Histamine-induced cyclic AMP formation in the chick hypothalamus: interaction with vasoactive intestinal peptide

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Abstract:
Effects of histamine (HA) on cyclic AMP production and its action upon the effects evoked by vasoactive intestinal peptide (VIP) were studied in the chick hypothalamus. HA (0.1–1000 μM) potently stimulated cyclic AMP formation in the hypothalamic slices, reaching maximal effect (2.5–3.5-fold increase) at a 100 μM concentration, and displaying an EC50 value of approximately 6.5 μM. The stimulatory action of HA was mimicked by agonists of HA receptors, with the following rank order of potency: HA > 4-methylHA (H1) ≥ N,Nz-dimethylHA (H2) ≥ 2-methylHA (H1) > amthamine (H2) > dimaprit (H2) = tele-methylHA. The HA (100 μM)-evoked increase in cyclic AMP production was concentration-dependently antagonized by selective H2-HA receptor blockers (aminopotentidine >> cimetidine ≥ ranitidine >> zolantadine) and was not affected by mepyramine and thioperamide, a selective H1- and H3-HA receptor antagonist, respectively. The pharmacological profile of HA receptors linked to the cyclic AMP-generating system in the chick hypothalamus indicates that they represent either an avian-specific H2-like HA receptor or a novel subtype of HA receptors. Chicken VIP (cVIP; 0.1–3 μM) potently stimulated cyclic AMP synthesis in the chick hypothalamus in a concentration-dependent manner. A combination of cVIP with HA produced cyclic AMP response more than additive, and such a synergistic interaction was antagonized by ranitidine. It is suggested that in the avian brain HA and VIP may play in concert to regulate neuroendocrine processes.

Key words:
histamine, VIP, cyclic AMP, hypothalamus, chick