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Telemetric recording of ectopic discharge and EEG in neuropathic rats – its application in evaluating analgesic and sedative actions of compounds

F-Y. Zhao, H. Wei, R. Jeggo and D. Spanswick.

NeuroSolutions Ltd. PO Box 3517, Coventry, CV4 7ZS, UK.

BACKGROUND:

Telemetry is increasingly used in biological/ pharmacological research with the ability to continuously record in freely moving animals offering obvious advantages over traditional electrophysiology. However, until now the use of telemetry in pain research has been relatively limited, particularly in relation to the recording of ectopic discharge from the peripheral nervous system. In combination with behavioural tests and EEG, this technique not only allows the evaluation of pain states and therapeutic treatments for pain, but also provides methodology for monitoring the quality of life of model animals and examination of potential side effects of test compounds. In this study, we aimed to develop methodology to telemetrically record ectopic discharge in peripheral nerves in models of neuropathic pain (Chung and CCI models), in combination with EEG recordings to evaluate analgesic and sedative actions of test compounds.

METHODS

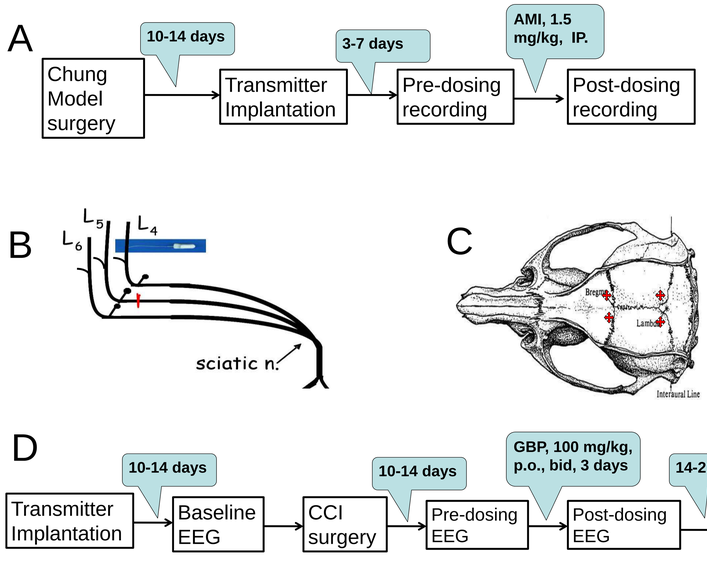


Figure 1. A schematic diagram showing the protocols used to record ectopic discharge (A,B) and EEG (C,D) in neuropathic rats (AMI-Amitriptyline, GBP-gabapentin).

RESULTS:

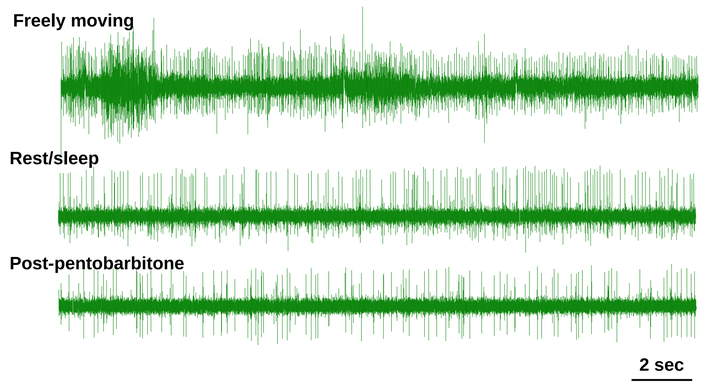


Figure 2. Ectopic discharge recorded from a Chung model rat whilst freely moving, at rest or sleep and following administration of pentobarbitone

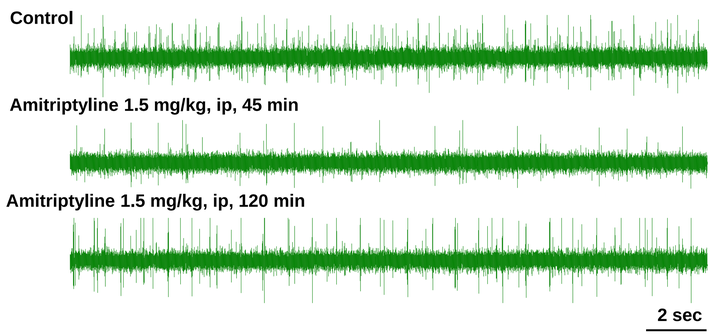


Figure 3. Amitriptyline suppressed ectopic discharge in a Chung model rat (under pentobarbitone anaesthesia)

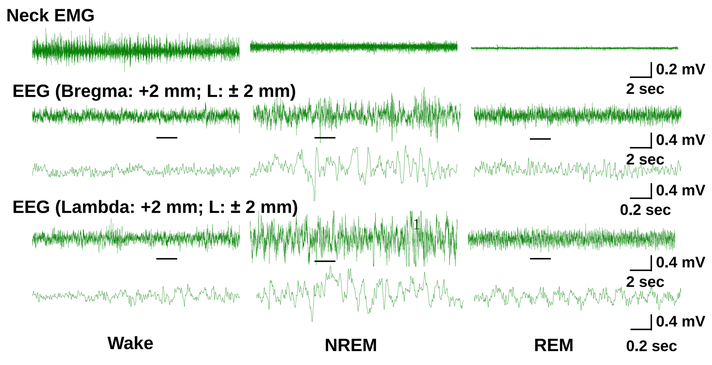


Figure 4. Scoring the wake/sleep phases according to EEG and neck EMG recorded in rats.

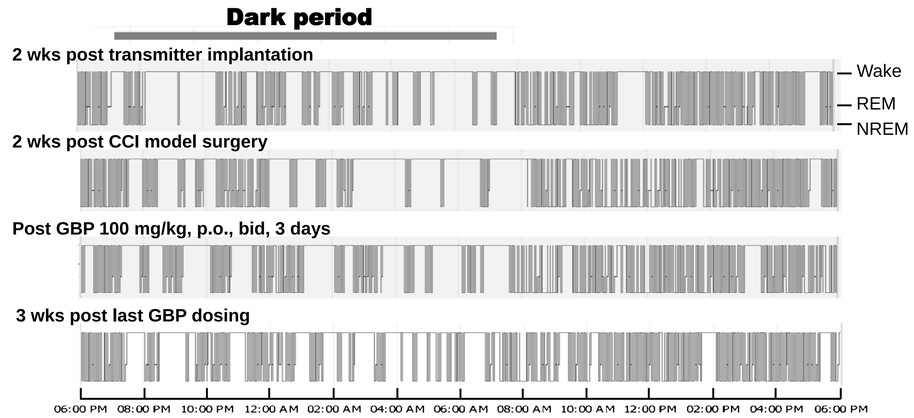


Figure 5. Rat hypnograms before/after CCI model surgery and dosing with GBP.

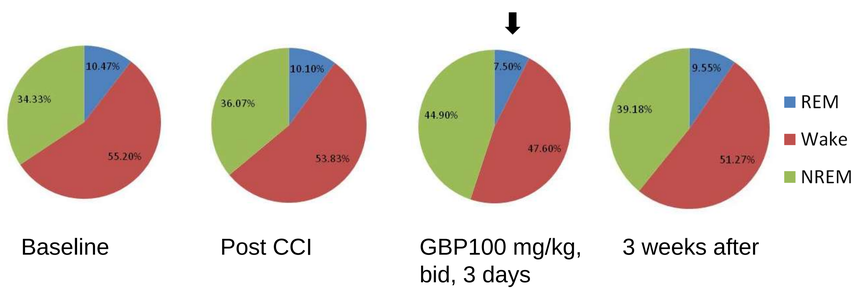


Figure 6. Gabapentin (GBP) increased slow wave sleep and reduced paradoxical sleep and wakefulness in CCI model rats.

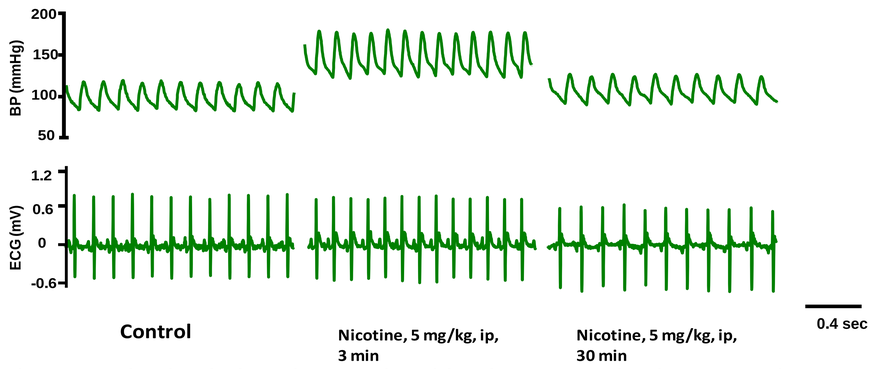


Figure 7. Nicotine induced a transient blood pressure rise in a normal rat.

CONCLUSIONS:

Telemetry is a valuable tool for the evaluation of the effects of analgesics actions and their potential side-effects.

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