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The influence of blood pressure on the responses of the nictitating membrane of the cat to sympathetic stimulation

SIR,—We have observed in cats anaesthetized with chloralose that the responses of the nictitating membrane were reduced when the blood pressure was reduced to 45 mm Hg.

Cats were anaesthetized with chloralose, 7·5 ml/kg of a 1% w/v solution in 0·9% w/v saline, administered intravenously after induction with ether. Carotid arterial blood pressure was recorded by means of a mercury manometer and contractions of the nictitating membrane by a frontal writing lever (15 times magnification, 8 g tension). The responses of the membrane to intravenously administered noradrenaline (50 μg) and adrenaline (40 μg) and to post-ganglionic nerve stimulation (10 V; 1 msec duration; 1, 5, 10 and 20 pulses/sec for 20 sec)

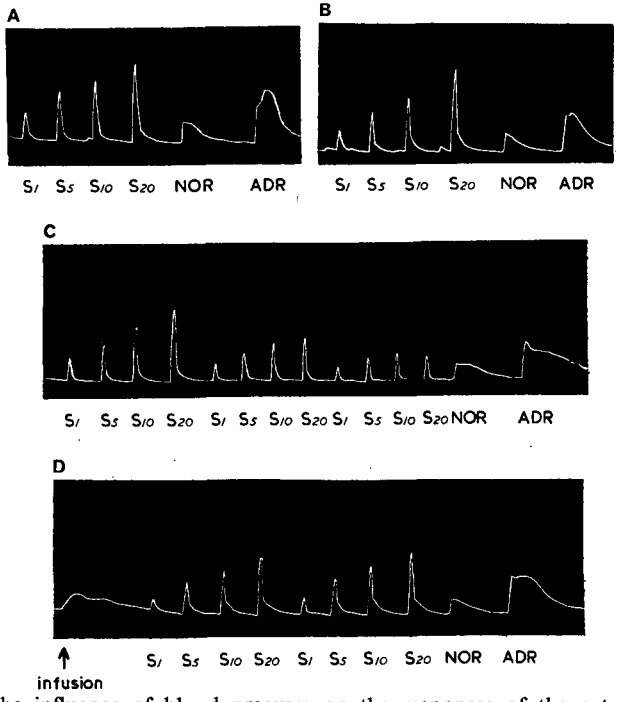

FIG. 1. The influence of blood pressure on the responses of the cat nictitating membrane to postganglionic stimulation of the ascending cervical sympathetic nerve (S) and to intravenous injections of 50 μg noradrenaline (NOR) and 40 μg adrenaline (ADR). Stimulus parameters 10 V, 1 msec duration at 1, 5, 10 and 20 pulses/sec for 20 sec. Between A and B the blood pressure was reduced by haemorrhage from 110 mm to 60 mm Hg. Between B and C the blood pressure was further reduced to 45 mm Hg. D shows the effect of restoring the blood pressure to 110 mm Hg by infusing the blood collected during haemorrhage.

were periodically recorded throughout the experiments, in which blood pressure was altered by changing the blood volume. Hypotension was produced by slow haemorrhage from a femoral arterial catheter and the blood pressure was restored by an intravenous infusion of heparinized cat blood. Typical results are shown in Fig. 1.

The mean resting arterial blood pressure of all cats used during these experiments was 100–120 mm Hg. In each case there was no significant change in any of the responses of the nictitating membrane until the blood pressure had been reduced to 45–60 mm Hg. A further reduction in pressure to 30–45 mm Hg resulted in a marked reduction in the responses of the membrane to nerve stimulation and only a slight reduction of the responses to injected catecholamines. When the cats were maintained in this state of hypotension the responses to injected adrenaline and noradrenaline remained unaltered whereas the responses to nerve stimulation became progressively weaker. Following re-establishment of the resting blood pressure there was an almost immediate return of all responses towards the control pre-haemorrhage levels.

We conclude that the reduction of blood pressure to 45–60 mm Hg or below, especially if prolonged, will reduce the responses of the cat nictitating membrane to nerve stimulation. Since the effect of blood pressure on the responses to intravenously administered catecholamines was minimal, interference with sympathetic nerve function is implicated.

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Potentiation of noradrenaline isomers by cocaine and desipramine in the isolated vas deferens of the rat

SIR,—A correlation of block of noradrenaline uptake and supersensitivity to this amine at the receptors of the effector organs, has received support from many authors (Hertting, Axelrod & Whitby, 1961; Muscholl, 1961; Thoenen, Huerlimann & Haefely, 1964).

The uptake of noradrenaline at nerve terminals is supposed to be stereospecific in favour of the D-(−)-isomer. Maickel, Beaven & Brodie (1963), Iversen (1963) and Euler & Lishajko (1964) have shown that D-(−)-noradrenaline is much more readily taken up into noradrenaline stores than is its L-(+)-isomer.

Block of uptake should result in a greater sensitization for those amines which are taken up readily than those which are scarcely taken up. Trendelenburg (1965) and Tye, Patil & LaPidus (1967) showed that cocaine sensitizes the nictitating membrane and the vascular system of the cat more to the D-(−)- than to the L-(+)-form.

In the investigations on which the present report is based, the phenomenon was examined *in vitro* on the isolated vas deferens of the rat, which is one of the most suitable preparations to assess noradrenaline supersensitivity (Ursillo & Jacobson, 1965; Cuenca & Valdecasas, 1965). In this preparation the D-(−)-form of noradrenaline is more active than the L-(+)-isomer (Patil, LaPidus & Tye, 1967). We found both cocaine and desipramine sensitized the preparation to the D-(−)-form whereas the L-(+)-form was unaffected by desipramine and slightly but not significantly potentiated by cocaine. This is shown in Fig. 1 where dose-response curves before and after cocaine or desipramine, obtained in four different preparations, are shown.