Cranial Nerves

Nerve	CN	Source	Branches	Motor	Sensory	Notes
Olfactory	I	Filaments of the bipolar olfactory epithelial cells constitute the Olfactory n.	Second order Olfactory nerve cell bodies located in the olfactory bulb	None	Smell (SVA)	Multiple olfactory filaments pass through the cribriform plate to exit the anterior cranial fossa and synapse in the olfactory bulb; the olfactory tract carries the signal from the bulb to olfactory cortex of the forebrain.
Optic	II	Ganglion layer of the retina to the forebrain.	None	None	Vision (SSA)	The course of the optic nerve is: through the optic canal to the optic chiasma, then the optic tract to the lateral geniculate body and optic radiation
Oculomotor	III	Oculomotor nuclei of the midbrain (extraocular muscles); accessory oculomotor nucleus (nucleus of Edinger-Westphal - preganglionic parasympathetic)	Superior br., Inferior br.	GSE: * Superior br.: levator palpebrae, superioris m., superior rectus m. * Inferior br: medial rectus m., inferior rectus m., inferior oblique m.; GVE: ciliary m. & sphincter pupillae m. (preganglionic parasympathetic axons go to the ciliary ganglion via the parasympathetic root, postganglionic parasympathetic go from the ciliary ganglion to the eyeball via short ciliary nn.)	None	Passes through the superior orbital fissure to exit the middle cranial fossa
Trochlear	IV	Trochlear nucleus of the midbrain	None	Superior oblique m. of the eye (GSE)	None	Passes through the superior orbital fissure to exit the

						middle cranial fossa; it is the smallest cranial nerve and the only cranial nerve to arise from dorsum of brainstem
Trigeminal	V	Motor root arises from the trigeminal motor nucleus in the pons (SVE); sensory part arises from the trigeminal ganglion (GSA) and projects into the pons to the primary sensory nucleus of V or more inferiorly to the nucleus of the spinal root of V (medulla and upper spinal cord)	Ophthalmic, Maxillary & Mandibular divisions	SVE: anterior belly of the digastric m., mylohyoid m., tensor veli palatini m., tensor tympani m.; muscles of mastication: temporalis m., masseter m., lateral pterygoid m., medial pterygoid m.	Skin of the face; mucous membranes of the nasal and oral cavities; general sensation (GSA) to the anterior 2/3 of the tongue	Some brs. carry pre- or postganglionic parasympathetic fibers; the trigeminal n. divides into three divisions at the trigeminal ganglion; SVE supplies muscles of 1st pharyngeal arch origin
Ophthalmic division of the trigeminal n.	V1	Trigeminal ganglion	Meningeal br., lacrimal n., frontal n., nasociliary n.	None	(GSA) skin of the forehead, upper eyelid and nose; mucous membrane of the upper nasal cavity, frontal sinus, ethmoid air cells and sphenoid sinuses	Passes through the superior orbital fissure to exit the middle cranial fossa; the lacrimal n. Receives postganglionic parasympathetic axons to the lacrimal gland from the zygomaticotemporal br. of zygomatic n.
Maxillary division of the trigeminal n.	V2	Trigeminal ganglion	Meningeal br., posterior superior alveolar n., pharyngeal, posterior superior medial and lateral nasal brs., nasopalatine n., greater and lesser palatine nn., zygomatic n., infraorbital n.	None	GSA: skin of the upper lip, cheek, lower eyelid; mucous membrane of the palate; teeth and gingiva of the maxillary alveolar arch; the mucous membrane lining most of the nasal cavity; the mucous membrane lining the maxillary sinus	Passes through the foramen rotundum to enter the pterygopalatine fossa; the pterygopalatine ganglion is associated with it in the pterygopalatine fossa; postganglionic parasympathetic fibers distribute with branches of the maxillary division to

						mucous glands of the nasal cavity and palate; the zygomatic n. & its brs. carry postganglionic parasympathetic axons to the orbit to reach the lacrimal n. and lacrimal gland
Mandibular division of the trigeminal n.	V3	Trigeminal ganglion; motor root arises from the pons	Meningeal br., medial pterygoid and lateral pterygoid nn., masseteric n., anterior and posterior deep temporal nn., buccal n., auriculotemporal n., lingual n., inferior alveolar n.	SVE: mylohyoid m., anterior belly of the digastric m.; tensor tympani m., tensor veli palatini m.; muscles of mastication (temporalis, masseter, medial pterygoid and lateral pterygoid)	GSA: skin of the lower lip and jaw extending superiorly above level of the ear; mucous membrane of the tongue and floor of the mouth; lower teeth and gingiva of the mandibular alveolar arch	Passes through the foramen ovale to exit the middle cranial fossa; the otic ganglion is associated with the medial side of V3 below the foramen ovale; the auriculotemporal n. carries postganglionic parasympathetic axons to the parotid gland; the submandibular ganglion is associated withe the lingual n. near the submandibular gland; postganglionic parasympathetics from the submandibular ganglion supply the submandibular gland and the sublingual gland
Abducens	VI	Pons: abducens nucleus	None	GSE: lateral rectus m.	None	Passes through the superior orbital fissure
Facial	VII	Pons and medulla: nucleus solitarius of medulla via nervus intermedius (SVA sensory root) from geniculate ganglion;	Greater petrosal n. (preganglionic parasympathetic to pterygopalatine ganglion, postganglionic parasympathetic travels with brs. of maxillary	Stapedius m., stylohyoid m., posterior belly of digastric m., muscles of facial expression; secretomotor to lacrimal, submandibular, sublingual, and	Taste (SVA) from the anterior 2/3 of the tongue; part of the skin of the external auditory meatus	Exits the posterior cranial fossa by passing into the internal acoustic meatus, goes through the facial canal; motor to muscles of facial expression exits the skull at the

		superior salivatory nucleus (GVE preganglionic parasympathetic) of pons via nervus intermedius; facial motor nucleus of pons via motor root	division of V), chorda tympani (SVA taste from anterior 2/3 of the tongue; preganglionic parasympathetic to the submandibular ganglion, postganglionic parasympathetic to the submandibular and sublingual glands), n. to stapedius, posterior auricular n., intraparotid plexus with temporal, zygomatic, buccal, marginal mandibular & cervical brs.	mucous glands of the nasal and oral cavities		stylomastoid foramen
Vestibulocochlear	VIII	Pons & medulla: vestibular nuclei from the vestibular ganglion of the semicircular ducts; cochlear nuclei in the inferior cerebellar peduncle	Divides within the temporal bone into vestibular and cochlear parts	None	Vestibular: balance/proprioception (SSA); cochlear: hearing (SSA)	Auditory nerve; passes into the internal auditory meatus
Glossopharyngeal	IX	Medulla: spinal trigeminal nucleus from the superior ganglion (GVA); nucleus solitarius from the inferior ganglion (SVA); nucleus ambiguus (GVA); inferior salivatory nucleus (GVE - preganglionic parasympathetic)	Tympanic nerve to the tympanic plexus and lesser petrosal n., carotid sinus n., stylopharyngeus brs., pharyngeal brs.	GSE: stylopharyngeus; GVE: secretomotor to the parotid gland (preganglionic parasympathetic via the tympanic n. to the lesser petrosal n. to the otic ganglion; postganglionic parasympathetic via the auriculotemporal n.)	GVA: carotid body, carotid sinus, pharynx, middle ear; GSA: skin of the external ear; SVA: taste from the posterior 1/3 of the tongue	Exits the posterior cranial fossa by passing through the jugular foramen;it may penetrate the stylopharyngeus m.
Vagus	X	Medulla: dorsal	Auricular br.,	SVE: intrinsic	GSA: skin of the	Passes through the

		motor nucleus (GVE preganglionic parasympathetic); inferior ganglion (GVA); nucleus ambiguus (SVE); superior ganglion (GSA); inferior ganglion(SVA)	pharyngeal br., superior laryngeal, superior and inferior cervical cardiac brs., recurrent laryngeal n., thoracic cardiac brs., brs. to the pulmonary plexus, brs. to the esophageal plexus, anterior and posterior vagal trunks	muscles of the larynx, pharynx (except stylopharyngeus), and palate (except tensor veli palatini); GVE: smooth muscle of the respiratory tree & gut (proximal to the left colic flexure), heart; secretomotor: mucous glands of the larynx, respiratory tree, pharynx and gut; secretomotor to digestive glands	external auditory meatus; GVA: viscera of head, neck, thorax & abdomen proximal to the left colic flexure; SVA: taste from the epiglottis	jugular foramen to exit the posterior cranial fossa; vagus means "wanderer" in reference to its extensive distribution to the body cavities
Accessory	XI	Cranial root: medulla - nucleus ambiguous. Spinal root: spinal nucleus of the upper cervical spinal cord	None	GSE: sternocleidomastoid and trapezius mm.	None	Spinal root enters cranial cavity by passing through the foramen magnum. Exits skull by passing through the jugular foramen. Accessory n. is motor only; the subtrapezial plexus of nerves receives proprioceptive fibers: for the sternocleido-mastoid m. from the ventral primary rami of spinal nn. C2 and C3 - for trapezius via ventral primary rami of C3 and C4
Hypoglossal	XII	Medulla: hypoglossal nucleus	No named branches. Branches of the ventral primary ramus of spinal nerve C1 are carried by this nerve and are not considered to be branches of the hypoglossal nerve	Intrinsic and extrinsic muscles of the tongue (except the palatoglossus m.)	None	Exits the posterior cranial fossa by passing through the hypoglossal canal; the superior root of the ansa cervicalis travels with the hypoglossal n. for a short distance