A technique for the quantitative characterization of the sleep-wake cycle in the rat

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States of the sleep-wake cycle in the conscious, unrestrained rat with chronically implanted cortical and neck muscle electrodes (Etevenon & Boissier, 1971) were characterized quantitatively by correlating the frequency and amplitude content of the electrocorticogram with that of the electromyogram. This was achieved by analogue filtering, integration and division. Subsequent statistical analysis was performed by digital computation using a programmed calculator; the results were presented in numerical and graphical forms (Figure).

Reference

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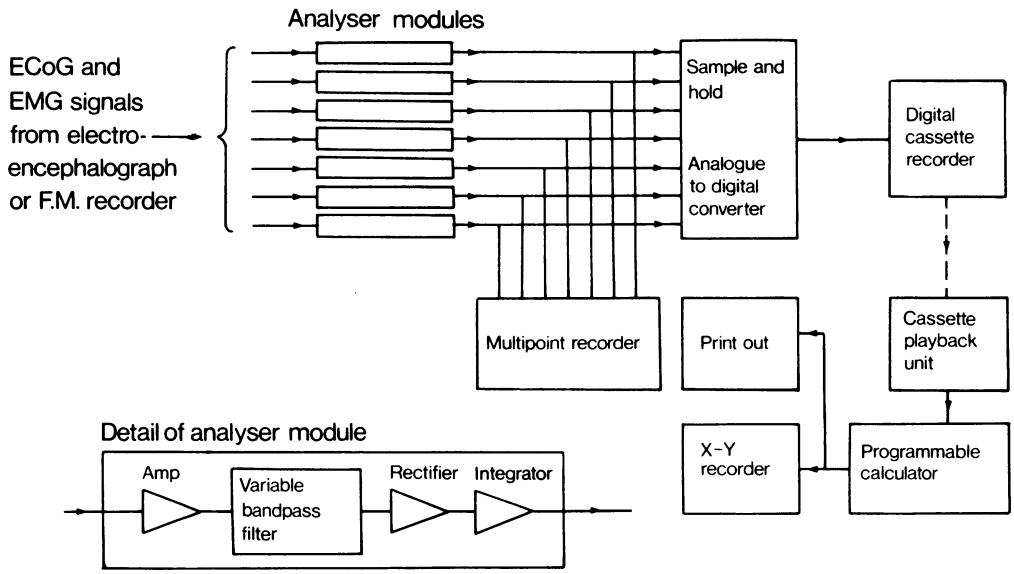

The sensitivity of motor units to neuromuscular blocking agents

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There are differences in the sensitivities of fast and slow twitch muscles to neuromuscular blocking agents (Paton & Zaimis, 1951). Within any one muscle there are motor units having a wide range of twitch speeds (Bessou, Emonet-Dénard & Laporte, 1963). For example in the fast muscle flexor digitorum longus of the cat some motor units have a twitch contraction time half that of the whole muscle, whilst at the other end of the range some motor units are almost as slow as a slow twitch muscle (e.g. Bagust, Knott, Lewis, Luck & Westerman, 1973).

It would be of interest to know if fast and slow

motor units within a fast muscle show the same differences in sensitivity to neuromuscular blocking agents as do fast and slow muscles. The demonstration illustrates the experimental techniques used to examine this problem. Some results using gallamine will also be presented.

Isometric tension is recorded with an unbonded wire strain gauge. In the amplifiers the passive tension of the muscle is subtracted from the total tension: the difference is the active tension which can then be amplified further. In this way whole muscle tension (about 500 g) can be recorded alternately with motor unit tension (as low as 50 mg). The amplifier output is analysed by a digital computer (Modular One, Computer Technology Ltd). The voltage is digitized with an accuracy 1 in 2024 (12 bit A.D.C.) and the programme estimates passive tension, maximum active tension, latency, time to peak and time to half relaxation of the twitch. The rate of change of tension is also derived so that the maximum value and the time to maximum can be measured. The electromyogram may be full-wave rectified and integrated.

Functionally single motor units are isolated by splitting ventral roots after cutting all nerves in the hind limb except that to flexor digitorum longus. It is possible to record from the whole muscle and one or more motor units stimulated in sequence during intravenous infusion of a competitive type of blocking agent and subsequent recovery.

We would like to thank the Medical Research Council who purchased the computer.

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Twin-channel recording of electrophoretically-induced rhythmical activity in the inferior olivary nucleus of the rat

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The occurrence of rhythmical activity in the inferior olivary nucleus following electrophoretic ejection of a number of drugs has been briefly described previously (Biscoe, Duggan, Headley & Lodge, 1973). In this demonstration we shall record simultaneously from two electrodes, one of which is also used to eject a rhythm-inducing drug.

Rats are anaesthetized with pentobarbitone and anaesthesia is maintained by a constant infusion of the barbiturate. Animals are ventilated following muscle relaxation. Two pairs of stimulating electrodes are implanted juxtafastigially in the cerebellum so that the inferior olive can be identified by antidromic invasion. A ventral craniotomy allows direct access to the olivary nucleus.

Two electrodes, controlled by separate micromanipulators, are inserted into the inferior olive. Ejection of a rhythm-inducing drug from one electrode induces widespread rhythmical activity which can be recorded at a distance by the second electrode. Rhythmical activity can be antagonized by the ejection of 5-hydroxytryptamine.

References

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