

The University of Connecticut
Schools of Medicine and Dental Medicine
MEDS5371: Systems Neuroscience
2012/2013

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Lecture

Brainstem Anatomy and Cranial Nerve Nuclei

Reading:

Purves 2012, 5th Edition, Appendix
 Haines 2008, Neuroanatomy Atlas

Pre-Class Preparatory Exercise

Use the Allen Brain Atlas <http://mouse.brain-map.org/> to locate cholinergic neurons in the brainstem of the mouse. Focus on the motor neurons for the cranial nerves. Look for the in situ hybridization images of the mRNA for choline acetyltransferase. <http://mouse.brain-map.org/experiment/show/252>
 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.

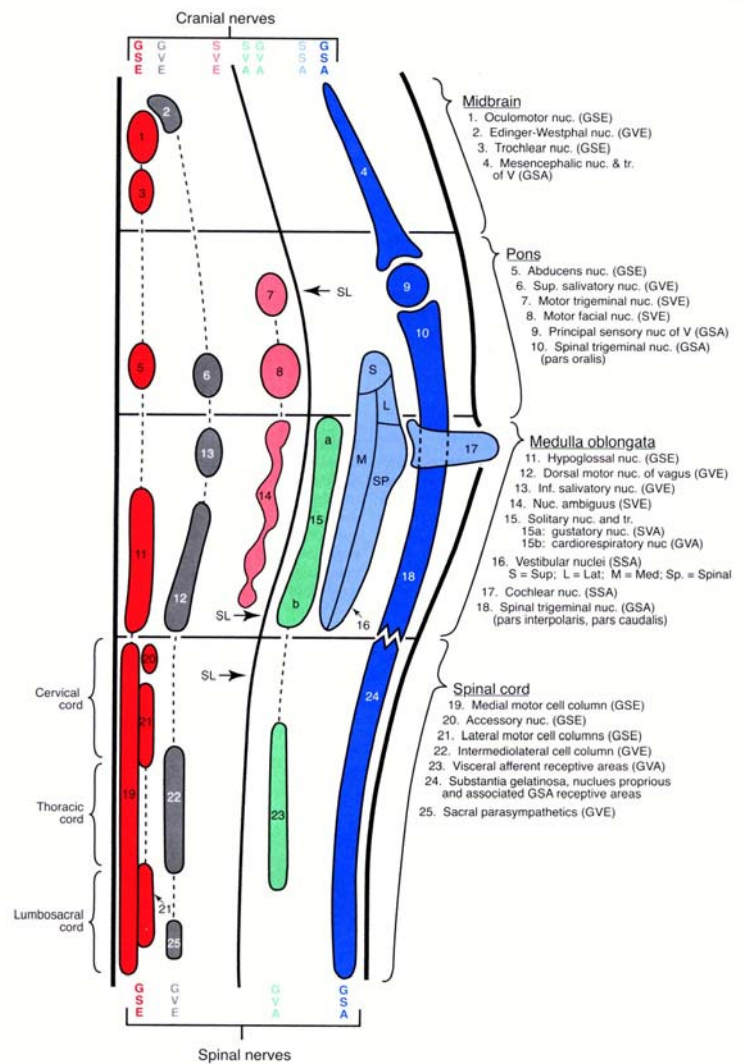
Clinical Significance:

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.



What do they connect? Where do they go?

REGION	Haines (2008) Neuroanatomy, An Atlas... 7 th edition, Lippincott		CRANIAL NERVE
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