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Pulsed stimulation and enhancement of sweetness intensity

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Pulses of highly concentrated tastants intermitted by solvent or low concentration intervals lead to taste intensity scores that are higher than those for continuous stimulation with the same average tastant concentration. Burseg et al now investigated the effect of concentration differences between pulse peak maxima and inter-pulse minima as well as taste quality changes between alternating tastants on sweet taste enhancement. The authors found that the perceived sweetness intensity increased with the magnitude of sucrose concentration differences between pulse and inter-pulse phases even though the overall sucrose concentration was kept constant. They also found that pulsed stimulation with an average concentration of 60 g/l sucrose was scored as sweet as continuous stimulation with 70 g/l sucrose. Sweetness enhancement remained if low but not high concentrations of citric acid replaced the inter-pulse water administration. Moreover, when citric acid pulses with concentrations around threshold alternated with water no taste intensity enhancement was observed. The authors propose that taste enhancement by pulsed stimulus administration is determined by the absolute rather than the relative concentration changes of tastants.

Aquaporins and mucin 5AC in Bowman's glands

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The Bowman's glands of the mammalian olfactory epithelium have hardly ever been a target of serious study, yet they provide critical protection for the epithelium. Their production of mucus hydrates the epithelial surface, contributes the solvent and the extracellular ionic environment that supports transduction of odor detection, and may help provide a barrier to pathogens. Solbu et al. now provide updated information on the locations of the aquaporins, AQP1, AQP3, AQP4, and AQP5 in the olfactory epithelium. Their locations suggest two general pathways of water flux outward from the blood vessels in the lamina propria to the apical mucus layer. One pathway leads through cells of the Bowman's glands into the duct of the gland, with fibroblasts of the lamina propria being a potential intermediary. The other leads through the cells of the epithelium proper, primarily through the sustentacular cells. In addition, the authors identify for the first time a mucin secreted by Bowman's glands, MUC5AC. MUC5AC is one of acidic glycoprotein mucins that form viscous gels, providing structure to the mucus layer and probably a barrier to many pathogens.

Glomerular activation patterns and discrimination of amino acid odorants in zebrafish

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Amino acid odors are detected by olfactory sensory neurons that express only one out of many olfactory receptor genes. Axons of sensory neurons containing the same olfactory receptor converge on specific glomeruli in the olfactory bulb. Therefore, amino acids induce typical glomerular activity patterns that are more similar for chemically similar amino acids. In order to examine olfactory discrimination of amino acids, Miklavc and Valentinčič conditioned zebrafish pairing five different L-amino acids with a food reward. Subsequently they measured food searching activity with the conditioned and 18 nonconditioned L-amino acids. The authors found that fish spend more time on food searching and searched more intensely when offered a conditioned amino acid compared with a nonconditioned one. Intriguingly, they also found that fish could discriminate all amino acids but L-Ile from L-Val and L-Phe from L-Tyr. Thus, the fish apparently cannot discriminate amino acids which elicit highly similar glomerular activity patterns in the olfactory bulb.

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