The role of endogenous opioid system in the dorsal horn in pain processing: providing insight into the mechanism of action of dorsal root ganglion stimulation

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SCS mechanism of action

* Gate theory (1960's-1980's)
  * A-β fibers inhibit A-Δ and C fibers
* Supraspinal mechanisms (1990's)
  * Micro-dialysis techniques
  * GABA, Serotonin, Substance-P
* Magnetic resonance spectroscopy (2000's)
  * Inc. GABA in ipsilateral thalamus (spino-reticulo-thalamic-cortical pathway, part of the ascending reticular arousal system (affective components of pain)
  * Immunohistochemical techniques
    * Serotonin activity in dorsal horn
    * GABA receptor type B antagonist

Endogenous opioid in pain transmission

* Delta, Mu, and Kappa
* Presynaptic afferent fibers, interneurons, and postsynaptic projection neurons in the dorsal horn
* Mu and delta receptors are expressed presynaptically on specific types of A delta and C fibers and postsynaptically on second order neurons in laminas I and II (dorsal horn)
* Enkephalin: leads to presynaptic inhibition of mechanosensory neurons and reduction of mechanical pain

Endogenous opioid in pain transmission

ORIGINAL ARTICLE

Spinal cord stimulation reduces hypersensitivity through activation of opioid receptors in a frequency-dependent manner

K.L. Sato[1], E.W. King[2], L.M. Johanek[3], K.A. Sluka[1]

	Sham	4 Hz	60 Hz
Vehicle	0 ± 0	404 ± 77	446 ± 81
Naloxone 3 mg/kg/h	0 ± 0	80 ± 50[a]	113 ± 126
Naloxone 10 mg/kg/h	0 ± 0	–	15 ± 15[a]
Naltrindole 1 mg/kg/h	0 ± 0	376 ± 64	0 ± 0[a]
Placebo pellets	–40 ± 40	243 ± 67	326 ± 93
Morphine pellets	–80 ± 50	–80 ± 50[a]	150 ± 98

[a]Significantly different from vehicle or placebo.