12.5H: Facial (VII) Nerve

The facial nerve (cranial nerve VII) determines facial expressions and the taste sensations of the tongue.

Learning Objectives

• Describe the facial nerve (cranial nerve VII)

Key Points

• The facial nerve (cranial nerve VII) is responsible for the muscles that determine facial expression, as well as the sensation of taste in the front of the tongue and oral cavity.

• The facial nerve’s motor component begins in the facial nerve nucleus in the pons, and the sensory component begins in the nervus intermedius. The nerve then runs through the facial canal, passes through the parotid gland, and divides into five branches.

• Voluntary facial movements, such as wrinkling the brow, showing teeth, frowning, closing the eyes tightly (inability to do so is called lagophthalmos), pursing the lips, and puffing out the cheeks, all test the facial nerve.

Key Terms

• nervus intermedius: A part of the facial nerve (cranial nerve VII) located between the motor component of the facial nerve and the vestibulocochlear nerve (cranial nerve VIII). It contains the sensory and parasympathetic fibers of the facial nerve.

• Bell’s Palsy: Bell’s palsy is a form of facial paralysis resulting from a dysfunction of the cranial nerve VII (the facial nerve) that results in the inability to control facial muscles on the affected side.
This is a drawing of a skull with the facial nerve shown. The facial nerve is shown branching into various parts of the face.

The facial nerve: Illustration of the facial nerve and its branches.

The facial nerve is the seventh (cranial nerve VII) of the 12, paired cranial nerves. It emerges from the brainstem between the pons and the medulla and controls the muscles of facial expression.

It also functions in the conveyance of taste sensations from the anterior two-thirds of the tongue and oral cavity, and it supplies preganglionic parasympathetic fibers to several head and neck ganglia.

Location

The motor part of the facial nerve arises from the facial nerve nucleus in the pons, while the sensory part of the facial nerve arises from the nervus intermedius. The motor and sensory parts of the facial nerve enter the petrous temporal bone into the internal auditory meatus (intimately close to the inner ear), then runs a tortuous course (including two tight turns) through the facial canal, emerges from the stylomastoid foramen, and passes through the parotid gland, where it divides into five major branches.

Although it passes through the parotid gland, it does not innervate the gland (this is the responsibility of cranial nerve IX, the glossopharyngeal nerve). The facial nerve forms the geniculate ganglion prior to entering the facial canal.

The path of the facial nerve can be divided into six segments.
1. The intracranial (cisternal) segment.
2. The meatal segment (brainstem to internal auditory canal).
3. The labyrinthine segment (internal auditory canal to geniculate ganglion),
4. The tympanic segment (from geniculate ganglion to pyramidal eminence).
5. The mastoid segment (from pyramidal eminence to stylomastoid foramen).
6. The extratemporal segment (from stylomastoid foramen to post parotid branches).

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**Function**

This is a color photograph of a person attempting to show his teeth and raise his eyebrows with Bell's palsy on his right side (left side of the image).

**Bell's Palsy:** A person attempting to show his teeth and raise his eyebrows with Bell's palsy on his right side (left side of the image).

Voluntary facial movements, such as wrinkling the brow, showing teeth, frowning, closing the eyes tightly (inability to do so is called lagophthalmos), pursing the lips, and puffing out the cheeks, all test the facial nerve. There should be no noticeable asymmetry.

In an upper motor neuron lesion, called central seven (central facial palsy), only the lower part of the face on the contralateral side will be affected due to the bilateral control to the upper facial muscles (frontalis and orbicularis oculi).
Lower motor neuron lesions can result in a cranial nerve VII palsy (Bell’s palsy is the idiopathic form of facial nerve palsy), manifested as both upper and lower facial weakness on the same side of the lesion.

Taste can be tested on the anterior 2/3 of the tongue. This can be tested with a swab dipped in a flavored solution, or with electronic stimulation (similar to putting your tongue on a battery).

In regards to the corneal reflex, the afferent arc is mediated by the general sensory afferents of the trigeminal nerve. The efferent arc occurs via the facial nerve.

The reflex involves the consensual blinking of both eyes in response to stimulation of one eye. This is due to the facial nerve’s innervation of the muscles of facial expression, namely the orbicularis oculi, responsible for blinking. Thus, the corneal reflex effectively tests the proper functioning of both cranial nerves V and VII.