CENTRAL NERVOUS SYSTEM – Brainstem External Features & Fourth Ventricle (High-Yield Summary)

Brainstem – Introduction
The brainstem is composed of the medulla oblongata, pons, and midbrain. It occupies the posterior cranial fossa. It is stalk-like and connects the spinal cord with the forebrain. Functions: conduit for ascending and descending tracts; contains vital reflex centers; contains nuclei of cranial nerves III–XII.

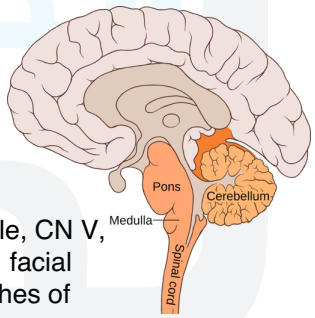
Medulla Oblongata
Extent: superiorly continuous with pons; inferiorly passes through foramen magnum. Parts: lower half (closed medulla) contains central canal; upper half (open medulla) related to 4th ventricle. Dimensions: 3 cm long, 2 cm transverse, 1 cm AP.

External Features – Anterior Surface
Anterior median fissure (interrupted by pyramidal decussation); pyramids; anterolateral sulcus (XII); olive; posterolateral sulcus (IX, X, XI); inferior cerebellar peduncle.

Posterior Surface (Closed Medulla)
Posterior median sulcus; gracile tract & tubercle; cuneate tract & tubercle; spinal tract & nucleus of trigeminal nerve.

Posterior Surface (Open Medulla)
Lower part of floor of 4th ventricle; median sulcus; inferior fovea; hypoglossal, vagal, and vestibular trigones.

Blood Supply
Vertebral artery branches and PICA.



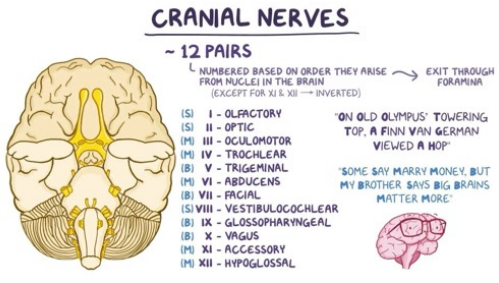
Pons
Middle part of brainstem between midbrain and medulla.
Anterior surface: basilar sulcus, basis pontis, transverse fibers, middle cerebellar peduncle, CN V, VI, VII, VIII. Posterior surface: floor of 4th ventricle with median sulcus, medial eminence, facial colliculus, superior fovea, vestibular area, striae medullares. Blood supply: pontine branches of basilar artery.

Midbrain
Uppermost part of brainstem; divided by cerebral aqueduct into cerebral peduncles and tectum. Cerebral peduncles contain crus cerebri, substantia nigra, tegmentum. Tectum contains superior & inferior colliculi. Superior colliculi: visual reflexes → LGB via superior brachium. Inferior colliculi: auditory reflexes → MGB via inferior brachium. Trochlear nerve emerges posteriorly.

Fourth Ventricle
Between pons & upper medulla anteriorly and cerebellum posteriorly. Diamond-shaped floor; roof formed by cerebellar structures. Angles: superior (aqueduct), inferior (central canal), two lateral recesses. Openings: one median (Magendie) and two lateral (Luschka).

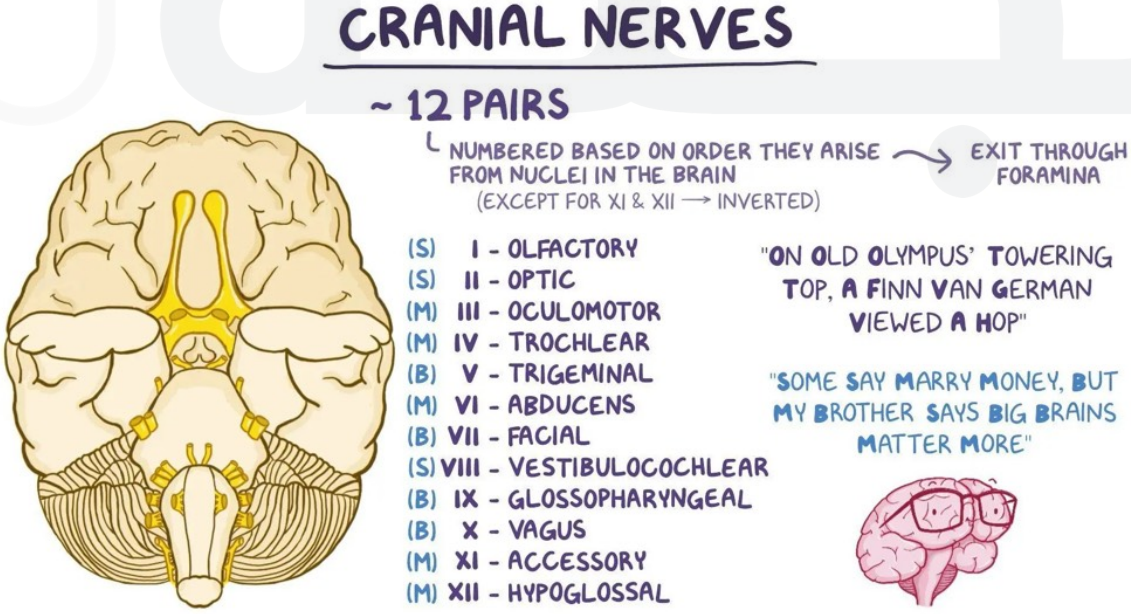
Comparison Table: Medulla Oblongata – Pons – Midbrain

Midbrain	Pons	Medulla Oblongata	Feature
Uppermost and shortest part of the brainstem	Middle part of the brainstem	Lowest part of the brainstem	**Position**
Connects pons and cerebellum to the forebrain	Superiorly continuous with midbrain; inferiorly continuous with medulla	Superiorly continuous with pons; inferiorly passes through foramen magnum	**Extent / Continuity**
Divided by cerebral aqueduct into: anterior (cerebral peduncles) and posterior (tectum)	No internal subdivision mentioned externally	Lower half (closed medulla) with central canal; Upper half (open medulla) related to 4th ventricle	**Parts**
—	—	3 cm long, 2 cm transverse, 1 cm AP	**Dimensions**
Cerebral peduncles separated by interpeduncular fossa; related to Circle of Willis; CN III emerges medially	Basilar sulcus; basis pontis; transverse pontine fibers; middle cerebellar peduncle; CN V; CN VI; CN VII & VIII	Anterior median fissure (interrupted by pyramidal decussation); pyramids; anterolateral sulcus (CN XII); olive; posterolateral sulcus (CN IX, X, XI); inferior cerebellar peduncle	**Anterior Surface – Main Features**
Tectum with four colliculi; superior cerebellar peduncles; superior medullary velum; CN IV emerges posteriorly	Forms upper part of floor of 4th ventricle: median sulcus, medial eminence, facial colliculus, superior fovea, vestibular area, striae medullares	Closed medulla: posterior median sulcus, gracile tract & tubercle, cuneate tract & tubercle, spinal tract of trigeminal nerve. Open medulla: median fissure, inferior fovea, hypoglossal trigone, vagal trigone, vestibular trigone	**Posterior Surface – Main Features**
2 superior colliculi (visual reflexes → LGB via superior brachium); 2 inferior colliculi (auditory reflexes → MGB via inferior brachium)	—	—	**Colliculi**
Superior cerebellar peduncles	Middle cerebellar peduncle	Inferior cerebellar peduncle	**Cerebellar Connections**
III, IV	V, VI, VII, VIII	IX, X, XI, XII	**Cranial Nerves (mentioned)**
Connected via cerebral aqueduct	Posterior surface forms upper part of floor	Open medulla forms lower part of floor	**Relation to 4th Ventricle**
Arterial supply from Circle of Willis	Pontine branches of basilar artery	Vertebral artery branches; PICA	**Blood Supply**
Great cerebral vein or basal vein	Dural venous sinuses	Adjacent venous sinuses	**Venous Drainage**



Cranial Nerves & Brainstem Surfaces

Brainstem Part	Surface	Cranial Nerve(s)	Site of Emergence
Medulla Oblongata	Anterior surface	Hypoglossal nerve (XII)	Anterolateral sulcus (between pyramid & olive)
Medulla Oblongata	Posterolateral surface	Glossopharyngeal (IX)	Posterolateral sulcus
Medulla Oblongata	Posterolateral surface	Vagus (X)	Posterolateral sulcus
Medulla Oblongata	Posterolateral surface	Accessory (XI)	Posterolateral sulcus
Pons	Anterior surface	Trigeminal nerve (V)	Junction with middle cerebellar peduncle
Pons	Pons–medulla junction	Abducent nerve (VI)	Groove between pons & pyramid
Pons	Pons–medulla junction	Facial nerve (VII)	Lateral to abducent nerve
Pons	Pons–medulla junction	Vestibulocochlear nerve (VIII)	Lateral to facial nerve
Midbrain	Anterior surface	Oculomotor nerve (III)	Medial aspect of cerebral peduncle
Midbrain	Posterior surface	Trochlear nerve (IV)	Back of midbrain (unique)



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"من كنوز الجنة"