

## STIMULATION OF EXOCRINE PANCREAS SECRETION BY EXOGENOUS CCK-8 AND SECRETIN BOLUSES DURING COLD VAGAL BLOCKADE

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### Introduction

Central nervous control by vagal nerves including vagal long reflexes plays an important role in regulation of exocrine pancreatic function. Block of vagal conductivity performed on many ways (vagotomy, pharmacological or cold block of vagi) decreases pancreatic juice outflow as well as protein content and trypsin activity (Grundy et al., 1983; Zabielski et al., 1989). The stimulatory effect of CCK and secretin on exocrine pancreatic secretion is well established. Unfortunately relationship between vagus and gastroenteropancreatic (GEP) hormones are still controversial. Henriksen (1969) reported that cholinergic and secretin stimulation do not influence each other. Konturek et al. (1974) found that vagotomy did not affect secretion induced by exogenous secretin or CCK. Kohler et al. (1987) observed that denervated dog pancreas is as sensitive as intact to exogenous secretin and caerulein stimulation. On the other hand cold vagal block decreased the secretory response to secretin stimulation of anaesthetised cat pancreas (Grundy et al., 1983). The present paper deals with pancreatic response to short and reversible blockade of nervus vagus performed on conscious calves in chronic experiments.

### Materials and Methods

In four Friesian male calves 1.5 to 3 months old cooling devices were implanted on both vagosympathetic trunks on the neck. Pancreatic duct was catheterised and perforated T-shape cannula was inserted to the jejunum, about 4 cm beyond the end of duodenum.

Pancreatic juice between the experiments (started about 3 weeks after surgery) was reintroduced to the jejunum. Animals were fasted 18 hrs before every experiment with a free access to water and salt lick. Collections of pancreatic juice were initiated at 08.00 by 4 x 30 min sample periods. At 10.00 vagal block was started and continued for

45 min. Temperature of thermode was established at 5°C. After 15 min of vagal block CCK-8 (0.16 µg/kg b.w., Sigma, USA) or secretin (0.5 U/kg b.w., Sigma, USA) were administered in bolus (A) i.v. injection. Collections of pancreatic juice after hormonal stimulation were divided to three periods of 5 (I), 10 (II) and 15 min long (III) (experimental condition). When rewarming of the nerve started 3x30 min collections of basal flow and effect of bolus (B) injection of hormones were performed in the same order as previously (control condition). Volume, protein concentration and trypsin activity were measured.

### Results and Discussion

Results of experiment (presented on figure 1, 2 and 3) confirm strong inhibitory effect of vagal blockade on exocrine pancreatic secretion and indicate different effect of secretin during vagal inhibition. Injection of secretin in the control condition increases the pancreatic juice outflow for 15 min and some rise of protein and trypsin secretion for 5 min, only. Cold blockade of vagi fully abolished the stimulatory effect of secretin on pancreatic secretion even slight hyposecretion was observed 15-30 min after hormone administration. It means that effect of secretin is vagal dependent.

Stimulation by CCK-8 caused marked 5-10 min long increase of all parameters of pancreatic secretion. During cold block CCK-8 affects pancreatic secretion proportionally to its action in control conditions. Thus it can be concluded that rise of pancreatic secretion caused by CCK-8 is independent on vagal activity, but it is strongly related to vagally controlled basal level of pancreatic secretion. These observations are in some extent similar to those of Grundy et al. (1983) where short time vagal block was also used, but are opposite to findings of Konturek et al. (1974) and Kohler et al. (1987). In their experiments unchanged or even higher sensitivity of exocrine pan-

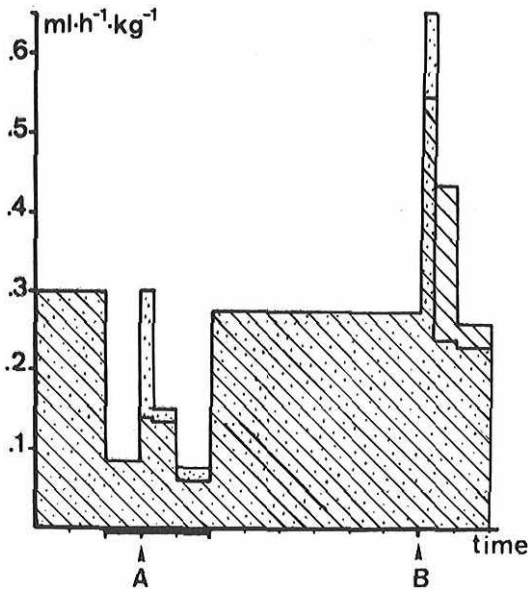


Figure 1. Average volume of secreted pancreatic juice in different experiments. Dotted area experiment with CCK-8; lined area experiment with secretin. Arrows indicate moment of hormone injection. Horizontal bar indicates period of vagal blockade. Time calibration: 15 min.

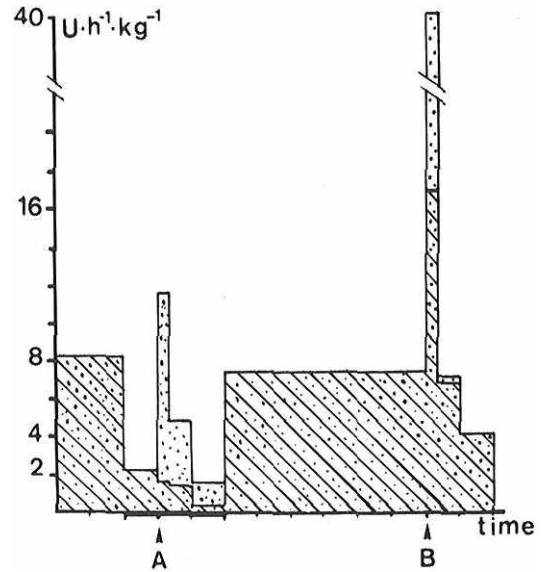


Figure 3. Average trypsin secretion in pancreatic juice. For description see figure 1.

creas to GEP hormones was probably caused by adaptative processes after chronical vagotomy or denervation of pancreas.

(Key Words: Exocrine Pancreas, Vagal Block, GI Hormones)

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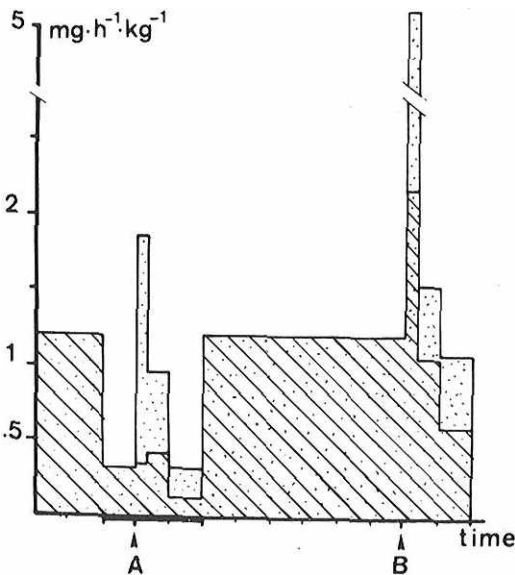


Figure 2. Average protein secretion in pancreatic juice. For description see figure 1.