Taste, Physiology of Gustatory Structures Encyclopedia Article

Taste, Physiology of Gustatory Structures

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The ability to taste depends on the presence and function of the 2,000-5,000 taste buds in the oral cavity. These are located on the tongue, where they are associated with papillae, and on the **soft palate**, the **pharynx**, **larynx**, and epiglottis.

Each taste bud is made up of cells arranged together much like the slices of an orange. At the end of the bud that connects with the surface is a taste pore, which houses a receptor for the various chemicals that confer taste. For example, sweet molecules are sugars and alcohols, salty chemicals are dominated by sodium, and sour chemicals are dominated by hydrogen ions.

The interaction of the various molecules with the taste bud receptor stimulates a depolarization of the membrane at the receptor site. In depolarization, the membrane becomes more permeable to the passage of ions such as sodium and hydrogen (this is dependent on the particular receptor). The depolarization causes the activation of a protein called the G-protein, which acts to alter the countermovement of potassium out of the cell. The resulting ionic imbalance between the inside of the receptor cell and the outside generates an electrical potential. The potential can be harnessed to drive the movement of calicium ions into the cell. The excess **calcium** and the release of a neurotransmitter converts the receptor signal to an electrical signal, which is conveyed to the **brain**.

Depolarization and re-polarization of the membranes of the cells are rapid events. This allows a taste cell to respond to a stimulus and quickly regain its potential for another response.

The taste receptors have a very low threshold, or the concentration at which a substance can be distinguished from water. The intensity of a taste sensation sems to be related to the number of taste cells that respond to the presence of the particular chemical. For example, if a food is exceptionally salty, the great number of sodium molecules in the food will stimulate the activity of a large number of taste buds. In more complex foods, which have a blended variety of tastes, the response by the population of taste buds will become diverse.