Physiological mechanisms of formation of taste quality and taste hedonics of NaCl behavioral, histochemical and electrophysiological studies.

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Summary

NaCl elicits salty taste, which is one of the fundamental tastes. However, it is still to be solved to what extent Na and Cl ions contribute to formation of salty taste. The present study aims to clarify the role of cations and anions of salts including NaCl in eliciting tastes. One other characteristics of NaCl is that its taste is preferred at low concentrations and rejected at high concentrations. The present study also aims to elucidate central representation of taste quality and hedonics of NaCl.

Wistar male rats were used. Under deep Nembutal anesthesia, whole strand or single fibers of the chorda tympani nerve were recorded in response to 20 kinds of sodium salts and potassium salts each dissolved in distilled water or 10^{-4}M amiloride, which is known to be a blocker of sodium channels. The magnitudes of tonic responses to Na salts dissolved in amiloride solution are correlated well with those of K salts dissolved in water. Behavioral experiments using the conditioned taste aversion and electrophysiological single fiber analyses indicated that responses to Na salts after treatment with amiloride reflected responsiveness to anions, and that since K ions had little stimulatory effects, responses to K salts were due to responses to anions.

In the next experiment, we have tried to localize FOS protein, which is produced as a result of a rapid induction of a proto-oncogene *c-fos*, in the parabrachial nucleus after ingestion of NaCl. *C-fos* neurons were found in the 3 subnuclei; the medial subnucleus receives taste information of Na ions, the central lateral subnucleus may be concerned with pleasant hedonic aspect of taste of NaCl as well as other palatable solutions, and the external lateral subnucleus may be related to gastrointestinal information.