Analyses of salt appetite with behavioral and electrophysiological methods.

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Summary

Associative learning between taste and odor was studied in Wistar male rats. They were trained to drink 0.5 mM Na-saccharin and 0.2M NaCl which contained low concentrations of odor stimuli such as strawberry essence, grape essence, almond essence or iso-amylacetate. After the 6 day-training session, they were tested for odor preference by exposing two kinds of waters, each of which contained one of the odors with the conventional two-bottle preference test. When the rats were put into sodium deficiency by injections of a diuretic, furosemide, they preferred water with the odor previously associated with NaCl. This finding suggests that odors can work as an effective cue to search foods needed on the basis of odor-taste association learning acquired after mere exposure to these flavored foods.

Rats drank water almost exclusively by in the dark cycle with the two peaks of intake at 19:00-20:00 and at 4:00-5:00. When water and NaCl were presented, rats preferred water to 0.2M NaCl, whereas no significant difference was detected between water and 0.1M NaCl. The rats administrated with furosemide preferred 0.2M NaCl to water soon after presentation of these fluids, but the total intake was greater for water than for 0.2M NaCl during the 12-h dark period. On the other hand, the preference of 0.1M NaCl to water was observed throughout the dark period. These results indicate that both the internal level of Na ions and the hedonics of NaCl taste regulate salt preference.

We recorded taste responses of single neurons in the parabrachial nucleus in rats to different kinds of taste stimuli. Only the amiloride-sensitive NaCl-best neurons showed enhanced responses to NaCl in rats conditioned to avoid NaCl than in control rats. This result shows that salt taste is conveyed exclusively by amiloride-sensitive neurons, but not by neurons responsive to other salts such as KCl.