

Behavioral and physiological aspects of spontaneous salt intake in mice exposed to various environmental conditions.

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Summary

Spontaneous salt intake of male mice of ICR strain was investigated in the three different experimental conditions. In all the experiments, animals were housed individually in polycarbonate cage; two water-supply bottles were set on each cage, and animals could choose a bottle to drink freely. In Experiment 1, ten-week old mice were given normal diet (Zn: 50 μ g/g, Na: 2.2 mg/g) and distilled water (Group 1), high-salt diet (Na: 8.0 mg/g) and distilled water (Group 2), or normal diet and distilled water and NaCl solution (Group 3) for 2 weeks. In Group 3, concentration of NaCl solution was raised from 0.0025 % to 0.6 % stepwise every two days. At the end of 2 weeks, preference for 0.9% NaCl solution in Group 2 (61%) and in Group 3 (75%) was significantly higher than that in Group 1 (40%). In Experiment 2, five-week old mice were given zinc deficient diet (Zn: 2 μ g/g) or zinc adequate diet (Zn: 50 μ g/g) for 8 weeks. Growth, zinc levels in various organs and in plasma, hepatic metallothionein (MT) contents, plasma alkaline phosphatase (ALP) were measured at the end of 6 weeks and 8 weeks. Taste threshold for NaCl solution was investigated at 4-6 weeks for a half of mice, and at 6-8 weeks for another half. The threshold was 0.05% in the zinc adequate group, while 0.1% in the zinc deficient group, in the both tests at 4-6 weeks and at 6-8 weeks. Plasma ALP and plasma zinc level in the zinc deficient group were significantly lower than those in the zinc sufficient group both at the end of 6 weeks and 8 weeks. In Experiment 3, the effect of repeated short-term cold exposure on spontaneous salt intake and colonic temperature was investigated. A half of ten-week old mice were exposed to cold (8°C; 6 hours per day; 4 days), and another half of the group both with and without cold exposure were allowed to choose between drinking water with (0.9%) or without (0%) NaCl. In all the groups, normal diet was used. Mice provided with NaCl solution showed increased salt intake with cold exposure. Preference for 0.9% NaCl solution increased from 40% to 60%. Total sodium intake from food and NaCl solution also increased from 17 mg/day to 25 mg/day. In mice exposed to cold and provided with NaCl solution, colonic temperature stayed unchanged, whereas in those without NaCl solution colonic temperature decreased significantly after cold exposure.