Drug-induced changes in the sensitivity of the isthmus of rabbit oviduct to noradrenaline

A. JOHNS* & D.M. PATON

Department of Pharmacology, University of Alberta, Edmonton, Alberta, Canada

The adrenergic innervation of the isthmus of the rabbit oviduct may influence ovum transport by functioning as a hormone-dependent sphincter (Brundin, 1965). In the present study, we have examined the influence of the adrenergic innervation of the oviduct on sensitivity to (-)-noradrenaline (NA).

Female New Zealand rabbits were pretreated with β-oestradiol and killed by air embolism. The oviducts were removed and the isthmic portions dissected. Isometric contractions of longitudinal and circular muscle were separately recorded from longitudinal segments and from connected rings using strain gauges. Tissues were suspended in oxygenated Krebs bicarbonate solution (26°C). Non-cumulative doses responses curves were determined.

Longitudinal muscle (ED_{50}, 8.2×10^{-7} M) was significantly more sensitive to NA than circular muscle (ED_{50}, 3.5×10^{-6} M). Cocaine (3×10^{-5} M) potentiated responses of circular muscle to NA about 13-fold (ED_{50}, 5.3×10^{-6} M to 4×10^{-7} M) and of longitudinal muscle four-fold (ED_{50}, 9.5×10^{-7} M to 2×10^{-7} M). Desipramine (10^{-7} M) potentiated responses of circular muscle to NA about seven-fold (ED_{50}, 3×10^{-6} M to 4.5×10^{-7} M) but did not alter responses of longitudinal muscle. Pretreatment of animals with 6-hydroxydopamine abolished responses to tyramine and transmural stimulation, and potentiated responses to NA of both circular (ED_{50}, 4×10^{-7} M) and longitudinal muscle (ED_{50}, 4.8×10^{-7} M). Responses to methoxamine were not affected by cocaine.

These findings have demonstrated that the sensitivity of the isthmus to NA is influenced by uptake of the amine into adrenergic neurones since NA was potentiated by cocaine and desipramine which inhibit neuronal uptake (Iversen, 1971) and by pretreatment with 6-hydroxydopamine which causes degeneration of adrenergic nerve terminals (Thoenen & Tranzer, 1968). Responses to methoxamine which is not transported into adrenergic neurones (Trendelenburg, Maxwell & Pluchino, 1970) were not influenced by these agents.

Circular muscle was less sensitive to NA than longitudinal muscle and was significantly more potentiated by cocaine, desipramine and 6-hydroxydopamine. These findings are consistent with fluorescent histochemical studies that have provided evidence that the circular muscle of the isthmus has a more dense adrenergic innervation (Brundin, 1965; Owman & Sjoberg, 1966).

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