RAT HYPOTHALAMIC GROWTH HORMONE RELEASING FACTOR (rhGRF) STIMULATES RECTAL GLAND SECRETION IN SQUALUS ACANTHIAS.

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The 43-amino acid peptide, rhGRF is a member of the family of peptides that includes vasoactive intestinal peptide (VIP), glucagon and secretin. These hormones contain similar sequences and are secreted by gastrointestinal, endocrine and neural cells. The rectal gland of Squalus acanthias contains receptors for VIP, a neurotransmitter in this tissue which stimulates adenylate cyclase and thereby regulates rectal gland secretion. Secretin and glucagon, though both structural homologues of VIP, do not affect secretion by isolated perfused rectal glands. By contrast, in the present experiments rhGRF was found to be a potent stimulus for chloride secretion.

Isolated rectal glands were perfused at 16°C with shark Ringer's solution containing 5 mM glucose and gassed with 99%O_2 1%CO_2 at a pH of 7.5 as previously described (Silva et al, Am J Physiol 233: F298-F306, 1977). VIP (Sigma) or rhGRF (kindly supplied by Drs. Jean Rivier and Wylie Vale of the Salk Institute) were dissolved in 1 ml. of shark Ringer's and injected as a bolus over a period of 1 minute into the arterial circulation of the perfused gland, without interrupting the normal flow of perfusate (about 4 ml/min). The concentration of hormone reaching the gland was calculated as the quantity injected divided by the volume of perfusate flow in one minute. The hormones were usually injected after 3 basal collection periods lasting 10 minutes each and the stimulatory effect upon the rectal gland was defined as the output of chloride in uEq/g wt/hr during the 10 minutes immediately following the bolus. At all doses of both hormones, the secretion induced by bolus injections reached its peak during the first 10 minutes after the injection and returned to its baseline level during the second or third 10 minute collection periods. Injections of rhGRF were usually alternated with boluses of VIP, to permit the comparison of relative potency in the same perfused gland. Figure 1 summarizes the results.

Growth releasing factor stimulated rectal gland secretion in a dose-dependent fashion, at concentrations varying from 2.9×10^{-7}M to 1.2×10^{-6}M. The potency of rhGRF relative to VIP was approximately 0.1 to 0.07; that is, rhGRF was required from at 10 to 15 times the molar concentration of VIP to produce comparable stimulation of chloride secretion.

These results suggest that GRF or a related peptide might play a physiological role in the control of rectal gland secretion, either by binding to VIP receptors as is the case in pancreatic acini (Pandol SJ et al, Science, 255: 326-8, 1984), or to specific receptors of its own.

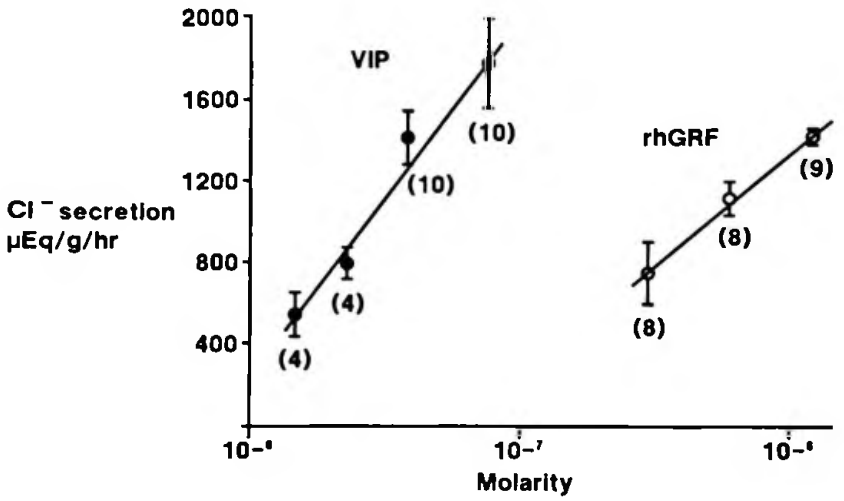

Figure 1

Effect on chloride secretion of varying concentrations of VIP and rhGRF, given as a bolus dose over 1 minute to isolated perfused rectal glands. The values shown are mean ± s.e. The number of separate observations is shown in parentheses.