The responses of the isolated stomach of a guinea-pig to electrical stimulation / by W.D.M. Paton and J.R. Vane.

PATON, W. D. M. and J. R. VANE (London, England).

The responses of the isolated stomach of a guinea-pig to electrical excitation.

The guinea-pig's stomach was washed out, suspended in Krebs' solution (37° C., gassed with 95 % O_2, 5 % CO_2) and the pressure or volume of the contents recorded. By means of electrodes either in the Krebs' solution inside and outside the stomach wall (" transmural stimulation "), or on the vagus nerves on the oesophogus (" vagal stimulation "), stimuli of 0.1 msec-2 msec. duration were applied at frequencies varying from 1 per min to 50 per sec. Such stimuli excited only nervous structures.

With transmural stimulation, contractions of the stomach were obtained with single shocks. Increasing the rate of stimulation increased the size of the contraction, which was then followed by a pronounced relaxation, often with distinct rapid and slow phases. Complete emptying (when recording volume change) or generations of pressures up to 20 mm. Hg. could be obtained with suitable transmural stimulation. After prolonged stimulation, the contents of the stomach also became acid.

Analysis of the responses, using selective blocking agents such as hyoscine, hexamethonium and neostigmine showed that :

(a) transmural stimulation excites both pre- and post-ganglionic sympathetic and para-sympathetic nerve fibres.

(b) the vagus nerve behaves, pharmacologically, as if it contains preganglionic nerves, innervating both cholinergic and adrenergic ganglion cells, as well as postganglionic adrenergic nerves.

The fluid in the bath was tested for the liberation of active substances : in the presence of eserine or neostigmine substantial amounts of acetylcholine (about 0.2 ng/shock applied) appeared on stimulation, but detectable amounts of histamine, 5-hydroxytryptamine and a sympathomimetic substance also appeared.

The possible role of these agents as transmitters of nervous effects in the stomach will be discussed.

Printed in Belgium

1958 Abs XX Congreso Int de Phy