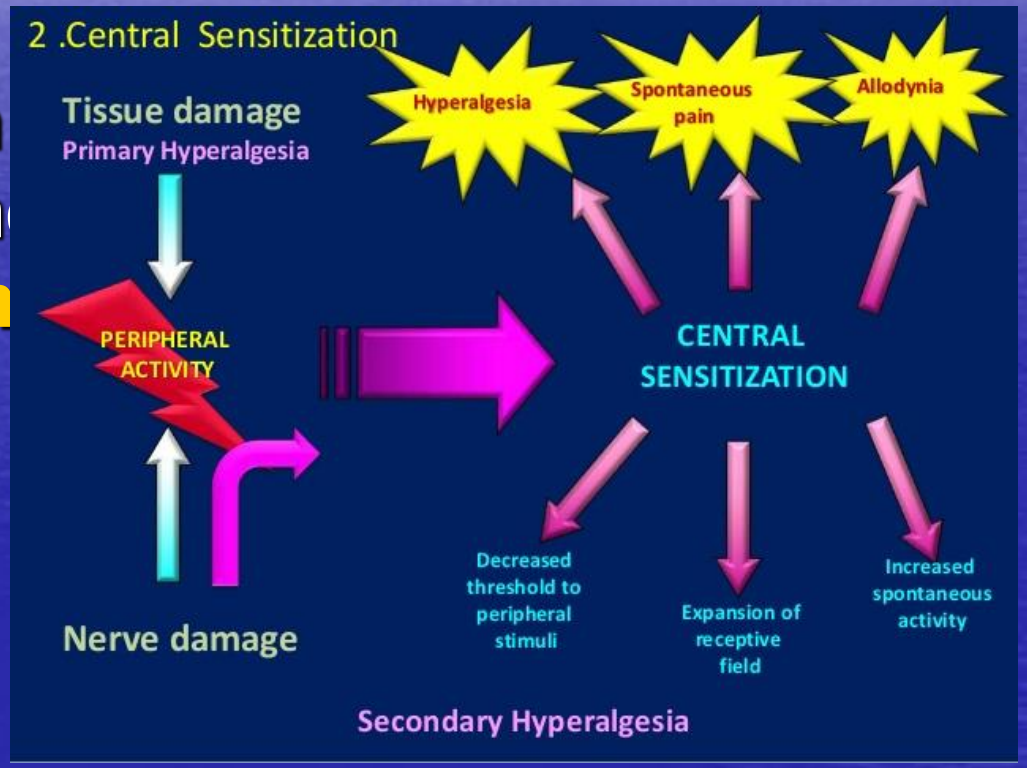


Modulation (2)

- Brain injury
  - Neurons don't recover but brain reorganizes and adapts
- J Keller. MCA
  - 70 days in coma
  - Relearn walk/talk
  - 344 days in hospital
  - Walked out on his own

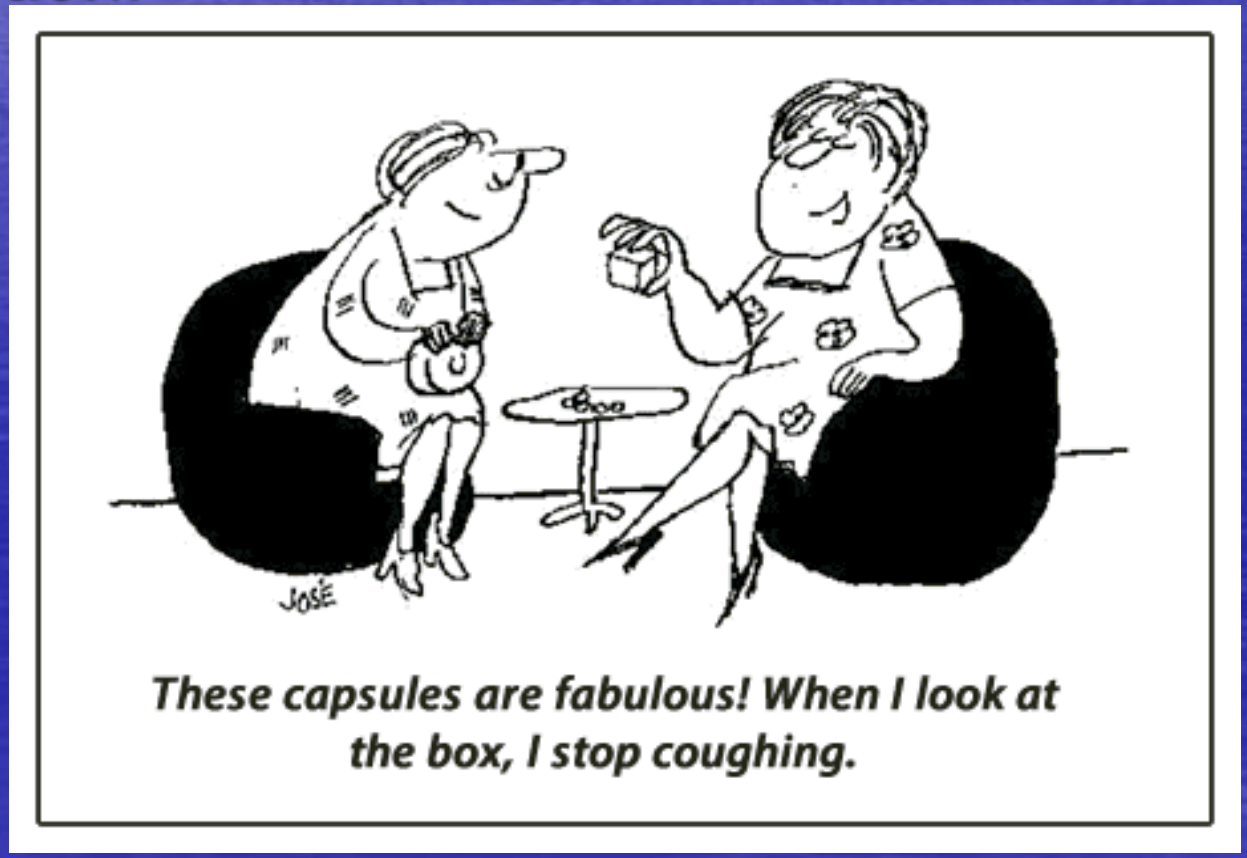
Modulation (3)

- **Central Sensitization**: nervous system goes through a process called "wind-up" an gets regulated in a **persisten state of high reactivity.**



Modulation (4)

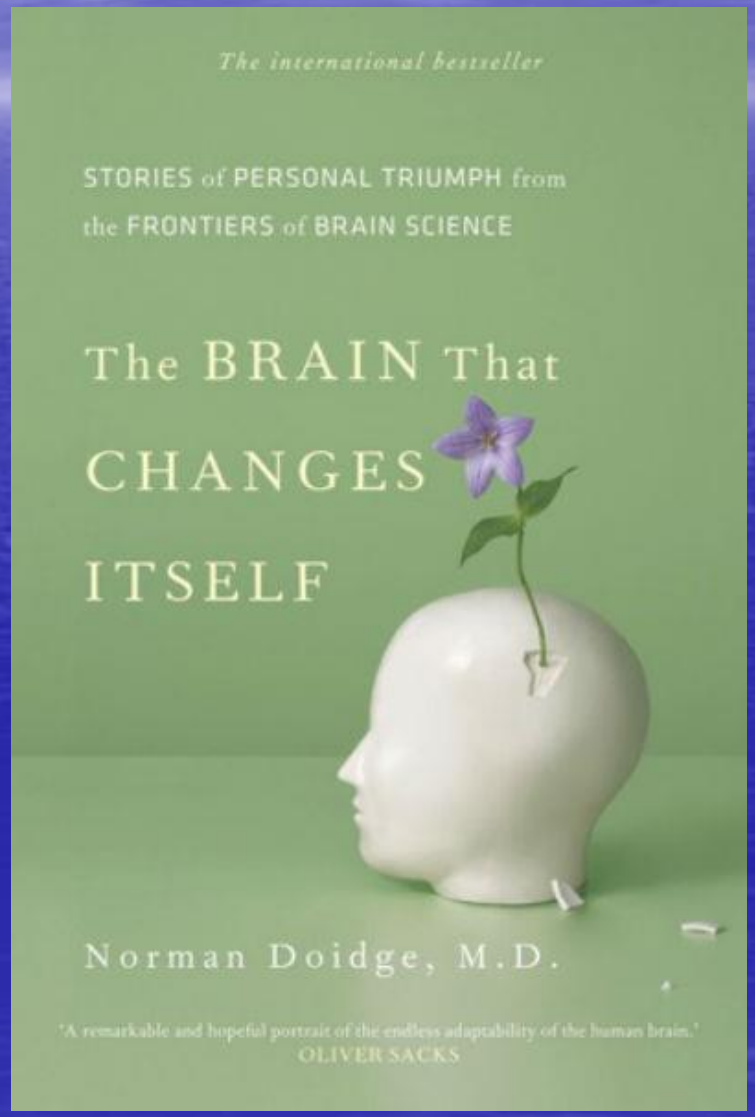
- **Placebo Effect:** example of cortical (brain) modulation.



Neuromodulation: Curse or blessing?

- "When we wish to perfect our senses Neuroplasticity is a blessing; when it works in the service of pain, plasticity can be a curse"

  –N. Doidge, MD



Is Chronic Pain all in my head?

-Not Faking

-Not intentional

-**But** a portion of Chronic Pain is "in your head"

-Role for

Pain Psychiatry/Neuro-Modulating Meds

THANK YOU