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PATHWAY FOR TASTE

RECEPTORS

Receptors for taste sensation are the type III cells of taste buds. Each taste bud is innervated by about 50 sensory nerve fibres and each nerve fibre supplies at least five taste buds through its terminals.

FIRST ORDER NEURON

First order neurons of taste pathway are in the nuclei of three different cranial nerves, situated in medulla oblongata. Dendrites of the neurons are distributed to the taste buds. After arising from taste buds, the fibres reach the cranial nerve nuclei by running along the following nerves(Fig. 176.2):

1. Chorda tympani fibres of facial nerve, which run from anterior two third of tongue
2. Glossopharyngeal nerve fibres, which run from posterior one third of the tongue
3. Vagal fibres, which run from taste buds in other regions.

Axons from first order neurons in the nuclei of these nerves run together in medulla oblongata and terminate in the nucleus of tractus solitarius.

SECOND ORDER NEURON

Second order neurons are in the nucleus of tractus solitarius. Axons of second order neurons run through medial lemniscus and terminate in posteroventral nucleus of thalamus.

THIRD ORDER NEURON

Third order neurons are in the posteroventral nucleus of thalamus. Axons from third order neurons project into parietal lobe of the cerebral cortex.

TASTE CENTER

Centre for taste sensation is in opercular insular cortex, i.e. in the lower part of postcentral gyrus, which receives cutaneous sensations from face. Thus, the taste fibres do not have an independent cortical projection.

The tongue contains small bumps called papillae, within or near which taste buds are situated. In

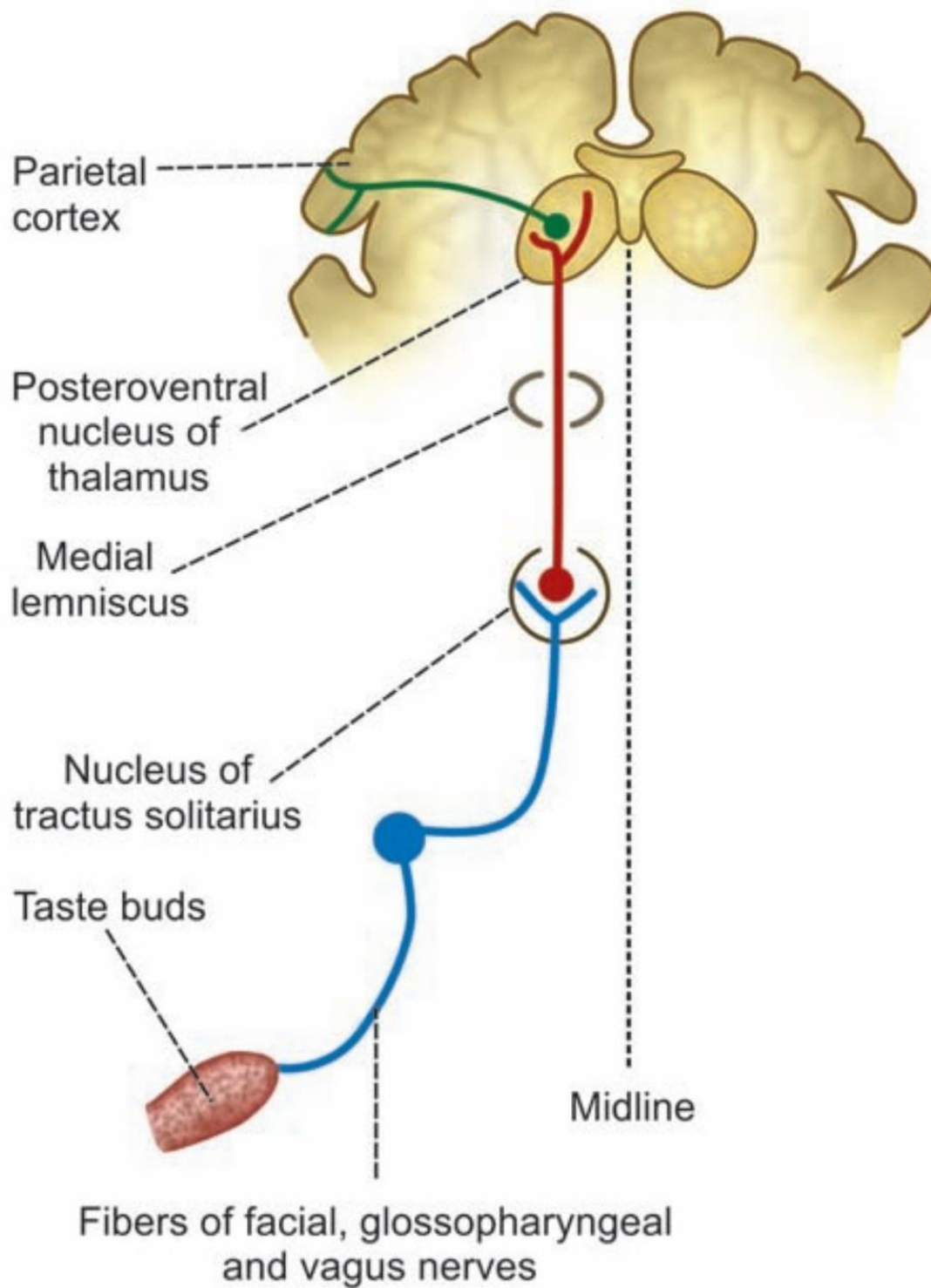


FIGURE 176.2: Pathway for taste sensation

the tongue's taste buds, the taste receptors receive sensory input via two important mechanisms – depolarization and neurotransmitter release. 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.

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 fibre 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.