

# Elucidation of the Function of Neural Circuits Involved in the Expression of Salt Taste Preference Learning

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## Summary

This study aimed to clarify how sodium deficiency induces a preference for intense saltiness and whether the paraventricular thalamus (PVT) is involved in the neural basis of this preference. In a previous study, we demonstrated that the intake of hypertonic saline increased gradually in rats fed a low-sodium diet and administered furosemide, a diuretic and antihypertensive medication. This increase was presumably due to a heightened preference for high-sodium saline because the intake of hypertonic saline alleviated the adverse effects of sodium deficiency. However, we could not confirm whether the rats preferred high salt content after conditioning. In the present study, we investigated whether rats would learn to prefer salt by conditioning them with different concentrations of a salt solution after being deprived of sodium through the administration of a diuretic antihypertensive drug (furosemide) and exposure to a low-sodium diet, as observed in a behavioral experiment. No increase in preference was observed for the 0.9% or 2% saline solutions, but a significant increase in intake was observed for the 3% saline solution after the second conditioning session. These results indicate that sodium deficiency increases intake in response to intense saltiness; however, it is unclear whether this is due to a change in preference. To investigate PVT involvement, we administered DCZ to rats expressing inhibitory designer receptors (hM4Di) in PVT neurons, but this did not result in significant changes in the intake of sodium chloride solution. Therefore, the direct involvement of the PVT was not indicated in this study. Further investigation of the behavioral model of salt taste preference learning, as well as a more detailed analysis of the neural circuits, including the PVT, is needed.