

#763 NEUROMODULATION USING ULTRA LOW FREQUENCY (ULF™) CURRENT WAVEFORM ATTENUATES ACTIVITY OF THALAMIC NEURONES IN A RODENT NEUROPATHIC PAIN MODEL

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1. Introduction:

- Chronic pain is a major cause of disability.
- Thalamic neurone firing is increased in pain patients and in models of chronic pain.
- We studied the effect of a novel, ultra low frequency (ULF™) biphasic neuromodulation in a model of neuropathic pain.

2. Methods:

- Induction of spinal nerve ligation (SNL) model of neuropathic pain in rats.
- Recorded spontaneous activity of cells in ventromedial posterolateral nucleus (VPL) in thalamus 4-11 days after SNL.
- ULF current applied at vertebral level T9/10.

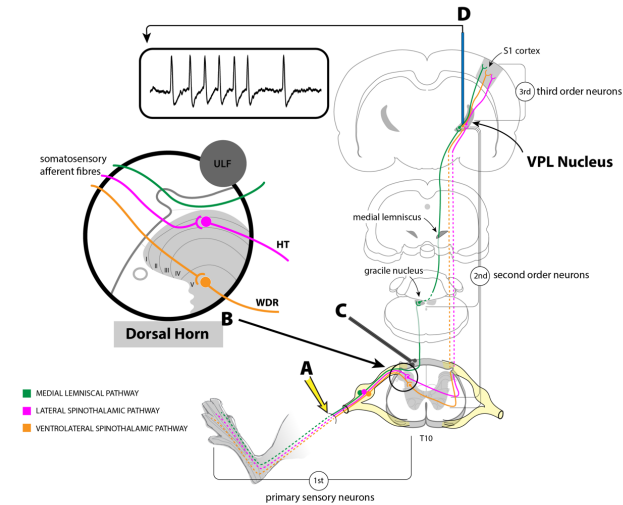


Figure 1. Schematic representation of sensory pathways to thalamus. A: site of SNL; B spinal dorsal horn; C: site of ULF; D: recording site.

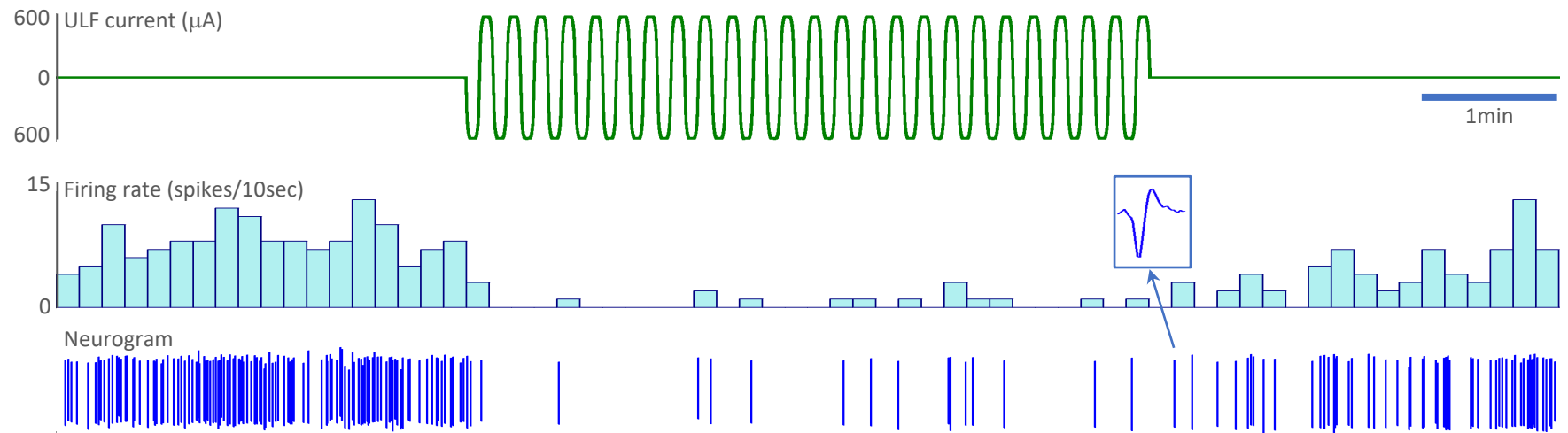


Figure 2. Reduction of firing rate of VPL neurone during spinal epidural ULF current. Top (green): ULF current applied at 600µA; middle (cyan): firing rate in 10sec epochs, with expanded inset of single spike; bottom (blue): spikes extracted from neurogram (Spike2 software, CED).

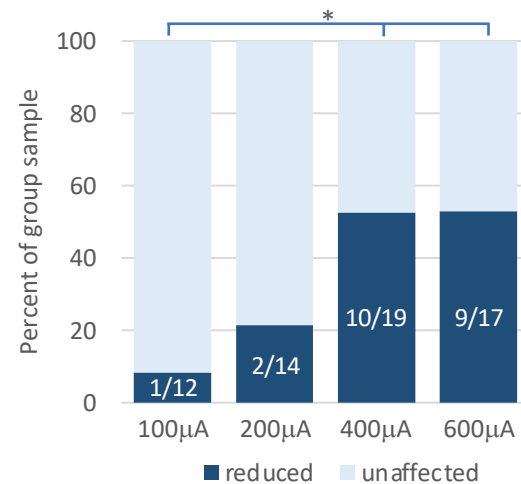


Figure 3. Numbers of cells exhibiting significant reduction in firing rate during ULF. * $P < 0.05$.

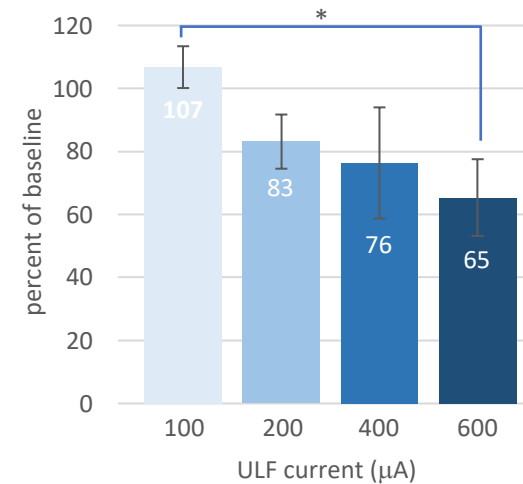


Figure 4. VPL neurone firing rate (mean ± SEM) at different ULF current intensities. * $P < 0.05$.

3. Results:

- Spinal epidurally-applied ULF current reduced the activity of VPL neurones in a dose-dependent manner.
- Firing rate recovered fully post-ULF.

4. Discussion and Conclusions:

- In this pain model, many neurones in VPL develop sustained pathological activity.
- **We demonstrate, for the first time, an acute and reversible reduction of pain-related activity in brain neurones by spinal ULF current.**
- The findings support previous results¹ indicating the potential for spinal epidural ULF current as a novel analgesic strategy.