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NURSING SCIENCE

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PATHWAY OF TASTE

Taste Receptor Cells, Taste Buds and Taste Nerves

The sense of taste is mediated by taste receptor cells which are bundled in clusters called taste buds. Taste receptor cells sample oral concentrations of a large number of small molecules and report a sensation of taste to centers in the brainstem.

The taste buds present on the anterior 2/3rd of the tongue are innervated by the facial nerve, posterior 1/3rd by the glossopharyngeal and epiglottis by vagus. These afferent fibers relay in the nucleus of tractus solitarius (NTS). Fibers from the NTS synapse in the thalamus, which pass to the somatosensory cortex

Sense of Taste

Taste is mainly a function of the taste buds in the mouth, but it is common experience that one’s sense of smell also contributes strongly to taste perception. In addition, the texture of food, as detected by tactual senses of the mouth, and the presence of substances in the food that stimulate pain endings, such as pepper, greatly alter the taste experience. The importance of taste lies in the fact that it allows a person to select food in accord with

desires and often in accord with the body tissues' metabolic need for specific substances.

PRIMARY SENSATION OF TASTE

Sour Taste

The sour taste is caused by acids, that is, by the hydrogen ion concentration, and the intensity of this taste sensation is approximately proportional to the logarithm of the hydrogen ion concentration. That is, the more acidic the food, the stronger the sour sensation becomes.

Salty Taste

The salty taste is elicited by ionized salts, mainly by the sodium ion concentration. The quality of the taste varies somewhat from one salt to another because some salts elicit other taste sensations in addition to salti ness. The cations of the salts, especially sodium cations, are mainly responsible for the salty taste, but the anions also contribute to a lesser extent.

Sweet Taste

The sweet taste is not caused by any single class of chemicals. Some of the types of chemicals that cause this taste include sugars, glycols, alcohols, aldehydes, ketones, amides, esters, some amino acids, some small proteins, sulfonic acids, halogenated acids, and inorganic salts of lead and beryllium. Note specifically that most of the substances that cause a sweet taste are organic chemicals. It is especially interesting that slight changes in the chemical structure, such as addition of a simple

radical, can often change the substance from sweet to bitter.

Bitter Taste

The bitter taste, like the sweet taste, is not caused by any single type of chemical agent. Here again, the substances that give the bitter taste are almost entirely organic substances. Two particular classes of substances are especially likely to cause bitter taste sensations:

(1) long-chain organic substances that contain nitrogen and

(2) alkaloids.

The alkaloids include many of the drugs used in medicines, such as quinine, caffeine, strychnine, and nicotine.

Umami Taste

Umami is a Japanese word (meaning “delicious”) designating a pleasant taste sensation that is qualitatively different from sour, salty, sweet, or bitter.

Umami is the dominant taste of food containing l-gluta mate, such as meat extracts and aging cheese, and some physiologists consider it to be a separate, fifth category of primary taste stimuli.

A taste receptor for l-glutamate may be related to one of the glutamate receptors that are also expressed in neuronal synapses of the brain. However, the precise molec ular mechanisms responsible for umami taste are still unclear.

Threshold for Taste

The threshold for stimulation of the sour taste by hydro chloric

acid averages 0.0009N; for stimulation of the salty taste by sodium chloride, 0.01M; for the sweet taste by sucrose, 0.01M; and for the bitter taste by quinine, 0.000008M. Note especially how much more sensitive is the bitter taste sense than all the others, which would be expected, because this sensation provides an important protective function against many dangerous toxins in food.

Taste Blindness

Some people are taste blind for certain substances, especially for different types of thiourea compounds. A substance used frequently by psychologists for demonstrating taste blindness is phenylthiocarbamide, for which about 15 to 30 percent of all people exhibit taste blindness; the exact percentage depends on the method of testing and the concentration of the substance.