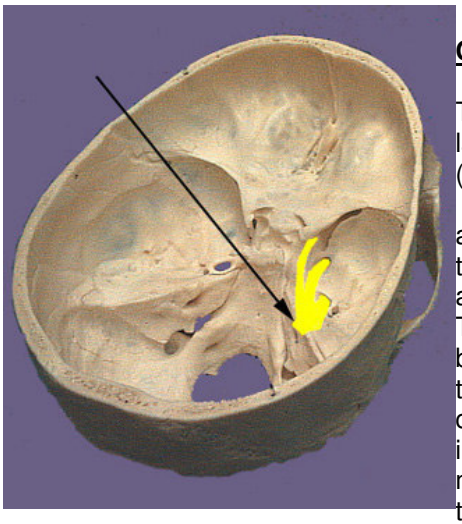
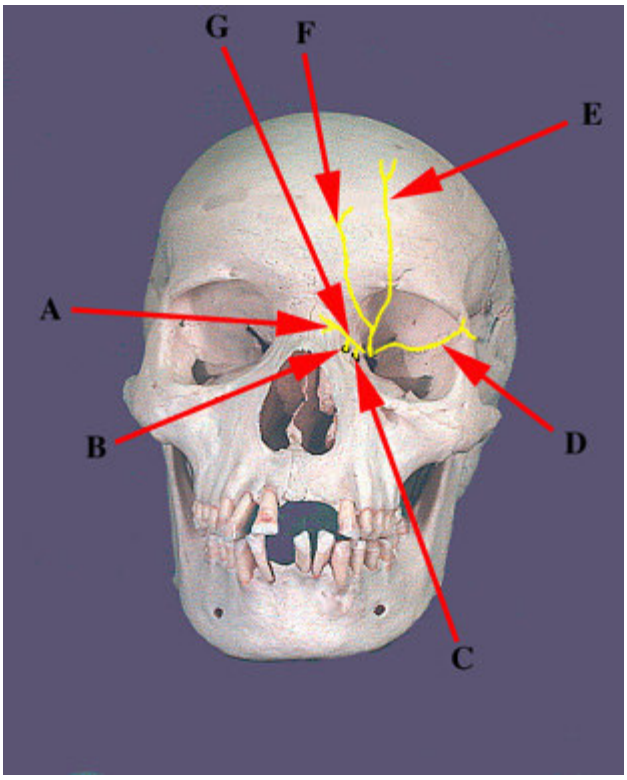


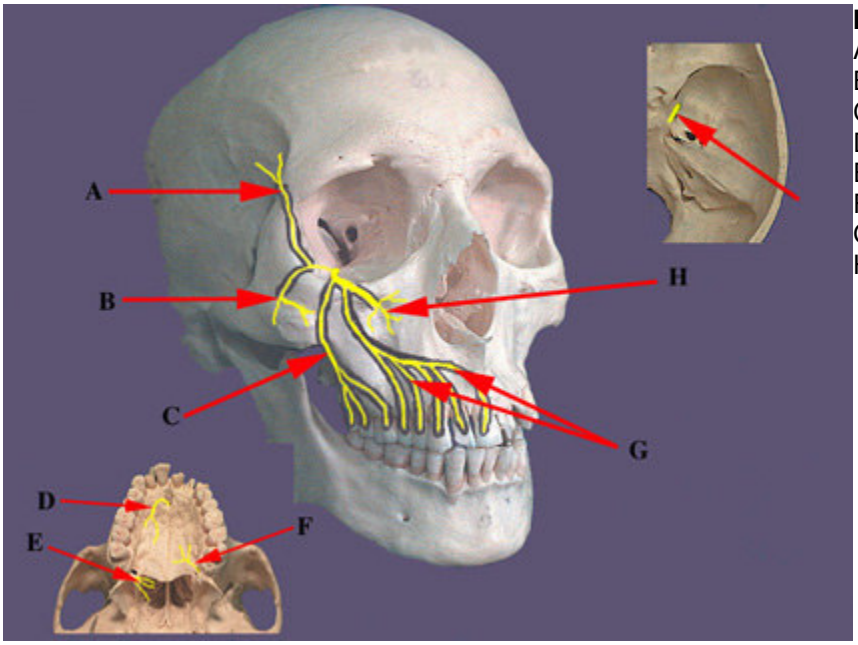
CN V. Trigeminal Nerve

The trigeminal nerve as the name indicates is composed of three large branches. They are the ophthalmic (V_1, sensory), maxillary (V_2, sensory) and mandibular (V_3, motor and sensory) branches. The large sensory root and smaller motor root leave the brainstem at the midlateral surface of pons. The sensory root terminates in the largest of the cranial nerve nuclei which extends from the pons all the way down into the second cervical level of the spinal cord. The sensory root joins the trigeminal or semilunar ganglion between the layers of the dura mater in a depression on the floor of the middle crania fossa. This depression is the location of the so called Meckle's cave. The motor root originates from cells located in the masticator motor nucleus of trigeminal nerve located in the midpons of the brainstem. The motor root passes through the trigeminal ganglion and combines with the corresponding sensory root to become the mandibular nerve. It is distributed to the muscles of mastication, the mylohyoid muscle and the anterior belly of the digastric. The mandibular nerve also innervates the tensor veli palatini and tensor tympani muscles. The three sensory branches of the trigeminal nerve emanate from the ganglia to form the three branches of the trigeminal nerve. The ophthalmic and maxillary branches travel in the wall of the cavernous sinus just prior to leaving the cranium. The ophthalmic branch travels through the superior orbital fissure and passes through the orbit to reach the skin of the forehead and top of the head. The maxillary nerve enters the cranium through the foramen rotundum via the pterygopalatine fossa. Its sensory branches reach the pterygopalatine fossa via the inferior orbital fissure (face, cheek and upper teeth) and pterygopalatine canal (soft and hard palate, nasal cavity and pharynx). There are also meningeal sensory branches that enter the trigeminal ganglion within the cranium. The sensory part of the mandibular nerve is composed of branches that carry general sensory information from the mucous membranes of the mouth and cheek, anterior two-thirds of the tongue, lower teeth, skin of the lower jaw, side of the head and scalp and meninges of the anterior and middle cranial fossae.

Ophthalmic division

A. Infratrochlear
B. Anterior Ethmoid
C. Posterior Ethmoid
D. Lacrimal
E. Supraorbital
F. Supratrochlear
G. Nasociliary

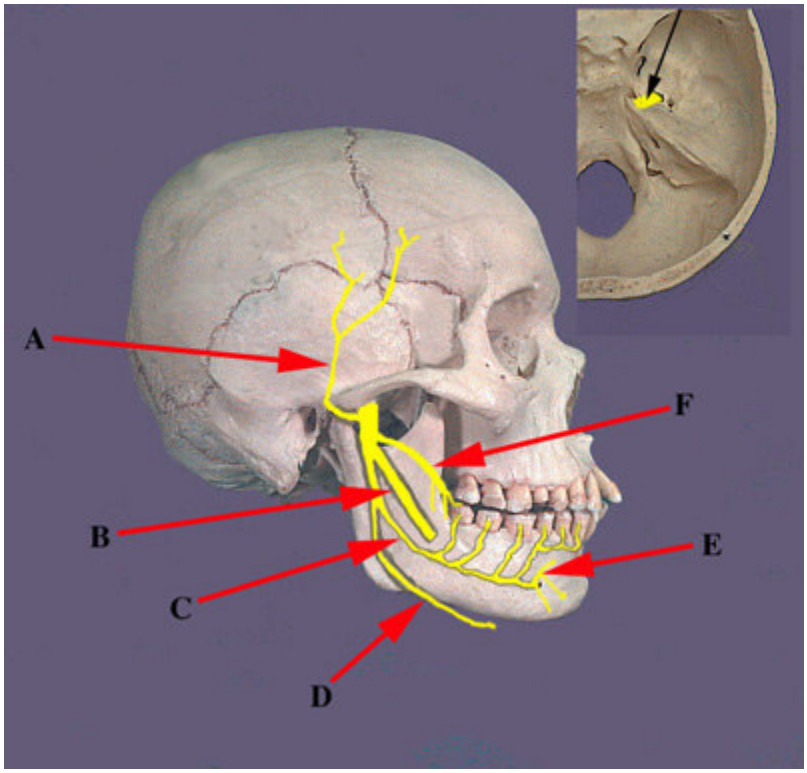




Maxillary division
A. Zygoticaticotemporal
B. Zygomaticofacial
C. Post. Sup. Alveolar Brs
D. Nasopalatine
E. Greater Palatine
F. Lesser Palatine
G. Mid. & Ant. Alveolar Brs
H. Infraorbital

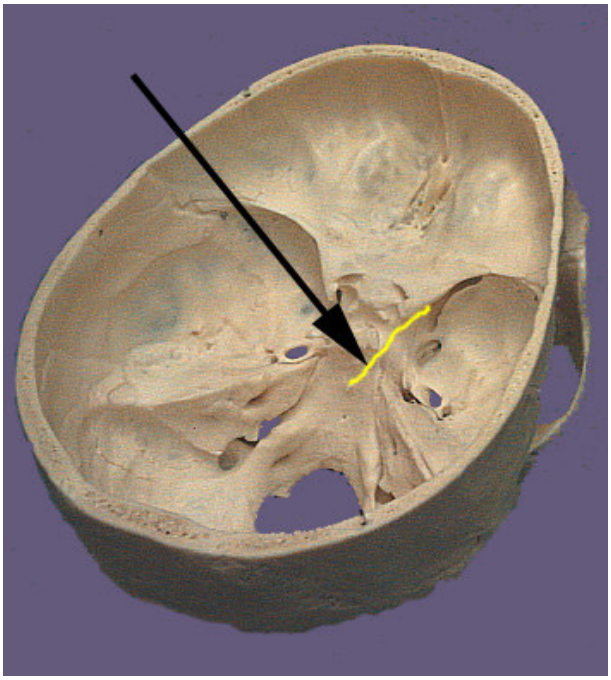
Mandibular Division

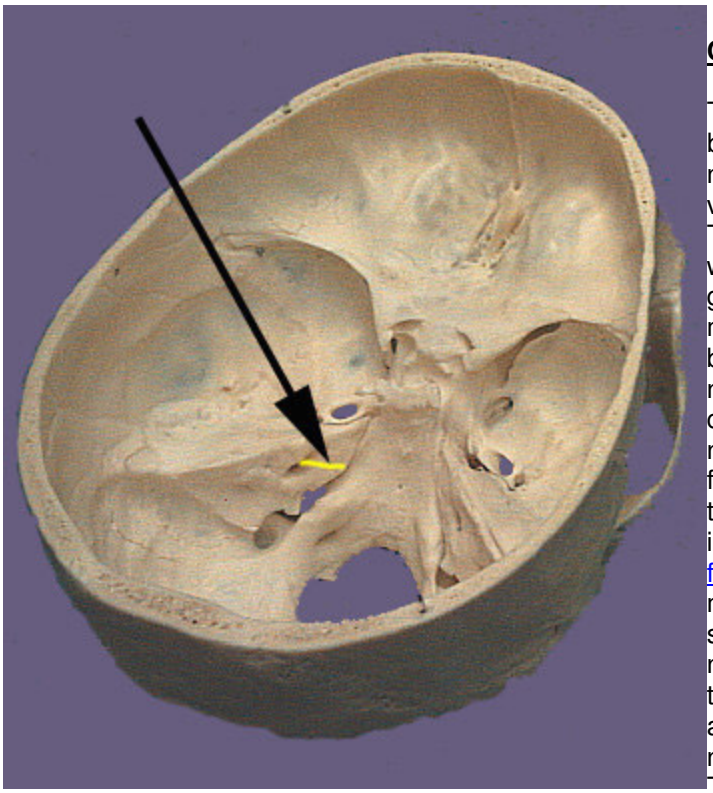
A. Auriculotemporal
B. Lingual
C. Inferior Alveolar
D. N. to the Mylohyoid
E. Mental
F. Buccal



CN VI. Abducens Nerve

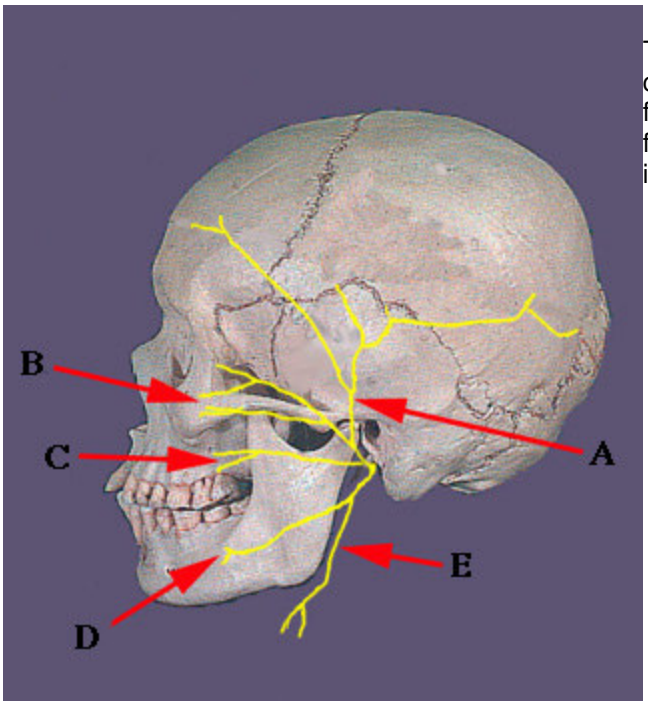
The abducens nerve originates from neuronal cell bodies located in the ventral pons. These cells give rise to axons that course ventrally and exit the brain at the junction of the pons and the pyramid of the medulla. The nerve of each side then travels anteriorly where it pierces the dura lateral to the dorsum sellae. The nerve continues forward and bends over the ridge of the petrous part of the temporal bone and enters the cavernous sinus. The nerve passes lateral to the carotid artery prior to entering superior orbital fissure. The abducens nerve passes through the common tendonous ring of the four rectus muscles and then enters the deep surface of the lateral rectus muscle. The function of the abducens nerve is to contract the lateral rectus which results in abduction of the eye. The abducens nerve in humans is solely and somatomotor nerve.





CN VII. Facial Nerve

The facial nerve is mixed nerve containing both sensory and motor components. The nerve emanates from the brain stem at the ventral part of the pontomedullary junction. The nerve enters the internal auditory meatus where the sensory part of the nerve forms the geniculate ganglion. In the internal auditory meatus is where the greater petrosal nerve branches from the facial nerve. The facial nerve continues in the facial canal where the chorda tympani branches from it the facial nerve leaves the skull via the styolomastoid foramen. The chorda tympani passes through the petrotympanic fissure before entering the infratemporal fossae. The main body of the facial nerve is somatomotor and supplies the muscles of facial expression. The somatomotor component originates from neurons in the facial motor nucleus located in the ventral pons. The visceral motor or autonomic (parasympathetic) part of the facial nerve is carried by the greater petrosal nerve. The greater petrosal nerve leaves the internal auditory meatus via the hiatus of the greater petrosal nerve which is found on the anterior surface of the petrous part of the temporal bone in the middle cranial fossa. The greater petrosal nerve passes forward across the foramen lacerum where it is joined by the deep petrosal nerve (sympathetic from superior cervical ganglion). Together these two nerves enter the pterygoid canal as the nerve of the pterygoid canal. The greater petrosal nerve exits the canal with the deep petrosal nerve and synapses in the pterygopalatine ganglion in the pterygopalatine fossa. The ganglion then gives of nerve branches which supply the lacrimal gland and the mucous secreting glands of the nasal and oral cavities. The other parasympathetic part of the facial nerve travel with the chorda tympani which joins the lingual nerve in the infratemporal fossa. They travel with lingual nerve prior to synapsing in the submandibular ganglion which is located in the lateral floor of the oral cavity. The submandibular ganglion originates nerve fibers that innervate the submandibular and sublingual glands. The visceral motor components of the facial nerve originate in the lacrimal or superior salivatory nucleus. The nerve fibers exit the brainstem via the nervus intermedius. (The nervus intermedius is so called because of its intermediate location between the eighth cranial nerve and the somatomotor part of the facial nerve just prior to entering the brain). There are two sensory (special and general) components of facial nerve both of which originate from cell bodies in the geniculate ganglion. The special sensory component carries information from the taste buds in the tongue and travel in the chorda tympani. The general sensory component conducts sensation from skin in the external auditory meatus, a small area behind the ear, and external surface of the tympanic membrane. These sensory components are connected with cells in the geniculate ganglion. Both the general and visceral sensory components travel into the brain with nervus intermedius part of the facial nerve. The general sensory component enters the brainstem and eventually synapses in the spinal part of trigeminal nucleus. The special sensory or taste fibers enter the brainstem and terminate in the gustatory nucleus which is a rostral part of the nucleus of the solitary tract.

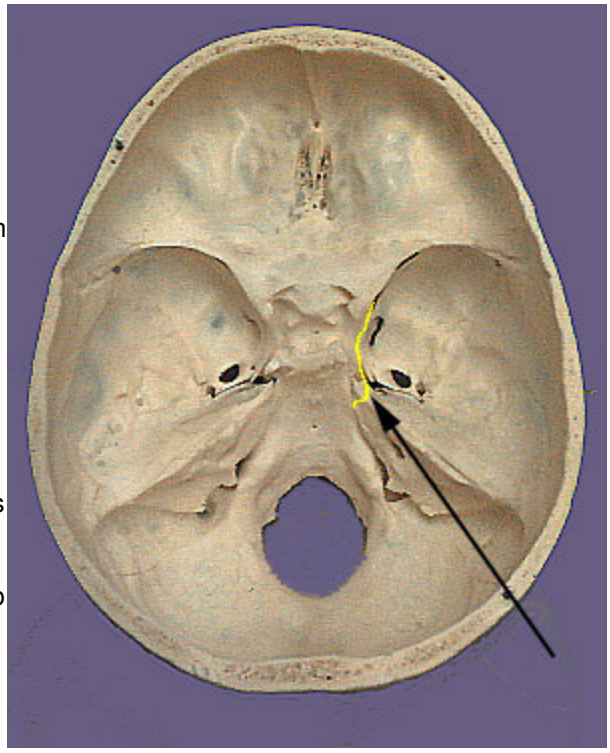


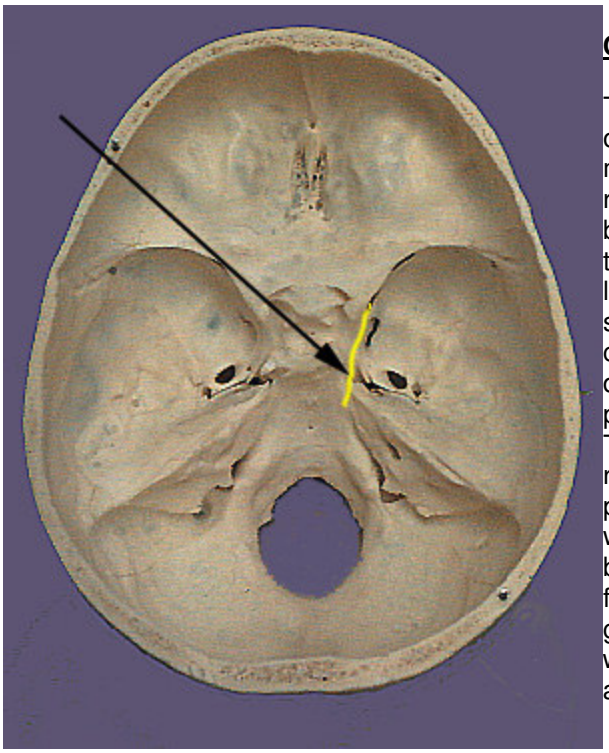
The branchiomotor component of the facial nerve controls the muscle of facial expression through five branches which are distributed in the superfical fascia of the head and neck. These branches include:

A. Temporal - auricular and fronto-occipitalis muscles
B. Zygomatic - muscles of the zygomatic arch and orbit
C. Buccal - muscles in the cheek and above the mouth
D. Mandibular - muscles in the region of the mandible
E. Cervical - the platysma muscle

CN IV. Trochlear Nerve

The trochlear nerve is purely a motor nerve and is the only cranial nerve to exit the brain dorsally. The trochlear nerve supplies one muscle: the superior oblique. The cell bodies that originate the fourth cranial nerve are located in ventral part of the brainstem in the trochlear nucleus. The trochlear nucleus gives rise to nerves that cross (decussate) to the other side of the brainstem just prior to exiting the brainstem. Thus, each superior oblique muscle is supplied by nerve fibers from the trochlear nucleus of the opposite side. The trochlear nerve fibers curve forward and enter the dura mater at the angle between the free and attached border of the tentorium cerebelli. The nerve travels in the lateral wall of the cavernous sinus and then enters the orbit via the superior orbital fissure. The nerve travels medially and diagonally across the levator palpebrae superioris and superior rectus muscle to innervate the superior oblique muscle.





CN III. Oculomotor Nerve

The oculomotor nerve originates from motor neurons in the oculomotor (somatomotor) and Edinger-Westphal (visceral motor) nuclei in the brainstem. Nerve cell bodies in this region give rise to axons that exit the ventral surface of the brainstem as the oculomotor nerve. The nerve passes through the two layers of the dura mater including the lateral wall of the cavernous sinus and then enters the superior orbital fissure to access the orbit. The somatomotor component of the nerve divides into a superior and inferior division. The superior division supplies the levator palpebrae superioris and superior rectus muscles. The inferior division supplies the medial rectus, inferior rectus and inferior oblique muscles. The visceromotor or parasympathetic component of the oculomotor nerve travels with inferior division. In the orbit the inferior division sends branches that enter the ciliary ganglion where they form functional contacts (synapses) with the ganglion cells. The ganglion cells send nerve fibers into the back of the eye where they travel to ultimately innervate the ciliary muscle and the constrictor pupillae muscle.