Effects on Rats of Low Intensity and Frequency Electromagnetic Field Stimulation on Thoracic Spinal neurons Receiving Noxious Cardiac and Esophageal Inputs

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BACKGROUND:

- **Numerous clinical studies have shown that low intensity and low frequency electromagnetic field stimulation (EMFs) provides substantial pain relief in patients with various chronic pains.**
- **The aim of this study was to examine the effects of EMFs on the activity of thoracic spinal neurons responding to noxious visceral stimuli.**
- **Our hypothesis is that low level EMFs modulates spinal neuronal activity, which is evoked by nociceptive cardiac and esophageal afferent inputs *(Nociceptors are the nerves which sense and respond to parts of the body which suffer from damage).* A preliminary report of this work has been published in abstract form**

METHODS:

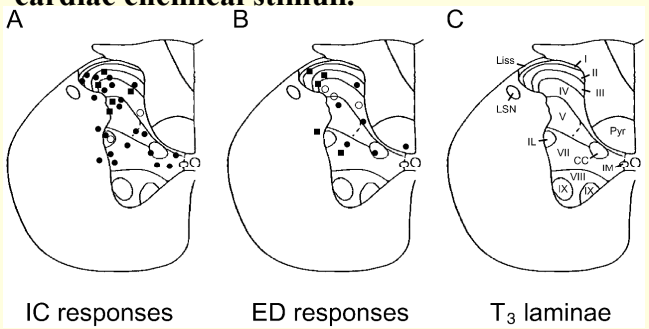
- **29 anesthetized male rats**
- **Extracellular potentials of T3-T4 neurons recorded**
- **Algogenic chemicals administered for noxious cardiac stimulation**
- **Noxious esophogeal distension produced by water inflation of latex balloon in pericardial sac.**
- **EMF's applied on both sides of chest**

RESULTS:

- **After EMFs, excitatory neuronal responses to intrapericardial chemicals were reduced in 24/32 (75%) spinal neurons.**
- **Inhibitory effect on spinal neurons occurred 10-20 minutes after the onset of EMFs.**
- **Even after termination of EMFs, the suppression of spinal neuronal activity 7/18 (39%) neurons to esophageal distension were inhibited, 5 (28%) were excited and 6 (33%) were not affected by EMFs.**
- **$p<0.05$**

CONCLUSIONS:

- **Results showed that EMFs generally reduced nociceptive responses of spinal neurons to noxious cardiac chemical stimuli.**



Lesion sites of neurons recorded from thoracic spinal cord. A: Neurons responding to intrapericardial chemicals. _ Neurons inhibited by EMFs; _ neurons excited by EMFs; and _ neurons not affected by EMFs. B: Neurons responding to esophageal distension. C: Spinal laminae of gray matter of T_3 segment. IX,