Responses of dorsal horn units in cat spinal cord to some putative transmitters and to cutaneous stimulation

J.L. HENRY (introduced by P.B. BRADLEY)

Department of Research in Anaesthesia, McGill University, Montreal, Canada.

Although attempts have been made to study the pharmacology of sensory transmission in the spinal cord (Game & Lodge, 1975; Henry, Krnjević & Morris, 1975; Randić & Yu, 1975) our knowledge remains limited.

In decerebrated or chloralose-anaesthetized cats, single units in the dorsal horn of the lumbar cord were studied to determine whether a correlation exists between responses to microiontophoretic application of some putative transmitters and those to peripheral stimulation. Stimuli used were: noxious thermal (radiant heat from a 250 W infrared bulb) and non-noxious (air stream, camel hair brush, gentle manual pressure).

One hundred and fifteen units were tested. Most units, regardless of the response to natural stimulation, were excited by glutamate and depressed by GABA. Substance P and bradykinin caused slow prolonged excitation of nociceptive units but failed to affect non-nociceptive units. Noradrenaline most commonly caused depression, although no correlation was found with a specific peripheral stimulus. 5-Hydroxytryptamine caused excitation and depression of approximately equal numbers of units; neither effect was clearly associated with a specific stimulus. In general, units located more dorsally tended to be depressed by 5-hydroxytryptamine, while those located more ventrally tended to be excited. Acetylcholine was usually without effect.

Although the pharmacology of pathways involved with specific sensory modalities is still far from clear these results suggest that Substance P and bradykinin may be associated with chemical transmission in spinal pathways subserving nociception and that glutamate and GABA might also be involved in transmission, although their effects are not associated with a specific sensory modality.

J.L.H. is a Fellow of the Canadian Medical Research Council. Present address: Laboratoire de Physiologie Nerveuse, CNRS–LPNI, Gif-sur-Yvette 91190, France.

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GABA antagonism as a possible basis for the convulsant action of a series of bicyclic phosphorus esters

N.G. BOWERY, J.F. COLLINS, R.G. HILL & S. PEARSON

Departments of Pharmacology, The University of Bristol, Bristol BS8 1TD, and St. Thomas's Hospital Medical School, London SE1 7EH and Department of Chemistry, City of London Polytechnic, London EC3.

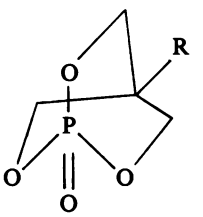

Figure 1

Compounds with the general formula 4(R)-1-Phospha 2,6,7-trioxabicyclo (2,2,2) octane-1-oxide ((R)PTBO where R = alkyl group, Figure 1) are potent convulsants (Bellet & Casida, 1973).

Intravenous or topical application of the isopropyl (IPTBO), ethyl (EPTBO) or pentyl (PPTBO) derivatives antagonizes the depressant action of microiontophoretically applied GABA in the rat medulla (Bowery, Collins & Hill, 1976). A quantitative comparison of the PTBO series as GABA antagonists was accordingly made *in vitro* on the isolated superior cervical ganglion of the rat (Bowery & Brown, 1974) and on the isolated hemisected spinal cord of the frog (Tebecis & Phillis, 1969).

Ganglia were excised from rats under urethane anaesthesia (1.5 g/kg) and suspended between two