論 文 要 旨

Diverse contributions of Tas1r2/Tas2rs within the rat and mouse soft palate to sweet and bitter neural responses.

友成　博

Neural responses to sweet and bitter stimuli in the rat and mouse are compared to the expression of the molecular taste receptors, Tas1r2/Tas2rs. Integrated taste responses from the greater superficial petrosal nerve (GSP) innervating the soft palate (SP) and the chorda tympani (CT) nerve innervating the fungi-form papillae (FF) were recorded in C57BL mice and SD rats. The sum of the phasic and tonic response magnitudes (SRM) was calculated by summating all relative mean responses to a concentration series of QHCl (10^{-6}–10^{-2}M) or Suc (10^{-4}–1.0 M). Molecular expression was analyzed by double-colored in situ hybridization for G-gustducin with Tas1r2 or Tas2rs in the SP and FF. The vast majority of cells expressingTas1r2 or Tas2rs were included in G _-gustducin-expressing cells in the SP of both species. Unexpectedly, a comparison between species revealed that the SRM from the GSP is not positively correlated with receptor expression in the SP. In the rat SP, the percentage of Tas2rs with G-gustducin (Tas2rs/gust, 65%) was twice larger than that for Tas1r2/gust (33%), while the SRM to Suc in the rat GSP was 1.5 times (tonic and phasic) larger than that to QHCl. In the mouse SP, the percentage of Tas2rs/gust (46%) was less than that in the rat and similar to that of Tas1r2/gust (40%). However, the SRM to QHCl in the mouse GSP was 2.4(phasic) and 4.7 (tonic) times larger than to Suc. On the other hand, threshold to Suc in the rat GSP was10^{-3}M, one log unit lower than in mouse, and the threshold to QHCl in the mouse GSP was 10^{-6}M, one log unit lower than in rat. These results suggest that the robust GSP response to Suc in rat and to QHCl in mouse likely do not depend upon a large number of taste cells expressing the taste receptors Tas1r2for Suc or Tas2rs for QHCl, but upon a higher density of Tas1r2/Tas2rs within the respective taste cells of the two species.