

THE PATHWAY INVOLVED IN TASTE

Taste or gustation, is a sense that develops through the interaction of dissolved molecules with taste buds. The tongue contains small bumps called papillae, within or near which taste buds are situated. In the tongue's taste buds, the taste receptors receive sensory input via two important mechanisms – depolarization and neurotransmitter release. Currently five sub-modalities (tastes) are recognized, including; sweet, salty, bitter, sour, and umami (savory taste or the taste of protein). Intake of salty foods leads more sodium ions to enter the receptor, causing the said mechanisms. The same is true with intake of sour foods (hydrogen ions) and sweet foods (sugar molecules), both of which result to the closing of K^+ channels upon their entry. 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 stratified squamous epithelium. There are three types of papilla, based on their appearance: vallate, foliate, and fungiform.

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

- (a) The second order neurons from the nucleus of tractus solitarius synapse at thalamus and the fibers project to the ipsilateral cerebral cortex;
- (b) The second order neurons arising from the nucleus of tractus solitarius, cross to opposite side and synapse at the thalamus, which projects to the contralateral cerebral cortex;
- (c) Few fibers from the nucleus of tractus solitarius decussate and terminate at the contralateral somatosensory cortex, whereas majority of the fibres continuing on ipsilateral side, project to the ipsilateral cerebral cortex (i.e., a bilateral representation)

Three nerves carry taste signals to the brain stem: the chorda tympani nerve (from the front of the tongue), the glossopharyngeal nerve (from the back of the tongue) and the vagus nerve (from the throat area and palate).

From the axons of the taste receptors, the sensory information is transferred to the three taste pathways via the branches of cranial nerves VII, IX and X. The chorda tympani of CN VII (facial nerve) carries the taste sensory input from the tongue's anterior two-thirds. Then, the rest of the taste sensations from the throat, palate and posterior tongue are transmitted by the branches of CN IX (glossopharyngeal nerve) and CN X (vagus nerve). From these cranial nerves, taste sensory input travels through the nerve fiber synapses to the solitary tract, the ventral posteromedial thalamic nuclei, and the thalamus. In these three locations, there are clustered neurons which respond to the same taste (sweet, sour, salty or bitter). The thalamus relays the information to the primary gustatory cortex located in the somatosensory cortex. The primary gustatory cortex is where the perception of a particular taste is processed.