Brainstem Anatomy and Cranial Nerve Nuclei

Reading:
Haines 2008, Neuroanatomy Atlas

Pre-Class Preparatory Exercise
See coronal sections: 53, 69, 93, 141 and identify the cranial nerves in which these neurons send their axons.

Goals
This lecture will review the anatomical organization of the brainstem. At the end of the session, students should be able to identify the main regions of the brainstem based on the shape and major structures, identify the alar and basal plate regions of the brainstem, and identify major sensory and motor nuclei and tracts.

Clinical Significance:
Understanding the anatomy of the brainstem is important for the diagnosis of diseases of brainstem and understanding the symptoms of stroke. A physician will be able to identify the site of a lesion in the brainstem after a thorough physical exam and the identification of the patient’s symptoms. This is because there is a close relationship between structure and function in the nervous system. This lecture will prepare the student to predict the loss of function in patients based on brainstem lesions.

PLEASE REFER TO SLIDES AND ATLAS SECTIONS

HOW TO LOOK AT SECTIONS

- What part of the brain is it?
  - Shape of the section
  - Critical structures for identification.
- What cranial nerves are present at this location?
  - Memorize the entry points of the cranial nerves.
  - Memorize the function of the cranial nerves.
- Where are the sensory and motor nuclei?
  - Alar plate derivatives are sensory nuclei.
  - Basal plate derivatives are motor nuclei.
- What structures are involved?
  - Name the **nuclei** and neurons involved
  - Name the **tracts** involved.
### REGION

|--------|---------------------------------------------------------------|---------------|
| Spinal Cord | Dorsal roots  
Ventral roots | XI. **Spinal accessory** cranial nerve, Motor |
| Myelencephalon - Medulla | Pyramids  
Fourth Ventricle  
Inferior Olive | XII. **Hypoglossal**, Motor  
X. **Vagus**, Motor, Parasympathetic, Visceral Sensory, General Sensory  
IX. **Glossopharyngeal**, Motor, Parasympathetic, Visceral Sensory, General Sensory |
| Medulla - Pons Junction |  | VIII. **Vestibulocochlear**, Special Sensory  
VII. **Facial**, Motor, Parasympathetic, Visceral Sensory, General Sensory  
VI. **Abducens**, Motor |
| Metencephalon - Pons | Cerebellum  
Pontine protuberance  
Fourth ventricle | V. **Trigeminal**, Motor, General Sensory |
| Mesencephalon - Midbrain | Tectum  
Cerebral peduncles | III. **Oculomotor**, Motor, Parasympathetic  
IV. **Trochlear**, Motor |
| Diencephalon - Thalamus | Optic chiasm  
Hypothalamus | II. **Optic** cranial nerve, Special Sensory |
| Telencephalon | basal ganglia  
cerebral cortex  
Frontal, Parietal, Occipital, Temporal lobes | I. **Olfactory** cranial nerve, Special Sensory |