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Cellular Mechanisms in Taste Buds

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Abstract: In the soft palate, tongue, pharynx and larynx surrounding the oral region, taste buds are present, allowing the sensation of taste. On the tongue surface, 3 kinds of papillae are present: fungiform, foliate, and circumvallate. Approximately 5,000 taste buds cover the surface of the human tongue, with about 30% fungiform, 30% foliate and 40% circumvallate papillae. Each taste bud comprises 4 kinds of cells, namely high dark (type I), low light (type II), and intermediate (type III) cells in electron density and Merkel-like taste basal cells (type IV) located at a distance from taste pores. Type II cells sense taste stimuli and type III cells transmit taste signals to sensory afferent nerve fibers. However, type I and type IV cells are not considered to possess obvious taste functions. Synaptic interactions that mediate communication in taste cells provide signal outputs to primary afferent fibers. In the study of taste bud cells, molecular functional techniques using single cells have recently been applied. Serotonin (5-HT) plays a role in cell-to-cell transmission of taste signals. ATP fills the criterion of a neurotransmitter that activates receptors of taste nerve fibers. Findings on 5-HT and ATP suggest that various different transmitters and receptors are present in taste buds. However, no firm evidence for taste-evoked release from type III cells has been identified, except for 5-HT and ATP. These results suggest that different transmitters and receptors may not be present in taste buds. Accordingly, an understanding of how transmitters might function remains elusive.

Key words: Taste bud cells, Cell communication, Second messenger, Serotonin, ATP

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