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Elucidate the pathway involved in Taste:

Receptor molecules that bind various tastants are found primarily on the apical microvilli of the taste cells, the transduction machinery involves ion channels on both the apical and basolateral membranes .Channels typically found in axonal membranes are located on the basolateral aspect of taste cells. These include voltage-gated Na+, K+, and Ca2+ channels that produce depolarizing potentials when taste cells interact with chemical stimuli. The resulting receptor potentials raise Ca2+ to levels sufficient for synaptic vesicle fusion and synaptic transmission, thus eliciting action potentials in the afferent axons. In general, the greater the tastant concentration, the greater the depolarization of the cell.

Transduction mechanisms in a generic taste cell. The apical and basolateral surfaces of the cell are separated by tight junctions. The apical surface contains both channels and G-protein-coupled receptors that are activated by chemical stimuli.

The molecular identity of taste receptors has been examined in several experimental animals, including nonhuman primates. The “receptor” for salt (NaCl) is apparently an epithelial-type Na+ channel on the apical membrane of some taste cells . In general, the larger the NaCl concentration applied to the tongue, the larger the depolarization in the relevent taste cells. These Na+ channels are regulated by hormones involved in water and electrolyte balance (for example, antidiuretic hormone and aldosterone), which mediate Na+-specific appetite and intake. Protons (H+) can also diffuse through this channel, albeit more slowly than Na+; this fact may explain why the addition of acids like lemon juice to salty foods reduces their salty taste. Protons, which are primarily responsible for sour taste, also interact with distinct channels on the apical membranes of a subset of taste cells . These cations activate proton-gated cation and Cl- channels . Thus, several mechanisms underlie the reception and transduction of acidic stimuli .Examples of various channels and G-protein-coupled receptors that activate taste transduction in response to various compounds. When stimulated, each of these channels or receptors changes neurotransmitter release via either direct changes in depolarization

Different ways of encoding taste. (A) Response profiles of individual chorda tympani axons to four different stimuli (indicated by the four different colors). The numbers indicate individual axons. The responses reflect the net activity for 5 seconds

The transduction of sweet-tasting compounds involves the activation of G-protein-coupled receptors (GPCRs) on the apical surface of taste cells .The particulars of the cascade depend on a number of factors, including the specifics of the stimulus. In the case of sweeteners such as the saccharides, activation of GPCRs depolarizes taste cells by activating adenylate cyclase, which in turn increases the cAMP concentration that will either directly or indirectly close basolateral K+ channels. Synthetic sweeteners, such as saccharine, activate different GPCRs that in turn activate phospholipase C (PLC) to produce IP3 and DAG. An increase in IP3 raises intracellular Ca2+ concentration, leading to transmitter release. An increase in DAG activates PKA, and PKA in turn phosphorylates and closes basolateral K+ channels, further contributing to this effect. Both of these pathways for the perception of sweetness can co-exist in the same taste cell.