The effect of glucagon on the canine duodenum and small intestine

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Glucagon is used to relax the duodenum during hypotonic duodenography (Chernish, Miller, Rosenak & Scholz, 1972). Our findings suggest that after a bolus injection, relaxation occurs only after initial stimulation and an infusion results in continuous stimulation.

We have measured the effect of exogenous glucagon (Novo) on the canine duodenum, jejunum and terminal ileum using implanted electrodes and strain gauge transducers. Simultaneous records of mechanical and electrical activity were made in four conscious fasted dogs and stored on magnetic tape. Electrical and force transducer data were analysed on a digital computer enabling quantitative correlations to be made between the basic electrical rhythm (BER), fast spike, and mechanical activity.

A bolus intravenous injection of glucagon (0.05 mg/kg) caused marked significant mechanical stimulation (unpaired *t*-test, $P < 0.01$) of the hitherto inactive duodenum and distal small intestine associated with fast spiking activity (mean maximum 360 spikes/min, s.d. 99), where previously only the BER was evident. Stimulation lasted 3 to 5 min followed by a fall of the base line of the strain gauge recording suggesting relaxation.

A 30 min infusion of glucagon (0.5 or 1.00 mg/h) caused significant rhythmical, mechanical (unpaired *t*-test, $P < 0.001$) and spike potential activity (mean max 260 spikes/min, s.d. 104) alternating with periods of quiescence which continued throughout the period of infusion. The measurement technique and examples of tape recordings will be demonstrated.

Reference

CHERNISH, S.M., MILLER, R.E., ROSENAK, B.D. & SCHOLZ, N.E. (1972). Hypotonic duodenography with the use of glucagon. *Gastroenterology*, **63**, 392–398.

A bee counter for monitoring bee activity and bee behaviour

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Bees are an important factor in the production of crops such as fruit and seed. It is important therefore to be able to measure accurately the toxic effects of chemicals which the bees are likely to meet on the crops. To this end we have developed a completely portable electronic bee counter for continuous use on nucleus or full hives. The aim was to study the effects of agrochemicals on the foraging behaviour of bees and obtain an estimate of the numbers of bees dying away from the hives.

The counter is fixed over the entrance to the hive and counts separately, numbers of bees entering and leaving the hive. The basis of the counter is a phototransistor 'activated' by a bee blocking off daylight. These detectors are arranged in pairs, 8 mm apart in twelve channels, each of which just allows bees to pass through singly. The detector nearest to the hive counts bees leaving and the furthest detector counts beeing entering the hive. Separation of 'in' and 'out' movements is achieved by a 'blanking circuit' which operates such that when one of a pair of detectors is activated, the other member of the pair is electronically blanked for four seconds, allowing a bee to completely clear the channel. The shape of the body of the bee passing over the detector produces a pulse with a complex shape. This bee pulse is squared and then shortened before passing to the counting circuit. Normally counts are divided by one hundred and displayed cumulatively on electromechanical counters.

The important features of the counter are: (a) it does not interfere with the normal behaviour of the bees; (b) it uses CMOS technology thus consuming negligible current and allowing continuous operation on a single 9 V battery.