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MATRIC NO; 18/MHS02/185

DEPT ; NURSING

PATHWAY INVOLVED IN TASTE  
Taste, or gustation, is a sense that develops through the interaction of dissolved molecules with taste buds. Currently five submodalities (tastes) are recognized, including sweet, salty, bitter, sour, and umami (savory taste or the taste of protein). Umami is the most recent taste sensation described, gaining acceptance in the 1980s. Further research has the potential to discover more sub-modalities  
in this area, with some scientists suggesting that a taste receptor for fats is likely. Taste is associated mainly with the tongue, although there are taste (gustatory) receptors on the palate and epiglottis as well. The surface of the tongue, along with the rest of the oral cavity, is lined by a strati¹ed squamous epithelium. In the surface of the tongue are raised bumps, called papilla, that contain the taste buds. There are three types of papilla, based on their appearance: vallate, foliate,and fungiform.

PRIMARY TASTE SENSATIONS

As previously mentioned, five different taste sensations are currently recognized. The first, salty, is simply the sense of Na+ concentration in the saliva. As the Na+ concentration becomes high outside the taste cells, a strong concentration gradient drives their diffusion into the cells. This depolarizes the cells, leading them to release neurotransmitter.The sour taste is transduced similar to that of salty, except that it is a response to the H+ concentration released from acidic substances (those with low pH), instead of a response to Na+. For example, orange juice, which contains citric acid, will taste sour because it has a pH value of about 3. Of course, it is often sweetened so that the sour taste is masked. As the concentration of the hydrogen ions increases because of ingesting acidic compounds, the depolarization of specifc taste cells increases. The other three tastes; sweet, bitter and umami are transduced through G-protein coupled cell surface receptors instead of the direct diffusion of ions like we discussed with salty and sour. The sweet taste is the sensitivity of taste cells to the presence of glucose dissolved in the saliva. Molecules that are similar in structure to glucose will have a similar effect on the sensation of sweetness. Other monosaccharides such as fructose or artificial sweeteners like aspartame (Nutrasweet), saccharine, or sucralose (Splenda) will activate the sweet receptors as well. The affinity for each of these molecules varies, and some will taste “sweeter” than glucose  
because they bind to the G-protein coupled receptor differently. The bitter taste can be stimulated by a large number of molecules collectively known as alkaloids. Alkaloids are essentially the opposite  
of acids, they contain basic (in the sense of pH) nitrogen atoms within their structures. Most alkaloids originate from plant sources, with common examples being hops (in beer), tannins (in wine), tea, aspirin, and similar molecules. Coffee contains alkaloids and is slightly acidic, with the alkaloids contributing the bitter taste to coffee. When enough alkaloids are contained in a substance it can stimulate the  
gag reflex. This is a protective mechanism because alkaloids are often produced by plants as a toxin to deter infectious microorganisms and plant eating animals. Such molecules may be toxic to animals as well, so we tend to avoid eating bitter foods. When we do eat bitter foods, they are often combined with a sweet component to make them more palatable (cream and sugar in coffee, for example).   
The taste known as umami is often referred to as the savory taste. The name was created by the Japanese researcher who originally described it. Like sweet and bitter, it is based on the activation of G-protein coupled receptors, in this case by amino acids, especially  
glutamine. Thus, umami might be considered the taste of proteins, and is most associated with meat containing dishes.

TASTE RECEPTORS

Taste receptors are proteins that recognize taste stimuli of various types, thereby functioning as the initial component in the process of sensing and discriminating ingested material. Taste stimuli can be categorized as belonging to one of at least five classes, comprising qualities perceived by humans as sweet, salty, sour, bitter, and umami (the savory taste of l-amino acids such as glutamate). Mammalian taste receptors that respond to sweet, bitter, and umami stimuli have been identified and functionally characterized. These receptors are expressed on the apical membranes of taste receptor cells (TRCs) that extend into the oral cavity. The receptor-stimulus-binding event initiates a transduction cascade in TRCs, leading to cell depolarization and neurotransmitter release  onto afferent nerve fibers, and ultimately propagation of sensory information to taste processing areas in the central nervous system.