

The *Drosophila* novel gene, CG15151, is required for salt preference

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Summary

The sodium chloride (NaCl) is a major substance that induces salty taste in various animals. Many animals prefer to low concentration of NaCl and avoid against high concentration of NaCl. Previously, we found that some strains do not show preference for any concentration of NaCl in *Drosophila melanogaster*. Furthermore, we showed that the difference of the NaCl preference among strains were due to a single gene, namely CG15151.

In this study, to examine which differences in CG15151 gene caused the difference of the NaCl preference, we determined the sequence of coding region in CG15151 of various strains (Canton-S, Hikone-R, Swedish-C, OGS-4, Katsunuma-1619 and Oregon-RC). In previous study, Cantons-S, Hikone-R and Swedish-C showed preference for NaCl, while OGS-4, Katsunuma-1619 and Oregon-RC did not show preference. RT-PCR analysis showed that all strains except Oregon-RC express CG15151. By sequencing these RT-PCR products, 695th amino acid residue is substituted serine for asparagine in OGS-4 and Katsunuma-1619. These results confirmed that CG15151 is required for NaCl preference and the 695th amino acid residue, Asparagine, is important.

In behavioral tests, the NaCl preference in *Drosophila* was not eliminated by amiloride, which is antagonist of vertebrate and *Drosophila* NaCl receptor in taste receptor neurons. This result suggests that *Drosophila* Na⁺ receptor, which induces NaCl preference, is not amiloride sensitive Na⁺ channel. And we speculated that CG15151 acts as Na⁺ receptor in *Drosophila*. We also found that CG15151 gene was expressed in labella and legs by RT-PCR analysis. Both organs have taste receptors and are thought as taste organs. We examined which organ is more important for NaCl preference. The NaCl preference in Canton-S flies removed forelegs surgically was eliminated, whereas the sensitivity to sugar, sour and high concentration NaCl was remained in the flies. This result indicates that the NaCl preference requires forelegs and suggests that the taste receptor neurons in forelegs are responsible for the sensitivity to low concentration NaCl.

Finally, to examine whether taste receptor neurons express CG15151 or not, we generated transgenic flies carrying the construct containing upstream sequence of CG15151 and GAL4. Using this transgenic fly, further analysis is required.