

Frequency Manipulation SCS

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Low Frequency Stimulation

- Is 40 – 60 Hertz optimal?
- Is there any difference with high vs low frequency?
- 2 Hz – an option but of any use?

The Journey to Date

- From rats to humans and back again.

Xing et al Dept Neurobiology Peking University Exp Neurology Dec
2007 208(2)

- Ligated sciatic nerve causes an increase in C fibre Dorsal Horn evoked field potential. Subcut stim in pain area:
 - 100Hz in sham causes LTD
 - 100Hz in SNL rats causes LTP
 - 2Hz causes LTD – reversed by naloxone

Treede group@Mainz – Klein et al J Neuroscience 2004
24(4) Perceptual Correlates of Nociceptive LTP and LTD
in humans

- Stimulation SC for 17 min then electrical stimuli applied.
- 100Hz increased pain and produced allodynia
- 1Hz decreased pain, no allodynia

Mainz Group J Neurophys 2007 97(3)

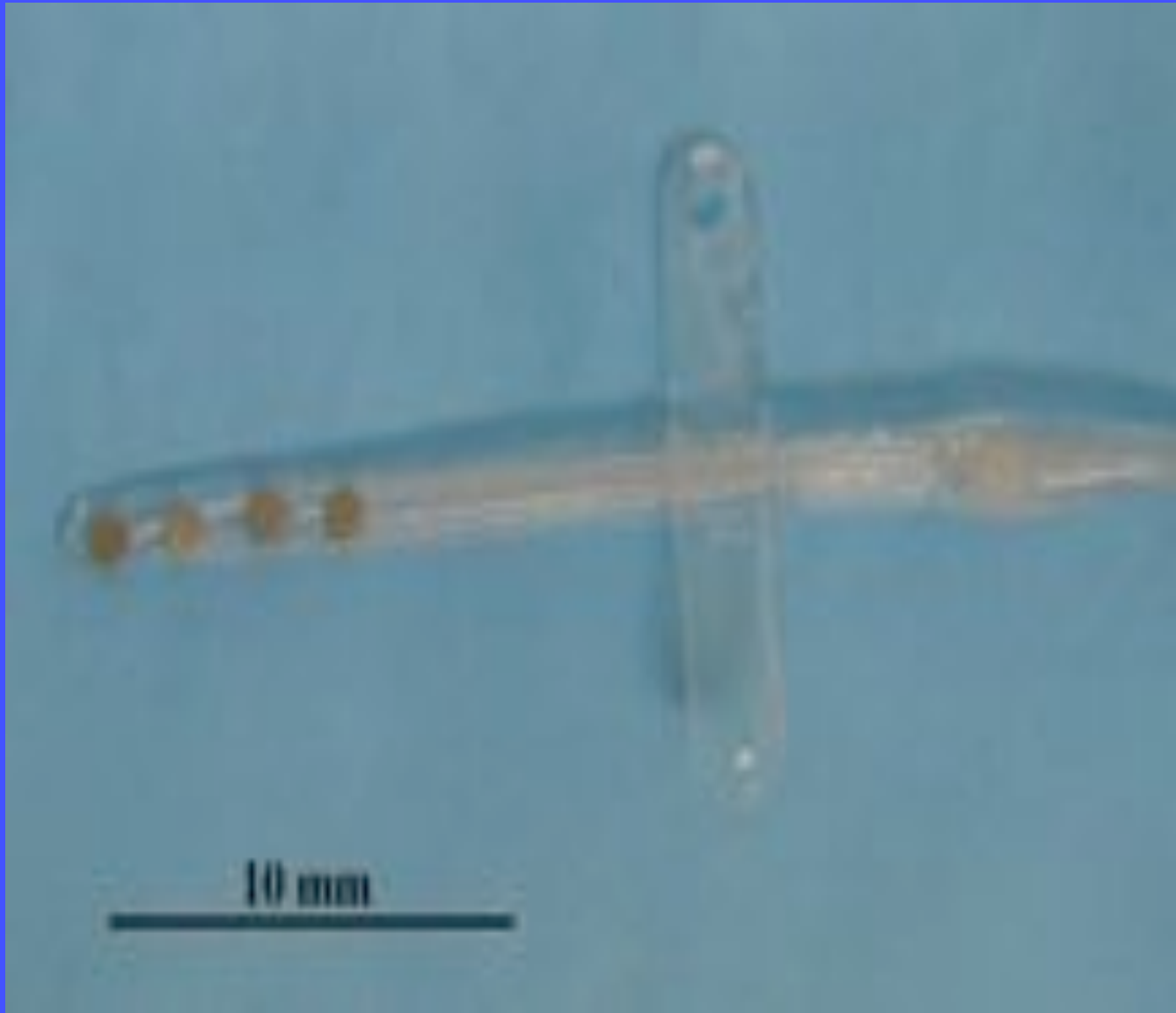
- 100Hz before electrical stimulus produced excessive amount of hot/burning descriptors and piercing/stinging descriptors compared to just baseline stimulus

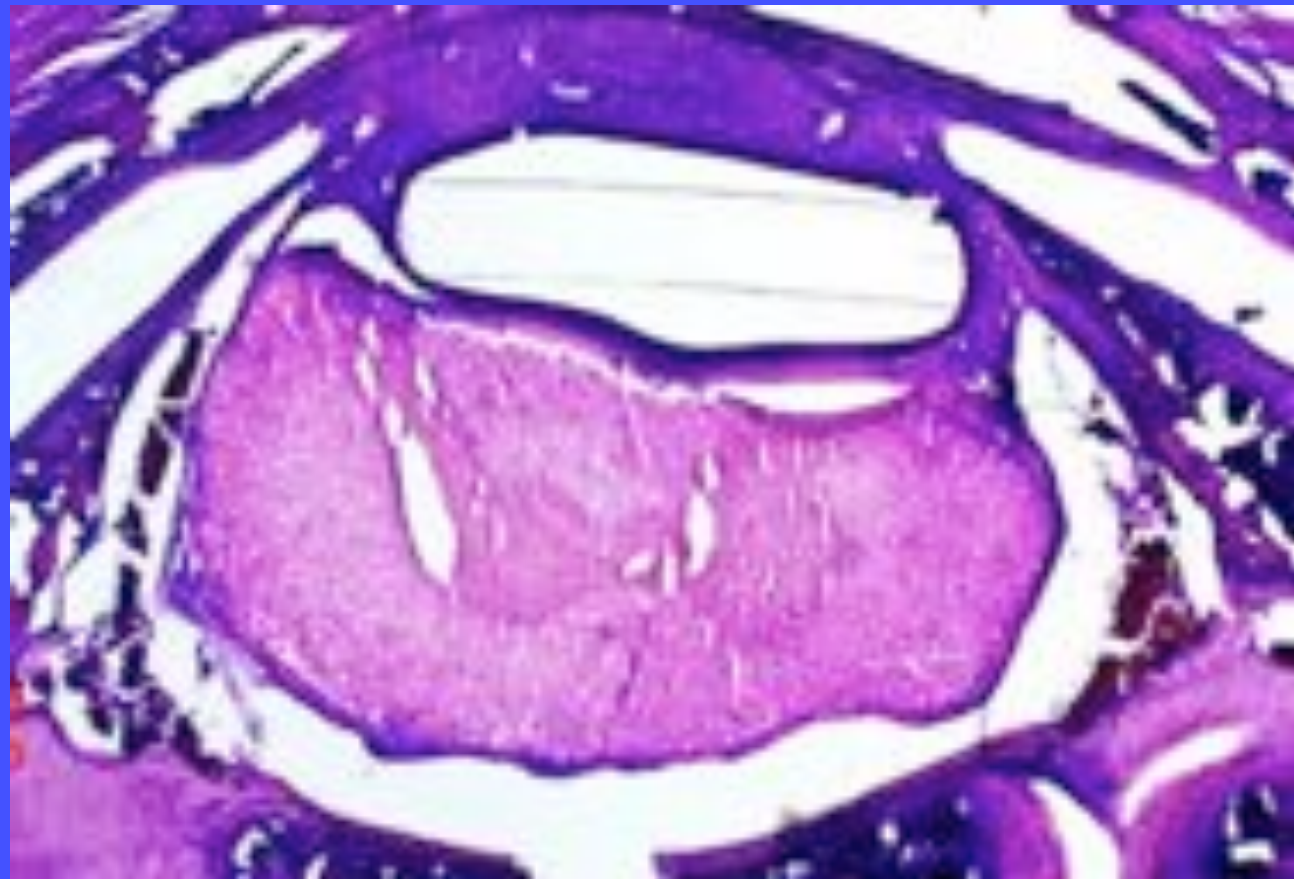
J Neurophys 2006 96(6) Perceptual correlate of
nociceptive LTP in humans

- 100Hz decreased the threshold for pinprick pain perceived as noxious.
- Lasted up to 32 hours
- Allodynia in 60% lasted up to 9 hours

Maeda et al Pain Research Program@ Uni Iowa Pain
2008 Jan18

- Spared Nerve Injury model – ligation of tibial+ common peroneal nerves and assessed 2 weeks later.
- SCS upper lumbar for 4 days @85% of motor threshold.

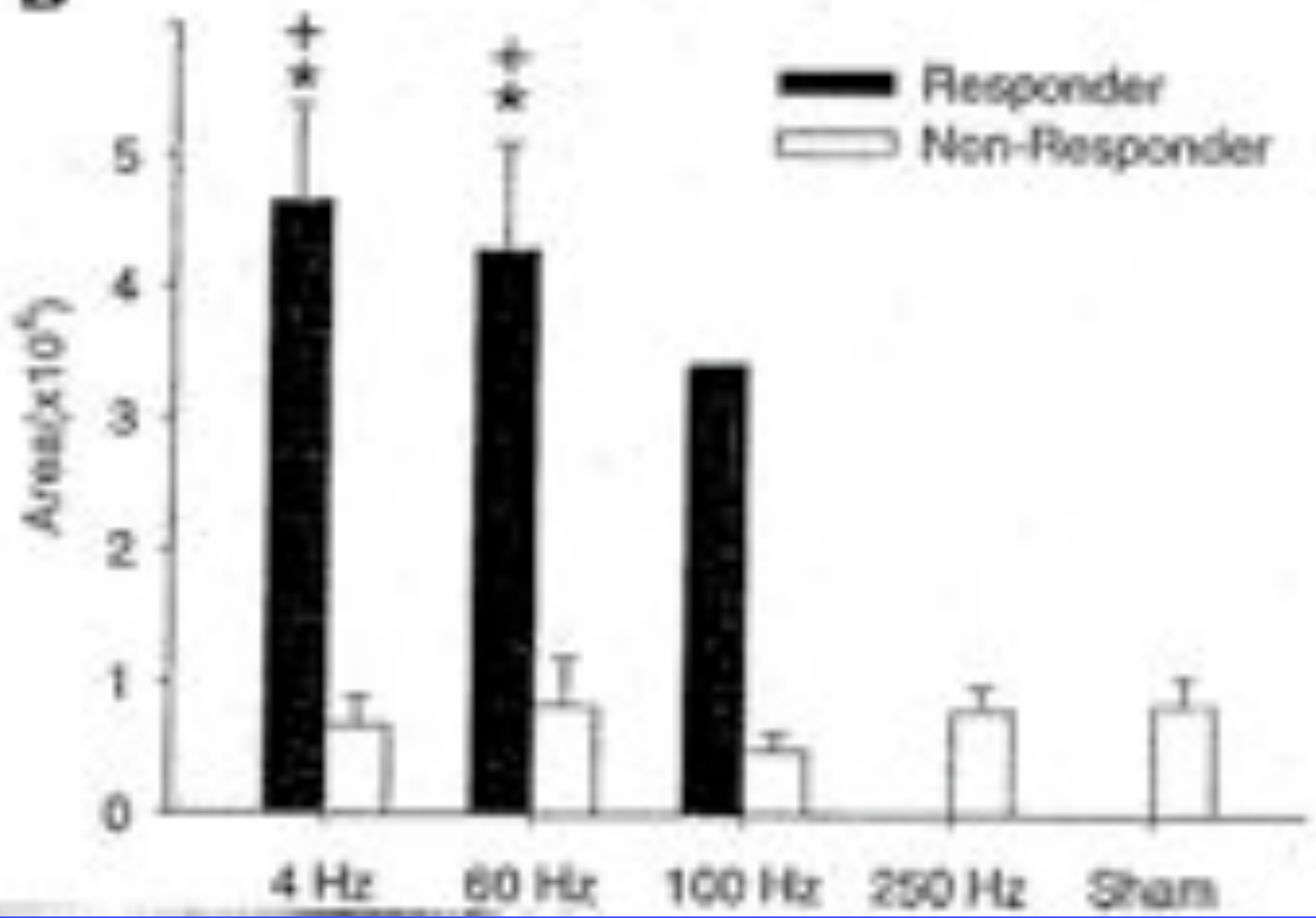




Results

- 4 and 60Hz NOT 100Hz caused decrease in hyperalgesia in subsequent paw withdrawal test (hot plate)

10



2Hz

- Does low frequency stimulation lead to altered protein expression that induces LTD via change in AMPA at the synaptic cleft?
- Does standard stim help perpetuate neuropathic pain?
- Pulse RF – 6 weeks?

2Hz Clinically

- We can do this.
- Nocturnal stim
- Multistim

What we need

- 1. Observations
- 2. Basic research
- 3. Testable hypothesis
- 4. Adequately powered trial