

The rat anococcygeus; a new, densely innervated smooth muscle preparation

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The ideal innervated smooth muscle preparation would be one consisting entirely of smooth muscle cells, these cells arranged in parallel bundles to form a thin sheet in which the problem of diffusion would be minimal. The muscle should be represented bilaterally so that control and experimental tissue can be obtained from the same animal. If such a preparation was densely innervated and both pre- and postganglionic fibres available for stimulation this would be an additional advantage.

The preparation to be described has many of these advantages. The anococcygeus muscles arise independently from one, or more usually two, upper coccygeal vertebrae. The muscles at their origin lie close to one another and behind the terminal colon. They pass caudally and ventrally to sweep round the lateral side of the colon and unite in a well defined ventral band in front of the colon about 0.5–1 cm short of the anal margin. Some fibres continue down the posterior surface of the colon. The two muscles are easily and quickly dissected out, are about 3 cm long by 0.5 cm broad at the broadest part but only 150–300 μm thick. The external nerve (a branch of the perineal) can be retained with the muscle. Histological sections prepared by the technique of Hillarp & Falck show a dense adrenergic terminal plexus diffusely spread throughout the muscle fibres.

The response of the muscle suspended in Krebs saline at 36°C has been examined. There is no spontaneous activity nor any resting tone. The muscle contracts to field electrical stimulation or to stimulation of the extrinsic nerves. Neither contraction is affected by hexamethonium in concentrations up to 3×10^{-5} M, both are blocked by phentolamine (10^{-6} M) or guanethidine (10^{-5} M). Guanethidine has no effect on the response to noradrenaline. Atropine (3×10^{-5} M) has no effect on the response to nerve or field stimulation. Noradrenaline in low concentrations (10^{-7} M) causes contraction blocked by phentolamine. Acetylcholine in low concentrations (3×10^{-7} M) causes contraction blocked by atropine. Isoprenaline in low doses of 10^{-7} – 3×10^{-6} M has no effect, higher concentrations of 3×10^{-6} – 3×10^{-5} M cause large contractions. These are unaffected by propranolol (3×10^{-5} M). All doses of isoprenaline, including those too small themselves to cause contraction, potentiate the response to noradrenaline. These results suggest that the smooth muscle cells are adrenergically innervated, have both α -adrenoceptors and muscarinic receptors, but no or few β -adrenoceptors.

An unexpected inhibitory response appears with field stimulation in the presence of guanethidine. This inhibition is seen only with large doses of guanethidine which themselves raise muscle tone. It is exaggerated if muscle tone is raised by noradrenaline. The origin and mechanism of this response are being investigated.

Pharmacological observations on the vas deferens of the mouse

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The vas deferens of the mouse, stripped of mesenteric investment, was suspended between parallel platinum wire electrodes immersed in Hukovic's solution (Hukovic,