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Neural Mechanism of “Liking” for Salt

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Summary

Salt tastes better when the body is deficient in sodium ions. However, the neural mechanisms by which sodium deficiency in the body makes salt more palatable have not been fully elucidated. Whether rodents such as mice and rats find saltwater tasty can be quantitatively estimated by the "liking" responses in a taste response test that detects oral-facial and forepaw movements. In addition, neurons that are active during salt deprivation (SD cells) are considered to be an important starting point for understanding the neural circuitry that makes salt taste good. In this study, we aimed to clarify whether the “liking” to salt is induced by the activity of neurons projecting from the subfornical organ (SFO) to the ventral part of the ventral borderline bed nucleus (vBNST) (SFO-vBNST cells), which is known to increase salt intake, and to examine the distribution of SD cells in the whole hemisphere comprehensively. To specifically activate SFO-vBNST cells, we used a chemogenetic approach. To comprehensively identify SD cells, we combined TRAP2;Ai14 mice with brain transparency techniques and light-sheet microscopy. Results showed that activation manipulation of SFO-vBNST cells tended to increase saline intake, but did not induce “liking” to saline. In addition, a comprehensive search for SD cells revealed a new brain region in the thalamus where SD cells are distributed. In the future, it is most important to confirm the reproducibility of the results by repeating the same experiments as in the present study or by modifying some of the conditions. The nucleus of the thalamus, where the existence of new SD cells was suggested, is very interesting in terms of novelty, since there have been few reports on the relationship between information processing of salt and biological reactions in the region, and the role it plays in salt information processing is unknown. When reproducibility is confirmed in the future, it is expected to provide a new perspective for understanding salt processing in the brain, such as the relationship and differences with known SD cells in other brain regions.