THE SECRETION OF CHLORIDE BY THE RECTAL GLAND OF THE LITTLE SKATE, RAJA ERINACEA.

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The rectal gland of Raja erinacea secretes chloride in response to dibutyryl cyclic AMP plus theophylline, or forskolin (Fletcher, L. et al., Bull MDIBL 23:12, 1983). In those experiments, vasoactive intestinal peptide (VIP) induced a 50% increase in the secretion of chloride but this increase was not statistically significant. The present experiments were performed to determine whether C-type natriuretic peptide (CNP) stimulated the secretion of chloride by this gland.

Glands were perfused as previously described (Fletcher, L. et al., Bull MDIBL 23:12, 1983) with shark Ringer's using a Harvard infusion pump at 1.1 ml/min. CNP (human, porcine) was dissolved in shark Ringer's. Boiled extracts of skate heart and intestine were prepared in phosphate buffer, lyophilized, suspended in distilled water and dissolved in shark Ringer's for use. Samples of heart and intestinal extracts were assayed for adenosine, and no adenosine was found.

The results are shown in Table I. Forskolin stimulated the secretion of chloride 10 fold, an increase of the same magnitude as that previously observed. CNP stimulated the secretion of chloride 40 fold. The effect of CNP was rapid and sustained. Both heart and intestinal extract stimulated the secretion of chloride, but their stimulation was of much smaller magnitude. In addition, in two glands, Scyliorhinin II, a peptide that stimulates the secretion of chloride by the rectal gland of Scyliorhinus canicula, was found to have no stimulatory effect. A similar lack of effect of Scyliorhinin II was found in the rectal gland of S. acanthias.

TABLE I

	Basal	Exp1	Exp2	n	p
Forskolin 10^{-6}M	177 ± 95	617 ± 134	1832 ± 371	12	0.01
CNP 10^{-8}M	29 ± 29	1194 ± 553	1212 ± 389	4	0.05
Heart extract	49 ± 49	324 ± 141		6	0.05
Intestinal Extract	186 ± 39	431 ± 84	540 ± 236	3	0.05

Basal, Exp1, and Exp2 are consecutive collection periods. Values are µEq of chloride secreted per hour per gram weight ± SEM. Statistical analysis was done using standard "t" test between Basal and Exp1 periods.

These results confirm the previous finding that the rectal gland of the little skate is stimulated by forskolin. The stimulatory effect of CNP contrasts with the previous observation that VIP 3 x 10^{-6} M has only a modest stimulatory effect if one at all. The difference in the response to VIP and CNP is striking when compared with that of the rectal gland of S. acanthias where CNP and VIP have similar effects at equimolar concentrations. The present finding suggests that in the skate, CNP may have a direct effect independent of VIP, an observation that needs further investigation. The stimulation observed with heart extract is probably due to the presence of CNP or a related peptide in the skate heart. The peptide(s) present in the skate intestine responsible for the stimulatory effect are not known.

Supported by grants from The American Heart Association: Maine Affiliate, NIEHS ESO3828, and NIH AM18098