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PHARMACOLOGY

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QUESTION: ELUCIDATE THE PATHWAY INVOLVED IN TASTE

**THE TASTE PATHWAY**

The neural taste pathway will undergo scrutiny from the perspective of starting within the tongue and moving away from it towards the brain. The three nerves associated with taste are the facial nerve (cranial nerve VII), which provides fibers to the anterior two-thirds of the tongue, the glossopharyngeal nerve (cranial nerve IX), which provides fibers to the posterior third of the tongue, and the vagus nerve (cranial nerve X), which provides fibers to the epiglottis region. Taste fibers categorize as special visceral afferent (SVA).

The branch of the facial nerve that innervates the anterior two-thirds of the tongue is the chorda tympani nerve. Another branch of the facial nerve, called the greater petrosal nerve, supplies innervation to taste buds of the soft palate. The cell bodies of the facial nerve associated with taste occur within the geniculate ganglion. Its central processes enter the brainstem at the pontomedullary junction and travel caudally to the medulla oblongata, where they synapse at the nucleus solitarius.

The cell bodies of the glossopharyngeal nerve associated with taste are in the inferior ganglion of the glossopharyngeal nerve (petrosal ganglion). The central processes of the glossopharyngeal nerve travel through the jugular foramen, enter the brainstem at the level of the rostral medulla, and eventually synapse at the nucleus solitarius.

The cell bodies of the vagus nerve associated with taste exist in the nodose ganglion. Its central processes travel through the jugular foramen, to the medulla, and also synapse at the nucleus solitarius.

At this point, fibers from all three of these nerves have synapsed at the nucleus solitarius. Specifically, the synapse occurs in the rostral part of the nucleus solitarius known as the gustatory region of the nucleus.[]](https://www.ncbi.nlm.nih.gov/books/NBK545236/) The caudal area of the nucleus solitarius receives cardio-respiratory information, and it is known as the visceral region.

Next, the second-order fibers ascend ipsilaterally to the parvicellular division of the ventral posteromedial nucleus (VPMpc) of the thalamus, where the next synapse occurs.

The third order fibers travel ipsilaterally through the posterior limb of the internal capsule to terminate in the frontal operculum, anterior insular cortex, and in the rostral part of the Brodmann area 3B. The overall function of these third-order fibers is to provide discriminatory taste sensations.

Additionally, there are secondary fibers that travel from the gustatory cortex to the posterolateral portion of the orbitofrontal cortex (OFC). This area is where the integration of taste and smell takes place, as well as the phenomenon of food reward. The description of food reward is the enjoyment of a particular food at the time in which an individual is eating it.

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). In addition, the trigeminal nerve carries signals from the touch / temperature / pain system. Taste signals combine in the brain stem areas involved in arousal (i.e. from sleep) then with smell signals in the brain to produce the sensation of flavour.

