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**Learning Guide:**

**Brainstem and Cerebellum**

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# **Connecting the Model without Braille Labels**



Locate the two parts of the model. The larger model is the cerebellum and the smaller model is the brainstem. The cerebellum feels like a pyramid/mountain and the brainstem feels like a tube. Place the cerebellum on a surface so that the flat part of the model faces the ground and the pointed part faces the sky. After placing the cerebellum on a surface, you will notice that one side has a triangle shaped indent while the other side is bumpy. Place the brainstem in the indent, and once the brainstem is in place, it will feel like the two parts are aligned with each other.

# **Braille Labels**



i: midbrain

p: pons (each smooth side where the p label is, is a cerebellar peduncle in the pons)

ed: medulla oblongata

sc: spinal cord and medulla (both parts are connected)

# **Connecting the Model with Braille Labels**



The model with “th” labels is the cerebellum. The flat sides that the “th” labels are on are the cerebellar peduncles. These connect to the cerebellum to the brainstem. Match the cerebellar peduncles on both the cerebellum and the brainstem by matching the “p” label with the “th”. All of the “p” braille dots should touch the “th” dots. In the walkthrough, begin with the two “p” labels facing towards you.

# **Walkthrough**



Start with the smallest piece. This is the **brainstem**. There are two flat ends. The smallest end faces down and the larger ends faces up. Notice there are 3 sections of the brainstem with the middle section having lines that go horizontally and diagonally. The bottom and top sections have lines that go vertically. The top section is the **midbrain**, the middle section is the **pons**, and the bottom section is the **medulla oblongata**. Start at the medulla and trace up until your fingers get stuck by the “cave” in the pons. The edges of the “cave” and therefore the smooth, flat ovals on either side are the **cerebellar peduncles** in the pons. Next, move to the center of the “cave.” The groove in the center is the **choroid plexus** in the roof of the fourth ventricle. Move outside the cerebellar peduncles and to the top of the model. You will find four bumps. The two bottom bumps are the **inferior colliculi** and the two top bumps are the **superior colliculi**.

The **cerebellum** is the larger model. Hold it horizontally and notice there are two flaps. The two flaps form a mountain-like shape. The peak of the mountain is the **anterior lobe**. Next, move down the left side of the mountain and feel the left flap. The bottom of this left flap is the **posterior lobe**. In the middle of each flap, you will feel a raised bump. Directly underneath each bump, there is a smaller, textured bump. These smaller bumps are the **flocculus**.

1. **Pons:** The pons are a group of nuclei that relay information between the cerebellum and cerebrum. Also, the pons are responsible for carrying out muscle functions.
2. **Midbrain:** The midbrain allows for the eye movement and auditory processing. It lies within the brainstem, forebrain and hindbrain, making up a relatively small part of the cerebellum. Damage to the midbrain would result in difficulty with memory, movement, hearing, and vision.
3. **Medulla Oblongata:** The medulla oblongata lies above the spinal cord and is a part of the brainstem anterior to the cerebellum. The function of the medulla is to carry out common reflexes including sneezing, coughing, vomiting and swallowing. In addition, the respiratory system and cardiovascular system unite to be one regulating system within the medulla. This is done so through the convergence of the rostral ventral lateral medulla (part of the medulla that controls respiration) and the caudal ventrolateral medulla (part of the medulla that regulates cardiovascular activity).
4. **Cerebellar peduncles:** The function of the cerebellar peduncles is to allow communication between the central nervous system and cerebellum. Inferior peduncles communicate information about the position of limbs and joints. Then, the middle peduncles bring information about the desired position of the limbs and joints. This information is analyzed and integrated, and through the superior peduncles, the cerebellum sends impulses to allow body parts to move to their desired position.
5. **Inferior Colliculi and Superior Colliculi:** The inferior colliculi are a part of the midbrain and channel auditory signals in the body. Therefore, they are responsible for integrating signals, recognizing frequencies and discriminating between pitches. The superior colliculi are a part of the midbrain and transform sensory input into movement output. By doing so, the superior colliculi orient the body, through eye movements, to be in the body’s desired position.
6. **Anterior Lobe:** The anterior lobe is responsible for unconscious perception and awareness. The spinal cord delivers inputs to the anterior lobe.
7. **Posterior Lobe:** The posterior lobe allows for fine motor movements, especially movements that are involuntary. The brainstem and cerebral cortex deliver information to the posterior lobe in order for these movements to be carried out.
8. **Flocculus:** The flocculus allows the brain to focus its gaze in both the horizontal and vertical axis. The eye sends signals to the flocculus to allow for gaze stabilization when the head rotates.
9. **Choroid plexus:** The choroid plexus is a network of capillaries with a primary function to produce cerebrospinal fluid (CSF). The choroid plexus is also a barrier within the brain that separates blood and CSF.

# **Citations**



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