

THE UNIVERSITY OF CONNECTICUT
Graduate School
Meds 384, Mammalian Neuroanatomy
Medulla & Pons

Barr's: Chapter 7**Goal**

The main point of this class is to learn the general organization of the medulla and pons.

I. General Features of the Medulla

The medulla is identify by the presence of the pyramidal tract. The caudal medulla begins at the junction of the spinal cord and the brain and terminates at the inferior olive. It contains the nucleus gracilis and cuneatus. The medulla is shown in slides CNS-10 - CNS-19.

A. Spinal Cord - Caudal Medulla Oblongata (Slide CNS-10-11)

Note the shape of the section and the shape of the gray matter. How do they compare to that of the spinal cord? Identify the decussation of the pyramids. How is it related to the lateral corticospinal tract?

Identify: ventral horns from C-1

cuneate fasciculus

spinal trigeminal tract

central gray

spinal trigeminal nucleus

decussation of the pyramids

gracile fasciculus

Find the approximate location of following tracts in CNS-10:

ventral and lateral funiculi corticospinal tracts

spinocerebellar tracts vestibulospinal tracts

rubrospinal tract reticulospinal tracts

Which tracts are still similar to those in the spinal cord?

Locate the neurons of the spinal accessory nucleus relative to the pyramidal decussation and tract in CNS-10 and CNS-11. To what muscles to these neurons project? What type of neuron are they?

In the dorsal part of CNS-11, locate:

nucleus gracilis

nucleus cuneatus

internal arcuate fibers and the begining of the medial lemniscus

B. Features of the mid Medulla (CNS-13 to 16)

In CNS-13 to CNS-16 find the main features of the middle medulla:

inferior olive

fourth ventricle (CNS-14)

pyramidal tract

hypoglossal nucleus

Throughout mid-medulla, you will see the medial lemniscus and the reticular formation.

Spinocerebellar Systems

Use your atlas to locate the dorsal spinocerebellar tract and ventral spinocerebellar tract in CNS-13 to CNS-16. Inputs to the cerebellum travel from the lower limbs in the spinocerebellar tracts.

Inputs to the cerebellum from the upper limbs travel in the cuneocerebellar tract. This begins in the lateral (accessory or external) cuneate nucleus. Find it in CNS-15. Both sets of tracts enter the inferior cerebellar peduncle (restiform body) on route to the cerebellar cortex and deep nuclei where they terminate. Find the inferior cerebellar peduncle in CNS-13 to CNS-16. Note that the inferior cerebellar peduncle is larger than the spinocerebellar tracts. This is because the fibers of the inferior olive join with the spinocerebellar tracts to project through the peduncle.

Caudal Vestibular Components

Find the medial vestibular nucleus and spinal (inferior) vestibular nucleus in CNS-16. These nuclei receive inputs from vestibular apparatus in the ear via the 8th cranial nerve. The medial nucleus and the MLF are involved in the control of head and eye movement. The spinal vestib. nucleus projects to the cerebellum via the inferior cerebellar peduncle.

The Three Mixed Bundles of The Brain Stem:

Identify the reticular formation and each of the mixed bundles in CNS-15 or -16. What does each contain? With what systems are they associated?

- 1) the medial longitudinal fasciculus (MLF)
- 2) the dorsal longitudinal fasciculus (DLF)
- 3) the central tegmental tract (mixed bundle of the reticular formation). Identify.

C. Features of the Rostral Medulla (CNS 17 to 20)

The rostral medulla is highlighted by the components of the 8th cranial nerve and the entry of the inferior cerebellar peduncle into the white matter of the cerebellum.

Cochlear Nucleus

In CNS-17, identify the dorsal cochlear nucleus. This nucleus receives inputs from which cranial nerve? It is part of which system? Sensory or motor? The output of this nucleus enters which pathway (hint, which lemniscus)?

In CNS-19, identify the ventral cochlear nucleus and the 8th cranial nerve. These are part of which system?

Vestibular Nuclei

Components of the vestibular system are visible in CNS-16 to CNS-20. These nuclei receive inputs from vestibular apparatus in the ear via the 8th cranial nerve. Examine these slides and identify the superior vestibular nucleus, lateral vestibular nucleus, 8th nerve root, spinal (inferior) vestibular nucleus, and medial vestibular nucleus. Some of these nuclei interconnect the nuclei

that control eye movement (nuclei for 3rd, 4th, and 6th cranial nerves) via the MLF. Other vestibular nuclei contain the cells of origin for the vestibulospinal tracts. The medial vestibulospinal tract (MLF) originates in the medial vestibular nucleus. Which vestibular nuclei contain the neurons that make up the lateral vestibulospinal tract?

II. General Features of the Pons

The middle cerebellar peduncle (brachium pontis) and the pontine nuclei are the main landmarks of the pons. The main projection of the pontine nuclei is to the cerebellum. The fibers enter the cerebellum through the middle cerebellar peduncle.

A. Pontomedullary Junction (caudal pons) (CNS 20-21)

Examine Slide CNS-20 and CNS-21. Locate the 4th ventricle. Where is the middle cerebellar peduncle? Identify the pyramidal tract. What is its relationship to the middle cerebellar peduncle? What cranial nerves do you expect to enter at the junction of the pons and medulla?

Identify the facial nucleus, facial colliculus, genu of the facial nerve root, facial nerve in CNS-20 and CNS-21.

Identify the lateral lemniscus, trapezoid body, and medial superior olive in CNS-21. These are components of the auditory system.

Identify the abducens nucleus and the abducens nerve roots also in CNS-21. The latter are lateral to the medial lemniscus.

B. Middle Pons (CNS-22)

Middle pons contains three components of the trigeminal system. Identify the trigeminal motor nucleus. On the medial side of the primary trigeminal afferents, identify the chief (main) sensory nucleus of trigeminal nerve. Locate the mesencephalic root of the trigeminal nerve.

C. Rostral Pons

In slides CNS-23 to CNS-25, identify:

pontine nuclei

4th ventricle

central gray

cerebral aqueduct

superior cerebellar peduncle

trochlear nerve

medial lemniscus

lateral lemniscus

trigeminal lemniscus (trigeminothalamic tract)

spinal lemniscus (anterolateral system, ALS)

medial longitudinal fasciculus (MLF)

central tegmental bundle (CTF)

raphe nuclei

pontine reticular formation