EFFECT OF pH ON INTESTINAL CHLORIDE INFLUX IN THE WINTER FLOUNDER (Pseudopleuronectes americanus)

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We recently reported that intestinal chloride absorption in the winter flounder is markedly augmented by increases in extracellular pH between pH 6.77 and 7.85 (Am. J. Physiol. 255:G247-G252, 1988). This effect was reversible, did not require CO_2 or HCO_3, and was not affected by the presence of mucosal barium. The finding that increments in pH caused decreases in Jsm as well as increases in Jms suggested that pH may have altered a chloride transport pathway other than an apical membrane (bumetanide-sensitive) absorptive process.

To examine this possibility, winter flounder small intestine was stripped of its muscle layers and mounted in influx chambers (kindly supplied by Dr. Mark Donowitz). Tissues were bathed in teleost Ringer's solution containing 5, 11 or 20 mM HCO_3 and both mucosal and serosal surfaces were continuously gassed with 1% CO_2 99% O_2 at room temperature. Uptake of 36-Cl from the mucosal solution into 1.04 cm^2 of exposed mucosa was measured over 30 seconds using 3-H mannitol as an extracellular fluid marker. In preliminary experiments, uptake was linear from 15 to 60 seconds, and was not affected by the presence of serosal glucose.

As shown in the table, we found that chloride influx was 1.25 $\pm$ 0.81 ueq/cm^2.h lower at pH 7.75 than at pH 7.15. In addition, mucosal bumetanide 0.1 mM inhibited chloride uptake equally at both pH levels.

pH	HCO_3 mM	PCO_2 torr	CONTROL uEq/cm^2.h	BUMETANIDE uEq/cm^2.h
7.15	5	7	8.08 $\pm$ 0.59 (10)	5.95 $\pm$ 1.11 (4)
7.60	11	7	5.52 $\pm$ 0.75 (4)	----------
7.75	20	7	6.83 $\pm$ 0.64 (10)	4.16 $\pm$ 0.63 (4)

Values are means $\pm$ SE. (n) is the number of tissues studied.

These data suggest that increases in intestinal chloride absorption caused by increments in extracellular pH are not due to direct (or indirect) stimulation of an apical membrane uptake process. Rather the results suggest that pH may alter net chloride absorption in part by modulating chloride recycling across the apical membrane.

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