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Articles Highlighted

Odorants for Grueneberg Ganglion Neurons

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The mammalian olfactory system consists of several subsystems that probably fulfill distinct functions. The function of one of these subsystems, the Grueneberg ganglion in the nasal vestibule, remained elusive. On the one hand, murine Grueneberg ganglion neurons respond to cooling. On the other hand, they resemble olfactory sensory neurons of the major olfactory epithelium. Like the latter, Grueneberg ganglion neurons express the olfactory marker protein as well as chemosensory receptors and send their axons to the olfactory bulb, suggesting that they are also involved in chemoreception. However, specific chemicals that are able to stimulate the Grueneberg ganglion neurons have not been identified so far. Mamasuew et al. addressed this question by exposing mice to various odorous substances and monitoring induction of the neuronal excitation marker, cFos. Treatment of the animals with dimethylpyrazine or related chemicals induced cFos expression in a subset of Grueneberg ganglion neurons characterized by the presence of a special chemoreceptor, guanylyl cyclase-G, and cyclic nucleotide-gated channel A3. This cell type is the same that was previously known to respond to cool temperatures. Indeed, cooling enhanced neuronal activation by dimethylpyrazine in these cells proposing a dual sensor to operate in the Grueneberg ganglion that is sensitive to low temperature and chemicals.

Retronasal Odor Referral to the Mouth

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Confusion frequently occurs between taste and retronasal odors due to little knowledge about the site of retronasal odor perception and about the mechanisms underlying the referral of retronasal odors to the mouth. Advance in this area has probably been hampered by the fact that separation of the flavor components, taste, smell, and texture is complicated and difficult to control as well as by a paucity of methods to monitor the location and degree of odor referral. Lim and Johnson delivered retronasal odors in the absence or presence of taste and/or tactile stimuli while quantifying the perceived location and degree of odor referral. This enabled them to assess the roles of taste and tactile stimulation in odor referral. Their approach also allowed the authors to investigate the effect of congruency of taste–odor pairs on odor referral. When applied alone, subjects localized vanilla and soy sauce odor more often in the nose than in the oral cavity or on the tongue. The presence of water in the mouth did not change the scores significantly, suggesting that tactile stimulation alone has little effect on odor referral. The presence of sucrose but not of other tastants enhanced localization of vanilla to the tongue. Similarly, the taste of sodium chloride stimulated the referral of soy sauce to the tongue. Thus, whereas retronasal odors can be referred to the mouth in the absence of taste or touch, the referral of odors to the tongue depends on the presence of congruent tastes.

Bitter Taste Receptor Variability and Appreciation of Common Beverages

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The genes encoding human TAS2R bitter taste receptors display extensive variability proposing that numerous functionally distinct bitter sensors exist. These could underlie the interindividual differences in sensory, hedonic, and ingestive responses to bitter food and beverages of the population. In fact, recent data support the correlation of allelic variation with receptor function and bitter taste sensitivity in a few selected cases. Hayes et al. now extended these studies by investigating associations between *TAS2R* gene variants and sensations, liking, and intake of bitter beverages among subjects. The authors report that a haploblock encompassing the *TAS2R3*, *TAS2R4*, and *TAS2R5* genes explain some variability in the bitterness of expresso coffee beverage. Moreover, a single-nucleotide polymorphism in the *TAS2R19* gene was linked to increased bitterness and decreased liking of grapefruit juice. Finally, variations of TAS2R16 and TAS2R38 associated with alcohol intake yet did not explain sensory or hedonic responses to sampled alcoholic beverage. The authors propose that their approach may identify polymorphisms related to dietary behavior in the absence of known receptor ligands.

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