12 pairs of cranial nerves emanate from the brain. All (except one – the vagus nerve) serve sensory and motor functions in the head and neck. Each pair is numbered (w/ Roman numerals) and has a name that relates to its function.

Cranial nerve I (CN I) is the olfactory nerve. Olfactory nerve fibers arise from olfactory receptor cells in the nasal lining and extend through the olfactory foramina in the cribriform plate of the ethmoid bone to synapse in the olfactory bulbs in the ventral surface of the frontal lobe. The olfactory nerves are sensory nerves that transmit signals involved in the sense of smell.

CN II is the optic nerve. Optic fibers begin in the retina of the eye and extend through the optic canals of the sphenoid bone. Some fibers cross over at the optic chiasma while others do not. (This creates a contralateral situation where signals from the right visual field are received by the visual cortex in the left occipital lobe and signals from the left visual field are received by the visual cortex in the right occipital lobe.) The new combination of fibers continues onward as the optic tract and synapses in the thalamus.

CN III is the oculomotor nerve. It begins in the ventral midbrain and it contains both somatic and parasympathetic motor fibers. The somatic fibers innervate 4 of the extrinsic muscles of the eye (superior rectus, inferior rectus, medial rectus, and inferior oblique) which allow for motion of the eyeball and the levator palpebrae superioris (which raises the upper eyelid). The parasympathetic fibers innervate the sphincter pupillae muscles (which constrict the pupil) and the ciliary muscle (which controls the shape of the lens of the eye and contracts for up-close vision).

CN IV is the trochlear nerve. Its fibers begin on the dorsal midbrain and innervates one of the extrinsic eye muscles (the superior oblique).

CN V is the trigeminal nerve. It is the largest cranial nerve. It extends from the lateral pons and branches all over the face. It transmits sensory signals (touch, temperature, and pain) from the face and the teeth. It also transmits motor signals to the muscles of mastication.

CNVI is the abducens nerve. Its fibers begin at the inferior pons and it innervates one of the extrinsic eye muscles (the lateral rectus).

CN VII is the facial nerve. It begins in the inferior pons and contains motor fibers (somatic and autonomic) and sensory fibers. Its somatic motor fibers innervate facial skeletal muscles (except the muscles of chewing). Its parasympathetic motor fibers innervate the lacrimal glands, nasal glands and 2 pairs of salivary glands (the submandibular glands and the sublingual glands). It transmits sensory info from the anterior ⅔ of the tongue.

CN VIII is the vestibulocochlear nerve. It primarily consists of afferent fibers arising from the cochlea of the inner ear (i.e. the structure that contains sound wave receptors) and from the semicircular canals and the vestibule of the inner ear (structures that are involved in equilibrium and balance). These afferent fibers enter the brainstem at the pons-medulla junction.

CN IX is the glosopharyngeal nerve. It emanates from the medulla and contains motor and sensory fibers. Its somatic motor fibers innervate muscles in the pharynx and its parasympathetic motor fibers innervate a pair of salivary glands (the parotid glands). It conveys sensory info from the tongue (glosso-means “tongue”) and pharynx. It also conveys sensory info regarding blood pressure and blood gas
levels from arteries in the neck.

CNX is the **vagus nerve**. The word “vagus” literally means “wanderer” and this is apt since this nerve travels beyond the head and neck and penetrates the thorax and abdomen. The vagus arises from the ventral medulla and primarily consists of parasympathetic motor fibers and sensory fibers. The parasympathetic motor fibers innervate the lungs, heart, and the abdominal viscera and are involved in the regulation of heart rate, respiration rate, and digestive activities. The vagus conveys sensory info regarding blood pressure and blood gas levels from arteries in the thorax. It also conveys sensory info from taste buds in the tongue and pharynx.

CN XI is the **accessory nerve**. It is unique in that it is not formed from the brainstem. It’s formed from ventral rootlets in the superior spinal cord (C1 to C5). The resulting accessory nerves enter the skull and then turn around and exit the skull with the vagus nerves. The accessory nerves primarily supply somatic motor signals to the **trapezius** and **sternocleidomastoids**.

CNXII is the **hypoglossal nerve**. It primarily conveys somatic motor signals to the tongue. It emerges from the ventral medulla and extends to the tongue.

A good mnemonic device to remember the cranial nerves in order is **“Old Opie occasionally tries trigonometry and feels very gloomy, vague, and hypoactive.”**