the heart was 90% depleted whereas the vas deferens and anococcygeus were only 50% depleted. This dose (200 μg/kg) and time (6 h) were selected to study the effects of nerve stimulation. Six groups of rats were used, control animals ; animals pithed but unstimulated ; animals pithed and the sympathetic nerves stimulated ; animals given reserpine but neither pithed nor stimulated ; animals given reserpine, pithed but not stimulated ; and animals given reserpine, pithed and stimulated. The appropriate spinal outflows were stimulated by a movable electrode in the spinal canal (Gillespie, MacLaren & Pollock, 1971).

The level of NA at 6 h in animals pithed but unstimulated rose in the anococcygeus muscle in comparison with the controls ; stimulation of the nerves at 30 Hz for 10 s periods at 90 s intervals for 2 h lowered NA levels in all organs. Reserpine alone caused a 50% reduction in the vas deferens and anococcygeus and a 90% reduction in the heart.

Pithing the animal after giving reserpine reduced the depletion in the vas deferens and anococcygeus to 36% and 42% respectively and in the heart to 66%. Stimulation of the nerves for 2 h in the reserpinized rat increased the depletion in the vas deferens and anococcygeus to 68% and 82% respectively, but in the heart simply restored the depletion to 90%. The increased depletion with nerve stimulation in the vas deferens and anococcygeus was statistically significant. Since the anococcygeus and vas deferens are equally resistant to reserpine depletion, the length of the adrenergic neurone seems to be unimportant. The reduced depletion, following pithing in all three tissues and the increased depletion by nerve stimulation in the vas deferens and anococcygeus suggest that impulse traffic is an important factor.

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The effect of cations on the spontaneous and drug induced efflux of ^{3}H-L-noradrenaline from the mesenteric arteries

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Perfusion of the rat mesenteric artery preparation with Ca^{2+} and Mg^{2+} free Krebs solution potentiates the pressor responses to tyramine, octopamine, metaraminol and noradrenaline (George & Leach, 1971).

To investigate the mechanism of this potentiation, the rat mesenteric artery preparation was perfused with (−)-noradrenaline-7-^{3}H and carrier (−)-noradrenaline diluted with normal Krebs solution to give a final concentration of 0·42 μCi/ml ^{3}H-(−)-noradrenaline and 200 ng/ml noradrenaline respectively, using the precautions described by Iversen (1963). The mesentery was perfused with this solution

for 60 min and the effect of perfusion with normal and modified Krebs solutions on the spontaneous release of ^{3}H-(−)-noradrenaline was then measured over a further 60 min period. The effect of changes in ion composition of the perfusing solution on the release of ^{3}H-(−)-noradrenaline caused by injection of noradrenaline 200 ng, metaraminol 20 μg, octopamine 50 μg and tyramine 100 μg, were studied and the results are summarized in Table 1.

TABLE 1

Perfusate composition	Mean spontaneous release D.P.M./ml	Mean increase in ^{3}H-noradrenaline outflow (D.P.M./ml)±S.E. on injection of Noradrenaline 200 ng	Octopamine 50 μg	Metaraminol 20 μg	Tyramine 100 μg
Normal	1,849	950±135	2,127±202	3,807±320	2,516±231
Mg^{2+} FREE	1,976	969±129	2,793±256	3,961±301	2,807±276
Ca^{2+} FREE	2,618	1,009±145	6,271±481	4,921±384	10,031±641
Ca^{2+} and Mg^{2+} FREE	3,549	1,117±172	10,098±836	9,551±522	16,728±1,062

These results indicate that the potentiation of the pressor response to sympathomimetic amines in the rat mesentery preparation is at least partly attributable to an increased release of noradrenaline under these conditions. It would also seem that the presence of Ca^{2+} in the bathing medium is not essential for the release of noradrenaline by sympathomimetic amines, and that Ca^{2+} exerts some influence on the potency of sympathomimetic amines in isolated preparations. Perfusion of the mesenteric arteries with Ca^{2+} and Mg^{2+} free solutions does not interfere with the uptake process for tyramine, octopamine and metaraminol.

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Effects of acetylcholine on vasoconstriction and release of ^{3}H-noradrenaline in response to sympathetic nerve stimulation in the isolated artery of the rabbit ear

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Vasoconstrictor responses of the isolated artery from the rabbit ear to sympathetic nerve stimulation at low frequencies (1–5 Hz) were increased in the presence of low concentrations of acetylcholine (ACh) ($<1\times10^{-9}$M) and were decreased by higher concentrations of acetylcholine ($>1\times10^{-8}$M). These findings are in accord with those of Malik & Ling (1969), who used rat mesenteric artery. To determine whether the effect of ACh on responses was due to alterations in transmitter release, observations were made on the efflux of tritium from arteries previously incubated with ^{3}H-noradrenaline (^{3}H-NA). Tritium release was increased by a low concentration (1×10^{-10}) of ACh but was decreased by higher concentrations of ACh ($>1\times10^{-7}$M).

Atropine antagonized the effects of ACh in decreasing vasoconstriction and tritium efflux in response to sympathetic nerve stimulation. In a series of experiments with stimulation at 2 Hz, a decrease of 50% or more in the contractile response was obtained with concentrations of ACh ranging from 5×10^{-8} to 1×10^{-6}M, then atropine