

Oculomotor, trochlear, abducens nerve

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Oculomotor Nerve (CN III)

Anatomical Course:

- Originates from the oculomotor nucleus located within the midbrain.
- Emerges from the anterior aspect of the midbrain, passing inferiorly to the posterior cerebral artery and superiorly to the superior cerebellar artery.
- Pierces the dura mater and enters the cavernous sinus, receiving sympathetic branches from the internal carotid plexus within the cavernous sinus.
- Leaves the cranial cavity via the superior orbital fissure.

Division:

Divides into superior and inferior divisions after exiting the cranial cavity.

Superior Division:

Provides motor innervation to:

- Superior rectus
- Levator palpebrae superioris

Sympathetic fibers run with the superior division to innervate the superior tarsal muscle.

Inferior Division:

Provides motor innervation to:

- Inferior rectus
- Medial rectus
- Inferior oblique

Also supplies pre-ganglionic fibers to the ciliary ganglion.

Motor Functions:

Superior Branch:

- Superior Rectus: Elevates the eyeball.
- Levator Palpebrae Superioris: Raises the upper eyelid.
- *Sympathetic fibers innervate the superior tarsal muscle, maintaining eyelid elevation.*

Inferior Branch:

- Inferior Rectus: Depresses the eyeball.
- Medial Rectus: Adducts the eyeball.
- Inferior Oblique: Elevates, abducts, and laterally rotates the eyeball.

Parasympathetic Functions:

- Sphincter Pupillae: Constricts the pupil, regulating light entry into the eye.
- Ciliary Muscles: Adjusts the lens for better short-range vision.

Trochlear Nerve (CN IV)

1. Anatomical Course:

- Arises from the trochlear nucleus of the brain, emerging from the posterior midbrain.
- Runs anteriorly and inferiorly within the subarachnoid space before piercing the dura mater adjacent to the posterior clinoid process of the sphenoid.
- Travels along the lateral wall of the cavernous sinus before entering the superior orbital fissure.

2. Motor Function:
 - Innervates a single muscle:
 - 1.) Superior Oblique: Depresses and intorts the eyeball.

Abducens Nerve (CN VI)

1. Anatomical Course:
 - Arises from the abducens nucleus in the pons of the brainstem, exiting at the junction of the pons and the medulla.
 - Enters the subarachnoid space and pierces the dura mater to travel through Dorello's canal.
 - Exits Dorello's space at the tip of the temporal bone and enters the cavernous sinus before reaching the orbit via the superior orbital fissure.
2. Motor Function:
 - Innervates a single muscle:
 - Lateral Rectus: Abducts the eyeball.