

The Short-term High Salt Intake Decides the Adequate Coping Style through Acquiring the Resilience against the Sequential Combination of Different Type of Psychological Distress

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Summary

High salt intake is associated with numerous adverse health effects. However, high salt intake mitigates the psychological stress. Recent studies suggested that the short-term high salt intake induces the active coping against psychological stress through regulating the paraventricular nucleus of hypothalamus (PVN) activity, including the expression of corticotropin-releasing factor (CRF). Active coping is an innate factor of resilience against psychological distress which is causable of the over-generalization in the patients with post-traumatic stress disorder (PTSD) and depressive symptoms. We found that the intra-PVN injection of ibotenic acid, a chemical neurotoxin regulated the mouse active defensive strategy during innate fear of 2,4,5 dihydro 2,5 trimethylthiazoline (TMT) (TMT), a component of fox faces. Therefore, we hypothesized that high salt intake induces the active coping by acquiring the resilience against psychological stress through regulating the CRF expression in PVN. The mice with 2% salt intake (salt intake mice) for 5 days entered the central zone in the test box more than non-salt intake mice (control mice). The changes in body temperature, freezing duration and travelled distance during TMT exposure in salt intake mice are similar level with control mice, indicating that the fear sensitivity was not affected by salt intake. In control mice, the number of entries into the central zone during TMT exposure is negatively correlated with freezing duration ($R^2 = 0.6392$, $p < 0.05$). However, this correlation was disappeared in salt intake mice. In the tail suspension test (TST), as an aversive stress was subsequently subjected to the mice in an hour after the TMT, salt intake mice exhibit significantly shorter duration of immobility during TST than control mice. Interestingly, the immobility time during TST in salt intake mice was significantly negative correlated with those of freezing duration ($R^2 = 0.6394$, $p < 0.05$) and the number of entries in central zone ($R^2 = 0.6373$, $p < 0.05$) during innate fear of TMT. Expression level of CRF in PVN in salt intake mice without the TMT exposure is significantly higher than control mice. These results have a possibility that the short-term high salt intake contribute to decide the adequate coping strategy by acquiring the resilience to prevent the over-generalization by sequential combination of psychological distress.