Role of GTP-binding protein on salt taste transduction mechanism

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Summary

Taste stimuli interact with receptor proteins located in the receptor membrane, triggering a biochemical cascade that results in membrane depolarization and increase of intracellular Ca^{2+} level. Arginine vasopressin (AVP) which activates GTP-binding protein enhanced the neural responses elicited by NaCl and HCl in the frogs, suggesting that taste response could be modulated by the hormone. In the present study, we examined the effect of AVP on the membrane properties of taste cells isolated from bullfrog using a perforated whole-cell patch-clamp technique. Intracellular substances such as ATP and GTP were maintained naturally by the perforated method using amphotericin-B (133 μ g/ml). Isolated frog taste cells were classified into two types of rod- and wing-cells. Under holding the membrane potential to -50 mV, AVP (40 mU/ml) induced three kinds of responses in rod cells: appearance of inward current (4 in 14 cells), decrease of outward current (3 in 14 cells) and increase of outward current (2 in 14 cells). The hormone was little efficacious against the membrane properties of wing cells. The results suggested that the receptor protein for AVP-related peptide may exist in rod cells, but that the receptor may not exist in wing cells. Frogs which belong to amphibians do not secrete vasopressin. Further analysis should be done using vasotocin which exists in frogs naturally.