

## The effects of glucagon and pentagastrin on capillary filtration coefficient in the innervated jejunum of the anaesthetized cat

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Capillary filtration coefficient (CFC) measurements in the innervated cat jejunum have been shown (Richardson, 1974) to be affected by doses of some drugs which are too low to produce any appreciable effects on other variables; the present report describes the effects of two gastrointestinal hormones on these preparations. Eleven cats (mean weight 3.1 kg, range 2.7-4.0 kg) were anaesthetized with chloralose (70 mg/kg i.v.) after halothane induction, and CFC measured in loops of innervated jejunum ( $60 \pm 14$  g: mean  $\pm$  s.d.) using a modification (Richardson, 1974) of the technique of Folkow, Lundgren & Wallentin (1963). All values are expressed as means  $\pm$  s.e. means, and the significance of differences between paired data tested by Student's *t*-test. The control values were: for systemic arterial mean pressure  $121 \pm 9$  mm Hg (1 mm Hg = 133 Pa), for heart rate  $172 \pm 12$  beats/min, for jejunal blood flow  $31 \pm 4$  ml  $\text{min}^{-1} 100 \text{ g}^{-1}$ , for jejunal vascular resistance  $4.58 \pm 0.59$  PRU (mm Hg  $\text{ml}^{-1} \text{min} 100 \text{ g}$ ) and for CFC  $0.028 \pm 0.005$  ml  $\text{min}^{-1} \text{mm Hg}^{-1} 100 \text{ g}^{-1}$ , values similar to those previously reported for such preparations (Richardson, 1974).

Glucagon hydrochloride (Lilly) was infused i.v. once to each of seven preparations in a dose of  $0.25 \mu\text{g kg}^{-1} \text{min}^{-1}$ , producing a significant ( $P < 0.01$ ) reduction in CFC of  $55 \pm 14\%$  from  $0.023 \pm 0.004$  to  $0.009 \pm 0.003$  ml  $\text{min}^{-1} \text{mm Hg}^{-1} 100 \text{ g}^{-1}$ . The systemic arterial mean pressure fell by  $5 \pm 1\%$  ( $P > 0.05$ ), the heart rate rose by  $8 \pm 6\%$  ( $P > 0.05$ ), the jejunal blood flow rose by  $7 \pm 4\%$  ( $P > 0.05$ ) and the jejunal vascular resistance fell by  $8 \pm 3\%$  ( $P > 0.05$ ).

Pentagastrin (Peptavlon, ICI) was infused i.v. in a dose similar to the human gastric secretagogue dose (Wormsley, Mahoney & Ng, 1966),  $0.1 \mu\text{g kg}^{-1} \text{min}^{-1}$ , on one occasion to each of five preparations. The CFC was reduced by  $46 \pm 4\%$  from  $0.037 \pm 0.008$  to  $0.021 \pm 0.008$  ml  $\text{min}^{-1} \text{mm Hg}^{-1} 100 \text{ g}^{-1}$  ( $P < 0.01$ ), whilst the systemic

arterial mean pressure fell by  $4 \pm 3\%$  ( $P > 0.05$ ), the heart rate rose by  $1 \pm 3\%$  ( $P > 0.05$ ) and the jejunal blood flow fell by  $4 \pm 2\%$  ( $P > 0.05$ ) leaving the jejunal vascular resistance unchanged ( $0 \pm 2\%$ ).

In five preparations, the glucagon infusion ( $0.25 \mu\text{g kg}^{-1} \text{min}^{-1}$ , i.v.) was repeated after phentolamine, 2.0 mg/kg, a dose found adequate to block the effects of exogenous  $\alpha$ -adrenoceptor stimulants (Richardson, 1974). The effects of glucagon on systemic arterial mean pressure, heart rate, jejunal blood flow and vascular resistance did not differ from those before phentolamine ( $P > 0.5$ ). However, glucagon now caused a rise in CFC of  $38 \pm 16\%$  from  $0.024 \pm 0.005$  to  $0.031 \pm 0.004$  ml  $\text{min}^{-1} \text{mm Hg}^{-1} 100 \text{ g}^{-1}$  ( $P < 0.02$ ). The difference between the effects of glucagon before and after phentolamine was highly significant ( $P < 0.001$ ).

Drug effects on CFC are due to changes either in vascular permeability or in the functional exchange vessel area brought about by alterations in the tone in the precapillary 'sphincters'. The reversal of the effects of glucagon by phentolamine points towards the conclusion that glucagon causes constriction of the precapillary 'sphincters' which is reversed to a dilator action after  $\alpha$ -adrenoceptor blockade. Glucagon releases supranrenal catecholamines in the cat (Fasth & Hulten, 1971) and these effects may be related to this action.

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