



# Brainstem A-1

This is still the spinal cord - probably the first cervical segment.  
Why are the dorsal horns so slender at C1?



This is a little of the posterior cerebellum (see the drawing in lower right)

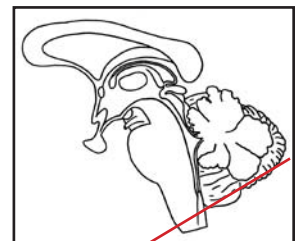
**About this Atlas**  
**We'd like you to take charge of the content of this Brainstem A atlas.** In these images you can study a brainstem that is cut in true cross section. Your other brainstem atlas (Brainstem B) shows a brainstem that was cut at a more oblique angle.

At the top of the page we've suggested some things that you might want to focus on in each image. But this is your atlas to create and learn from as you find helpful -- and to share with your classmates

At the top right of each page there's a **KEY** that you can mouse over to confirm the region of the brainstem.

The **KEY** may also include additional notes or questions to help guide your learning.

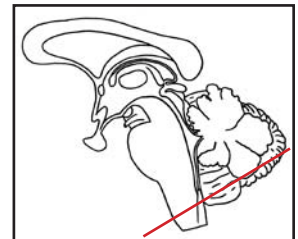
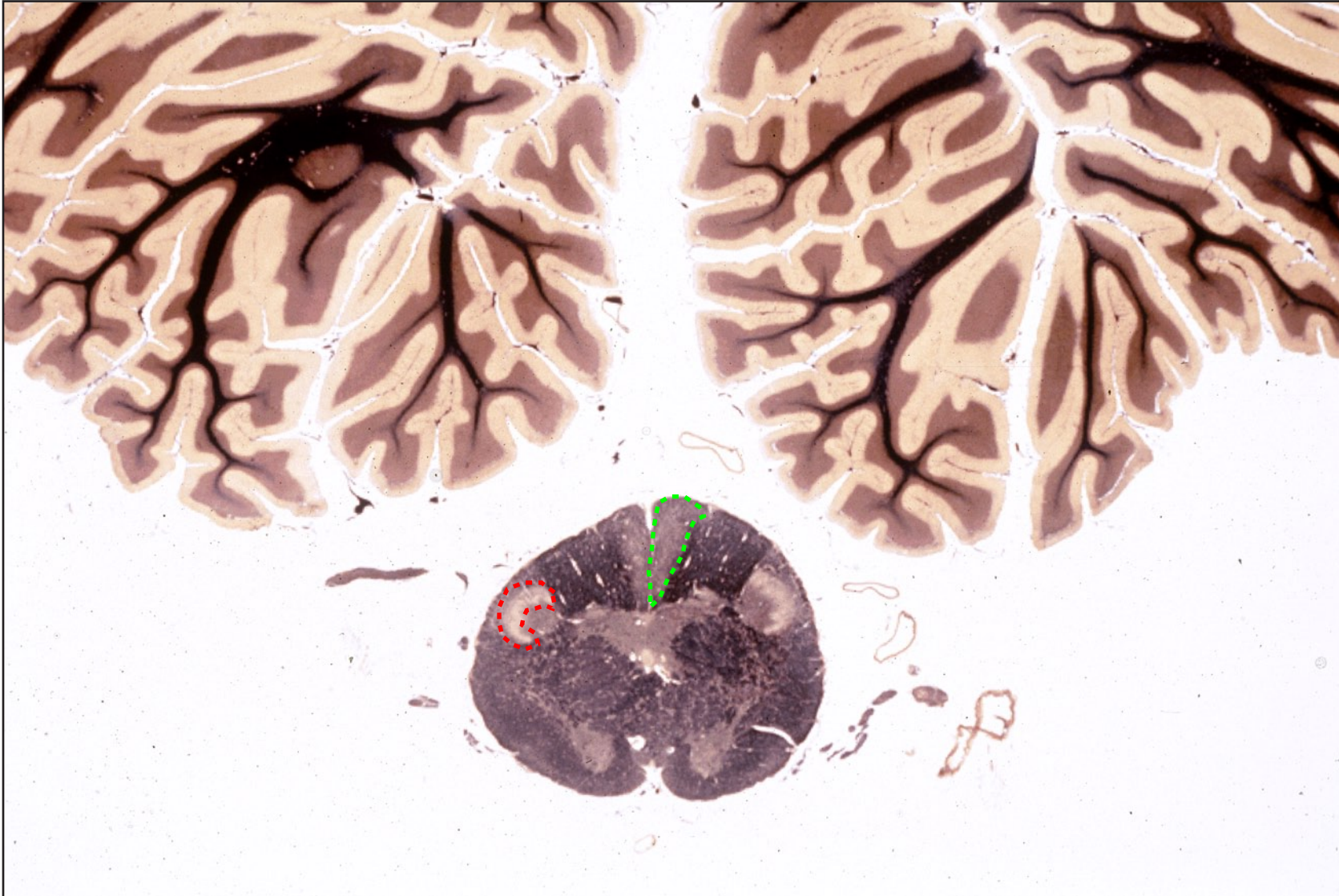
Happy Atlasing...





## Brainstem A-2

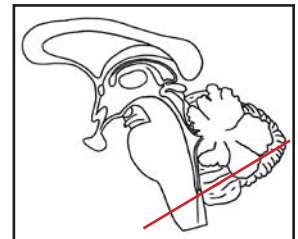
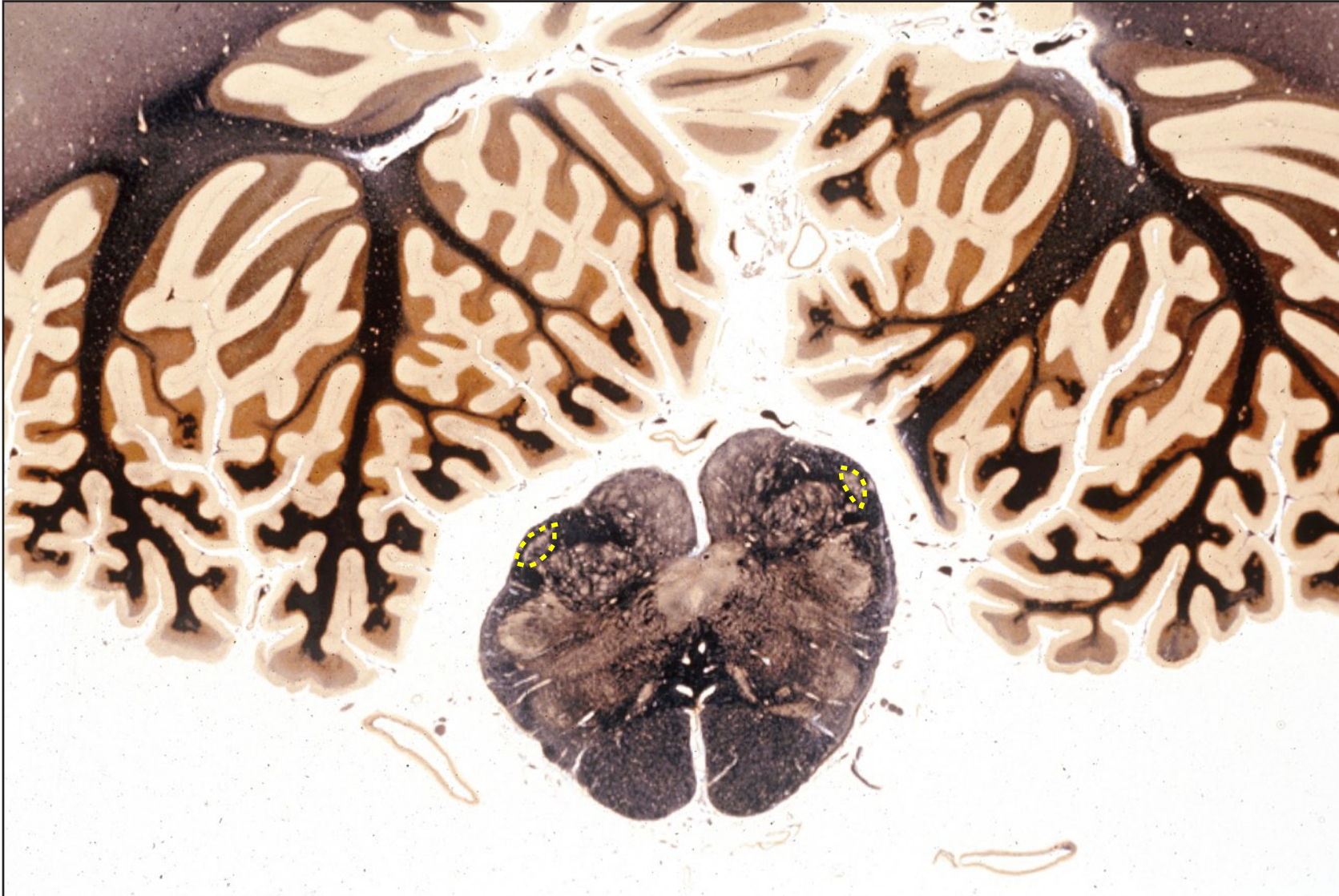
What region of the CNS is this? Identify the major decussation that is present here? If all these crossing axons were interrupted, predict what that patient's neurologic exam would show. Identify the structure circled in red. Briefly, what is its functional role, and what are its connections? Identify the structure circled in green. What pathway or system is it part of?





# Brainstem A-3

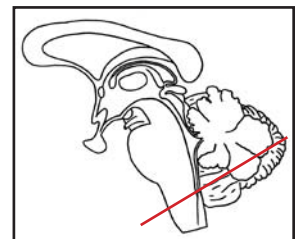
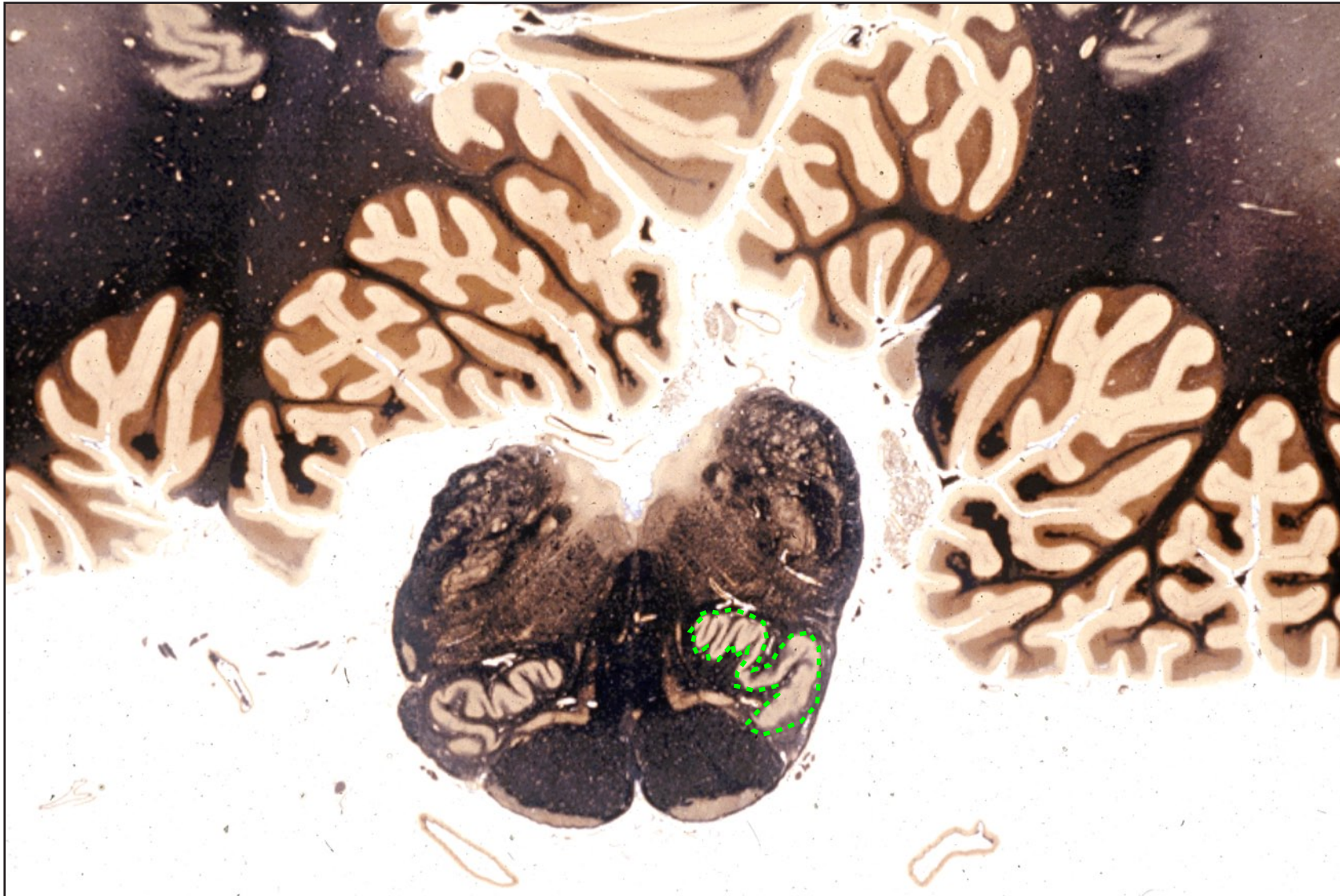
What region of the brainstem is this? The lateral (accessory or external) cuneate nucleus is circled in yellow. Describe its connections. Be sure you can identify: nucleus gracilis and nucleus cuneatus, the caudal part of the spinal trigeminal nucleus, and the location of the corticospinal tracts.





# Brainstem A-4

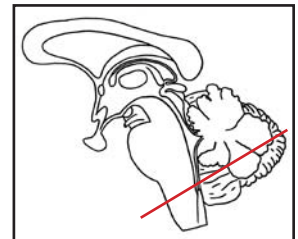
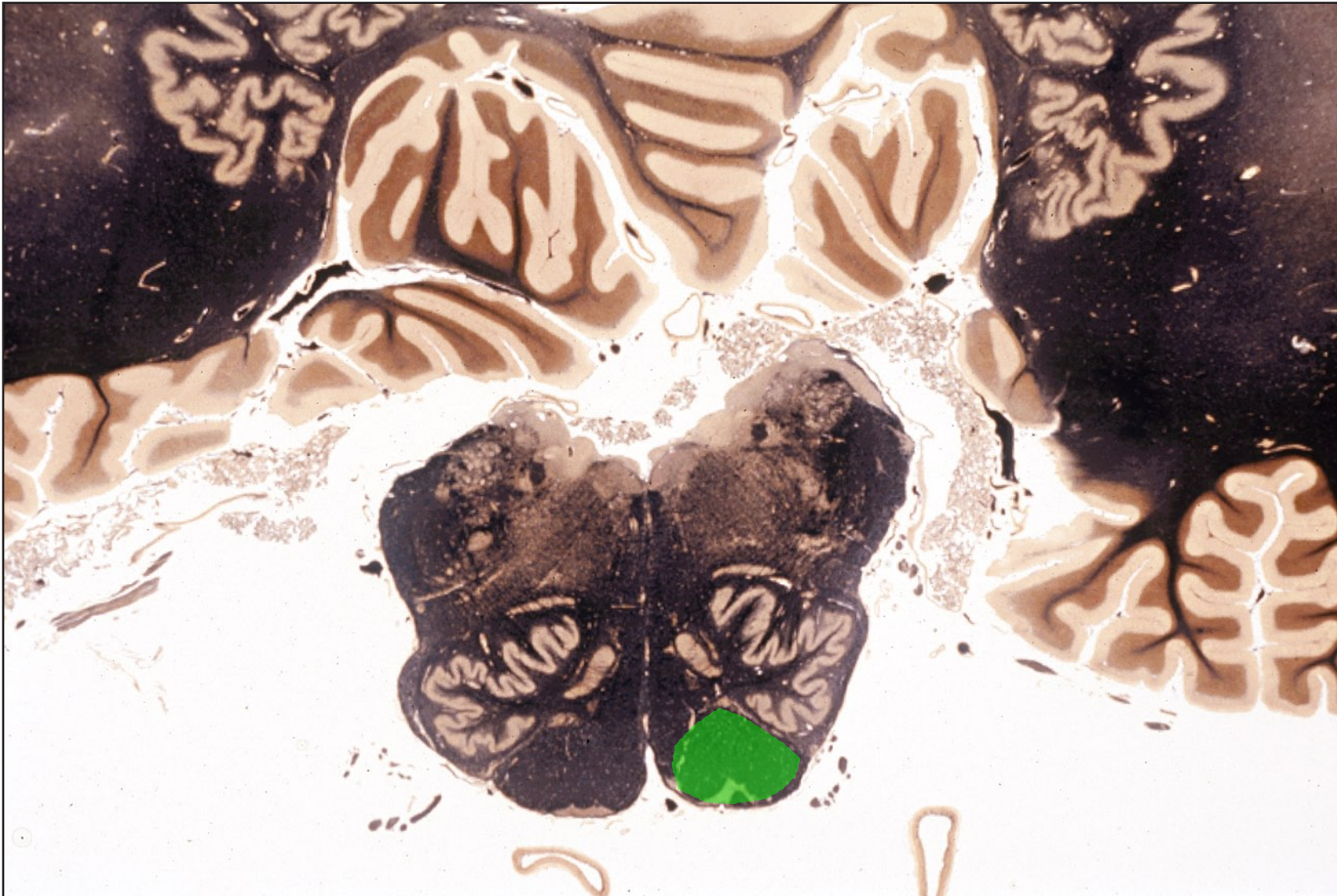
What region of the brainstem is this? Identify the medial lemniscus. What is the location of the cell bodies whose axons form the medial lemniscus? Where will its axons synapse? What maneuvers of the neurologic exam would test the integrity of the RIGHT medial lemniscus (and the system it is part of)? Identify the structure outlined in green. It projects axons to the contralateral cerebellum. Through which peduncle?





## Brainstem A-5

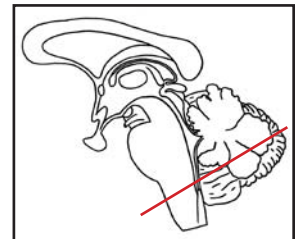
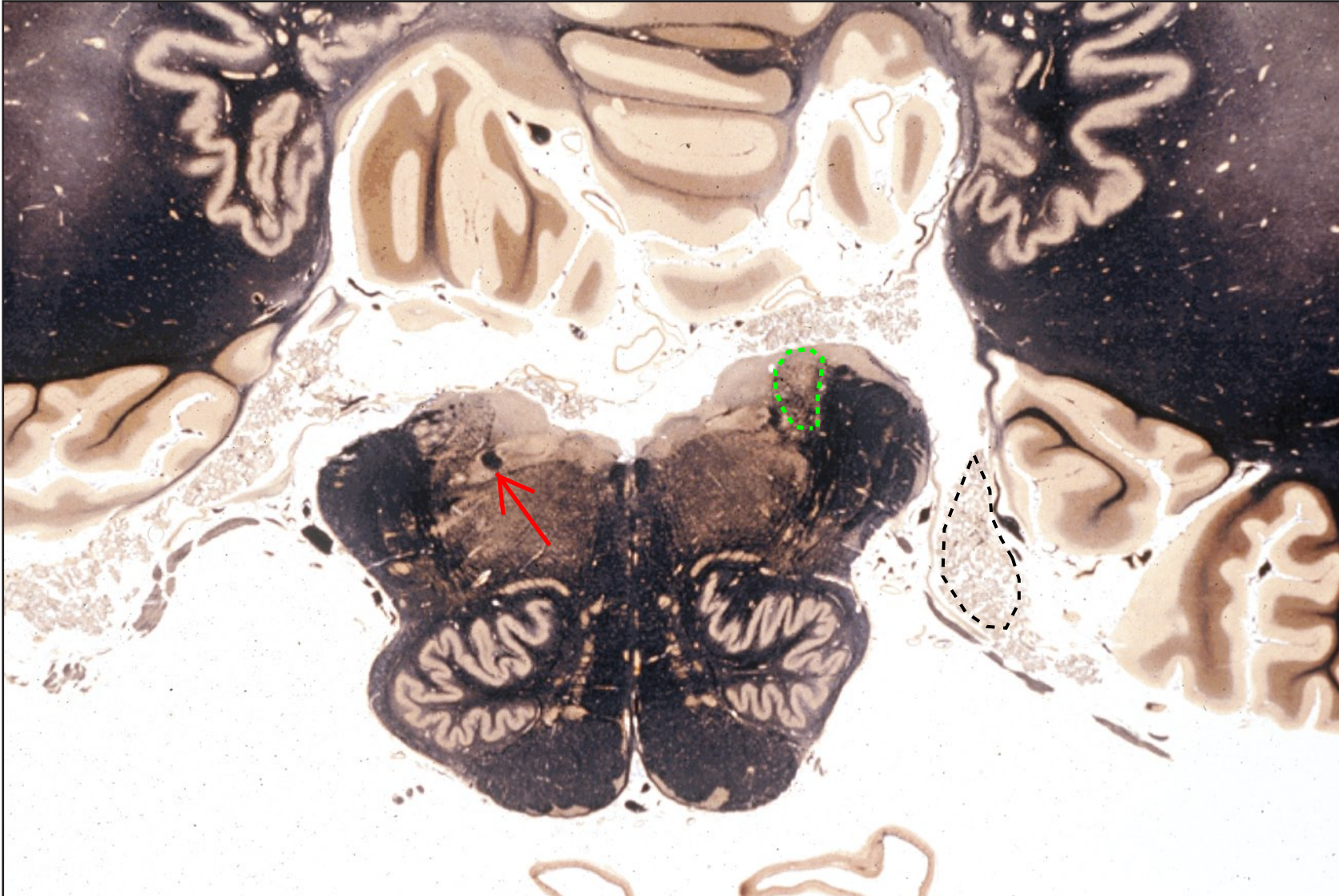
What brainstem region? Identify the somatic MOTOR cranial nerve nuclei present here. One is very easy to find; the second is not. For each, describe neurologic exam findings you'd anticipate in a patient who has suffered damage to that nucleus (or to the axons of its motor neurons).  
A lesion in the green region would be likely to produce what signs and symptoms, and on what side?





# Brainstem A-6

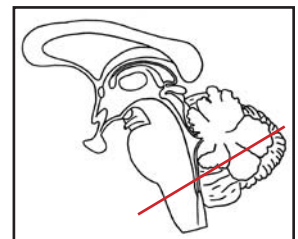
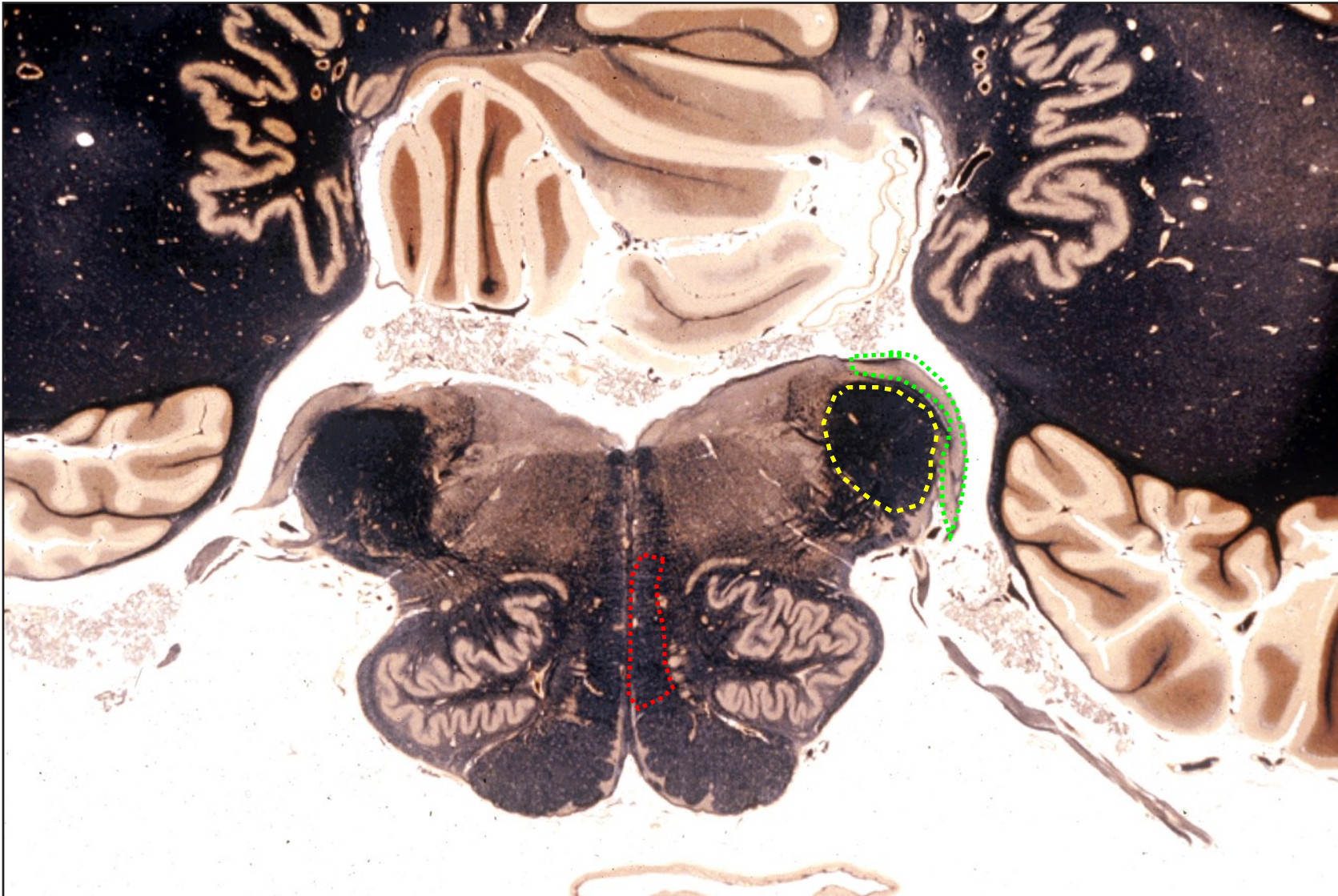
What brainstem region? The red arrow points to a lonely white matter structure. Identify it, and its major functions. Several nuclei are circled in green. What function do they serve? Where is the spinothalamic tract located at this level? What's circled in black? You can see it in several different locations.





# Brainstem A-7

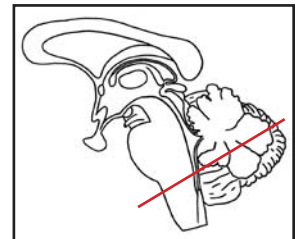
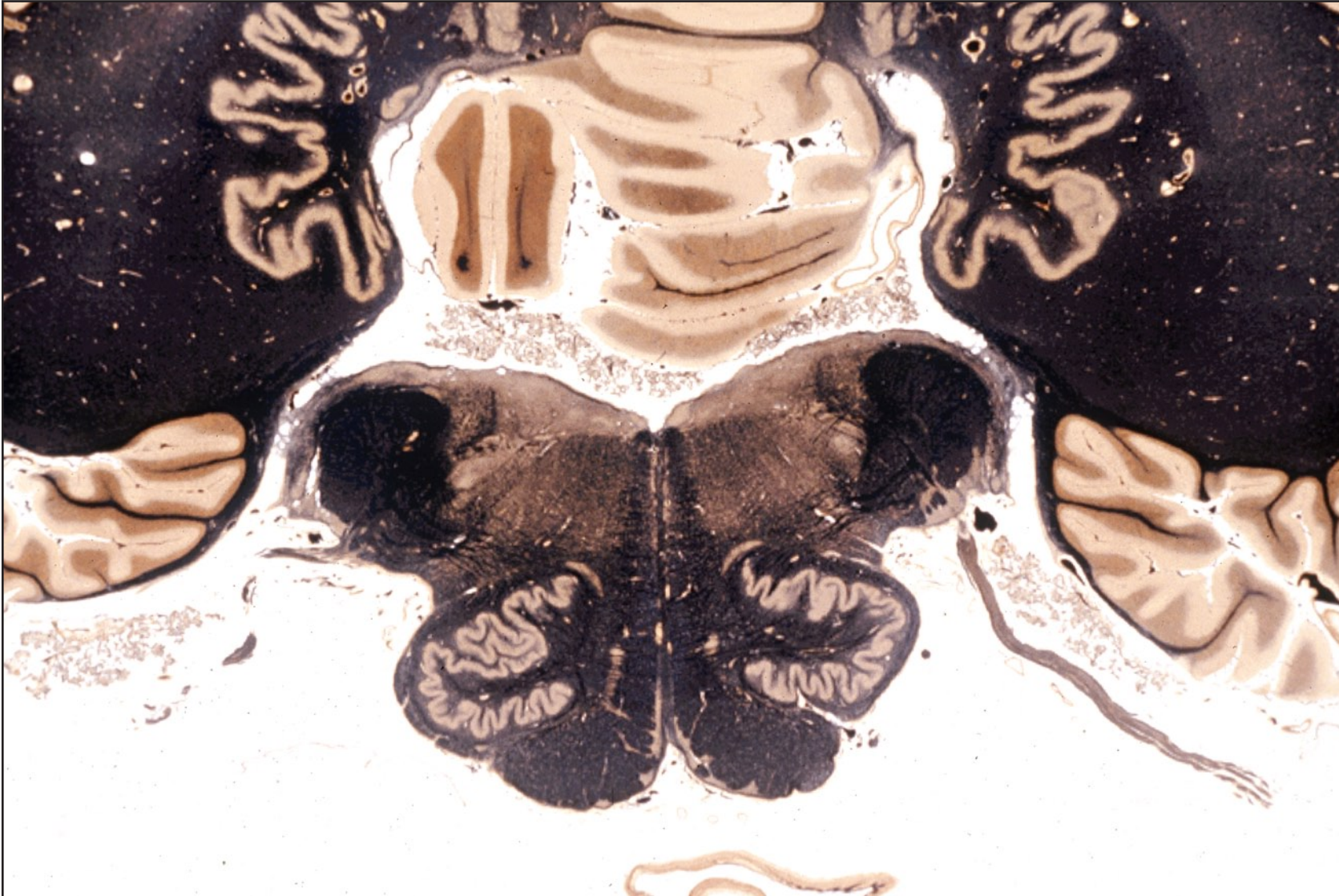
What brainstem region? There's a lot to identify and think about here. Just to get started, identify each of the circled structures, and consider what neurologic deficits a patient might show if it is damaged on one side. The reticular formation extends throughout the brainstem - roughly where is it located in this region?





## Brainstem A-8

What level of the brainstem? Maybe this would be a good place to think about long tracts. Why don't you start with this group -- spinothalamic tract, corticospinal tract, medial lemniscus, descending tract of 5, and dorsal spinocerebellar tract. Mark each of their approximate locations and comment on their functions. There's a cranial nerve attached to the lateral brainstem. Assume it is CN10. What are its different functions?

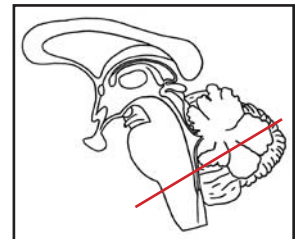






## Brainstem A-9

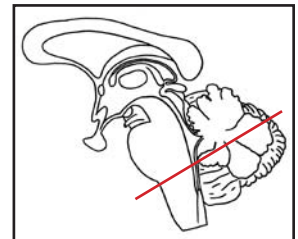
What brainstem region? There's a cranial nerve attached to the brainstem at the red arrow. Which one of the following is it most likely to be - 12, 11, 9, 6, or 5? What can you say about its various functions?





# Brainstem A-10

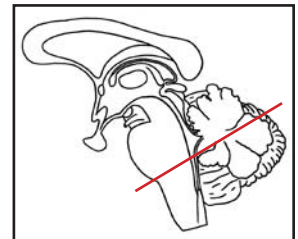
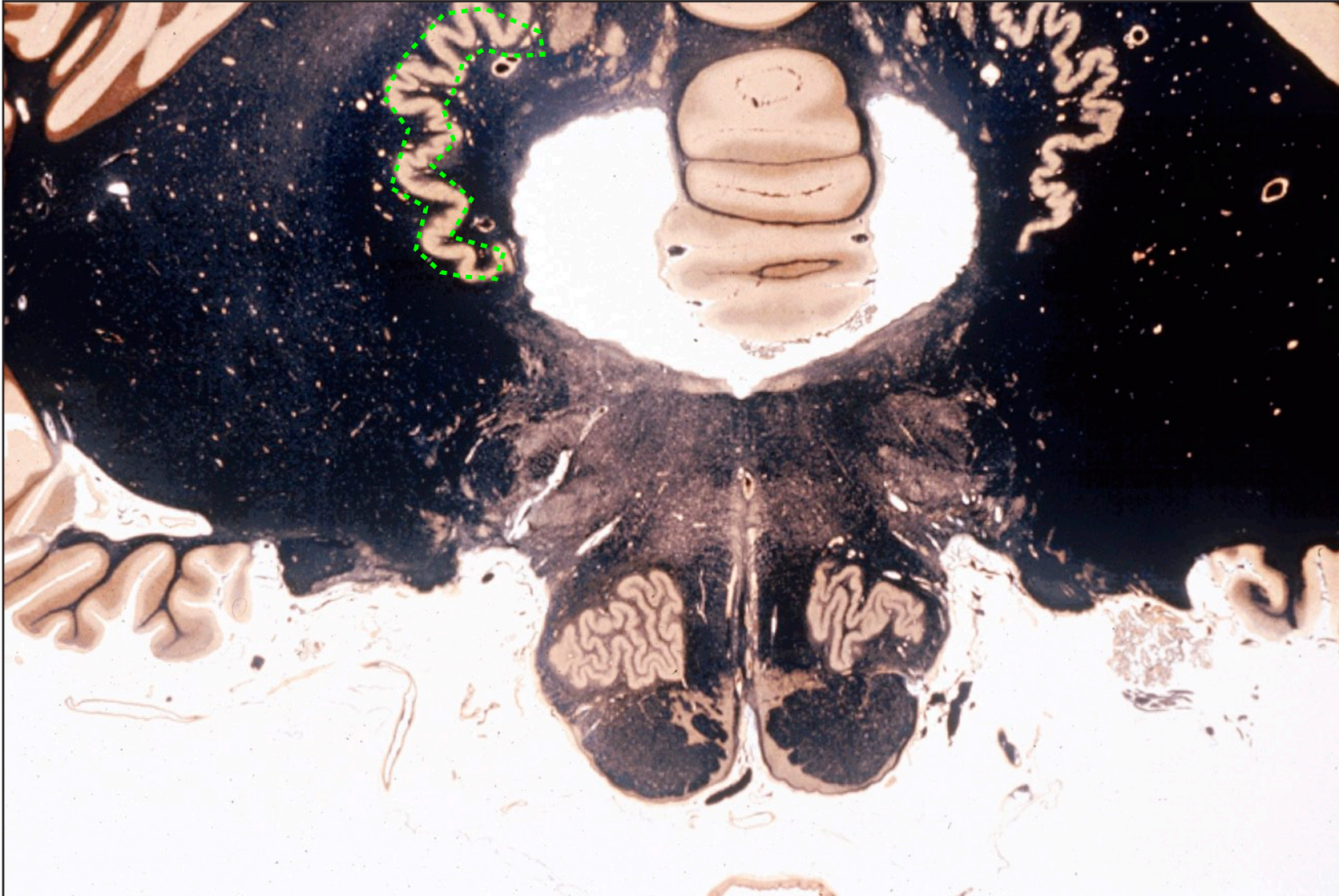
What brainstem region? What structure is indicated by the **red arrow**? Name at least 3 important tracts that it contains. Note whether or not the axons in each tract have crossed the midline. Identify the large artery (circled) at the ventral surface of the brainstem.





## Brainstem A-11

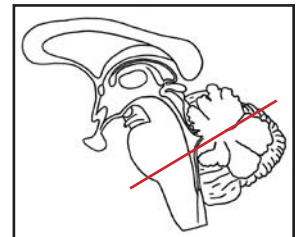
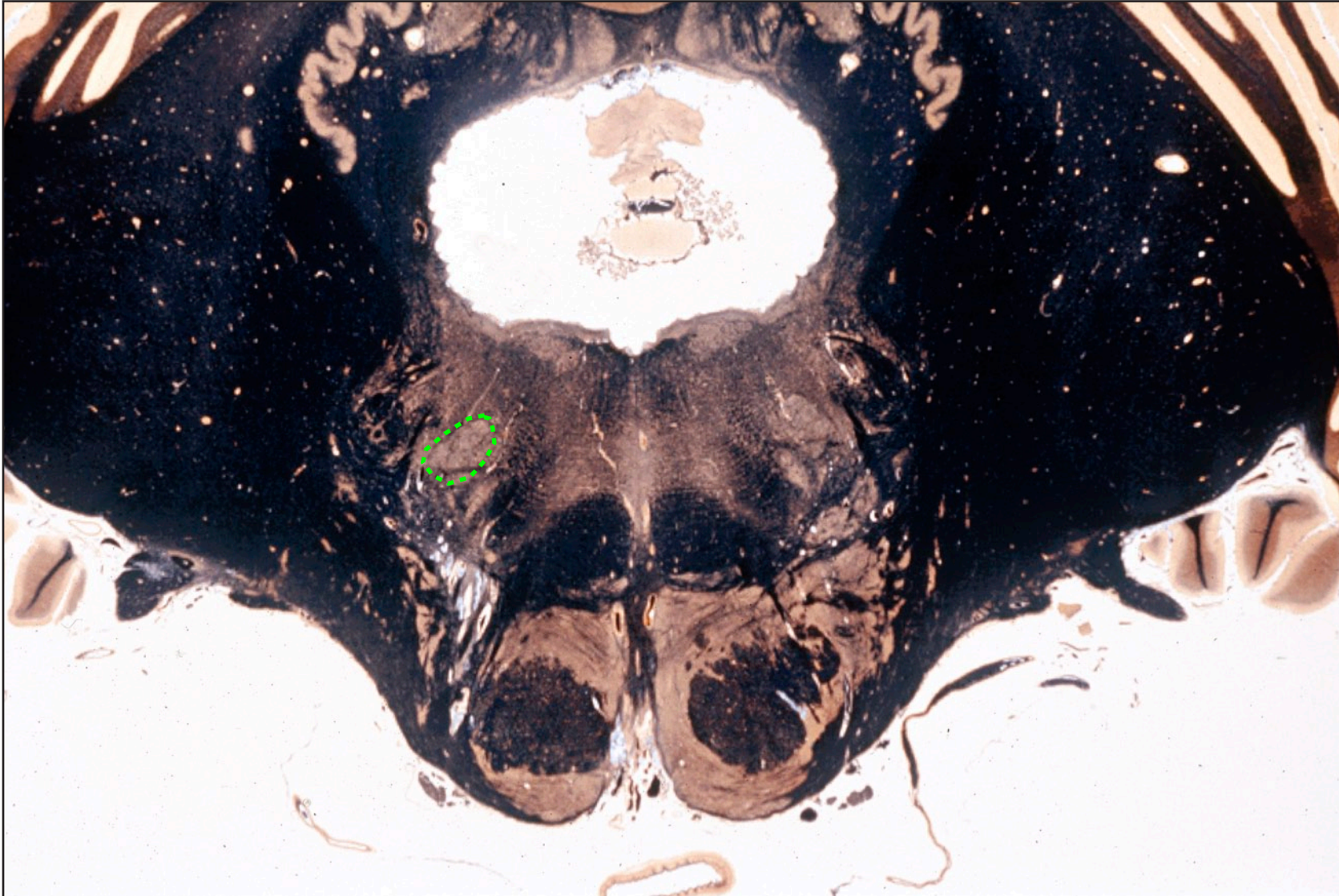
What brainstem region? The dentate nucleus of the cerebellum is outlined in green. The axons of its large neurons form most of one cerebellar peduncle. Which peduncle, and where does it enter the brainstem? Does it cross the midline? Name two synaptic targets of axons originating from cell bodies in the dentate nucleus.





# Brainstem A-12

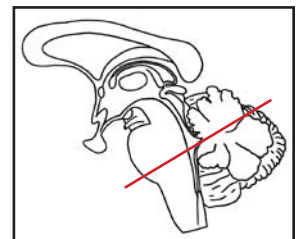
Brainstem region? Identify the pontine nuclei (griseum pontis). Where are the medial lemniscus and the corticospinal tract located? Approximately where is the spinothalamic tract? The facial motor nucleus is circled in green. What would neurologic exam show if the nucleus or the axons of its motor neurons were completely destroyed on the right?





## Brainstem A-13

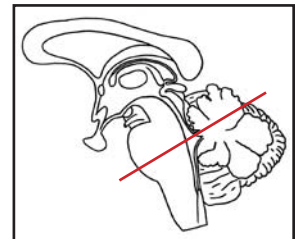
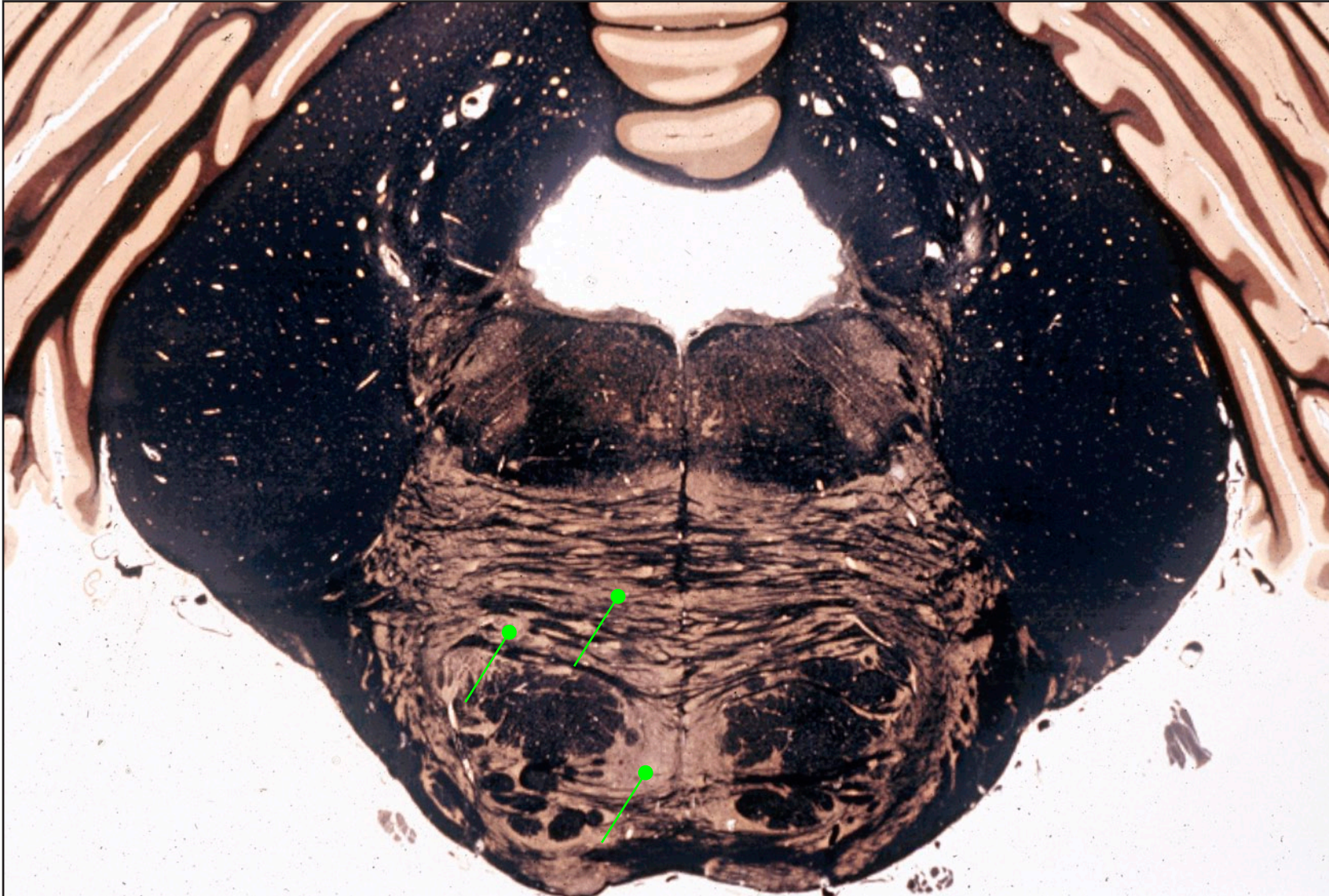
What brainstem region? What two MOTOR cranial nerve nuclei are present here? Identify them. Describe where **axons** of motor neurons in each nucleus travel in the brainstem and where they exit the brainstem. What neurologic deficits would be caused by an infarct in the **red** region on the LEFT side of the brainstem?





## Brainstem A-14

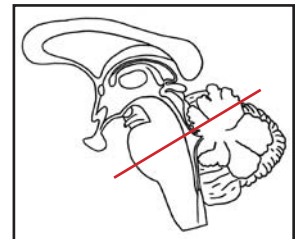
What brainstem region? At this level, both motor and sensory nuclei of the **trigeminal system** are present. Identify them, and briefly discuss the functions of each. Identify the gray matter at the base of the pons (green markers). What is the course of the axons that originate from its cells? Where do they synapse? What massive fiber tract do they form? Identify it here.





# Brainstem A-15

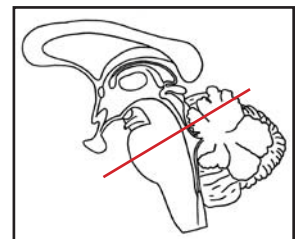
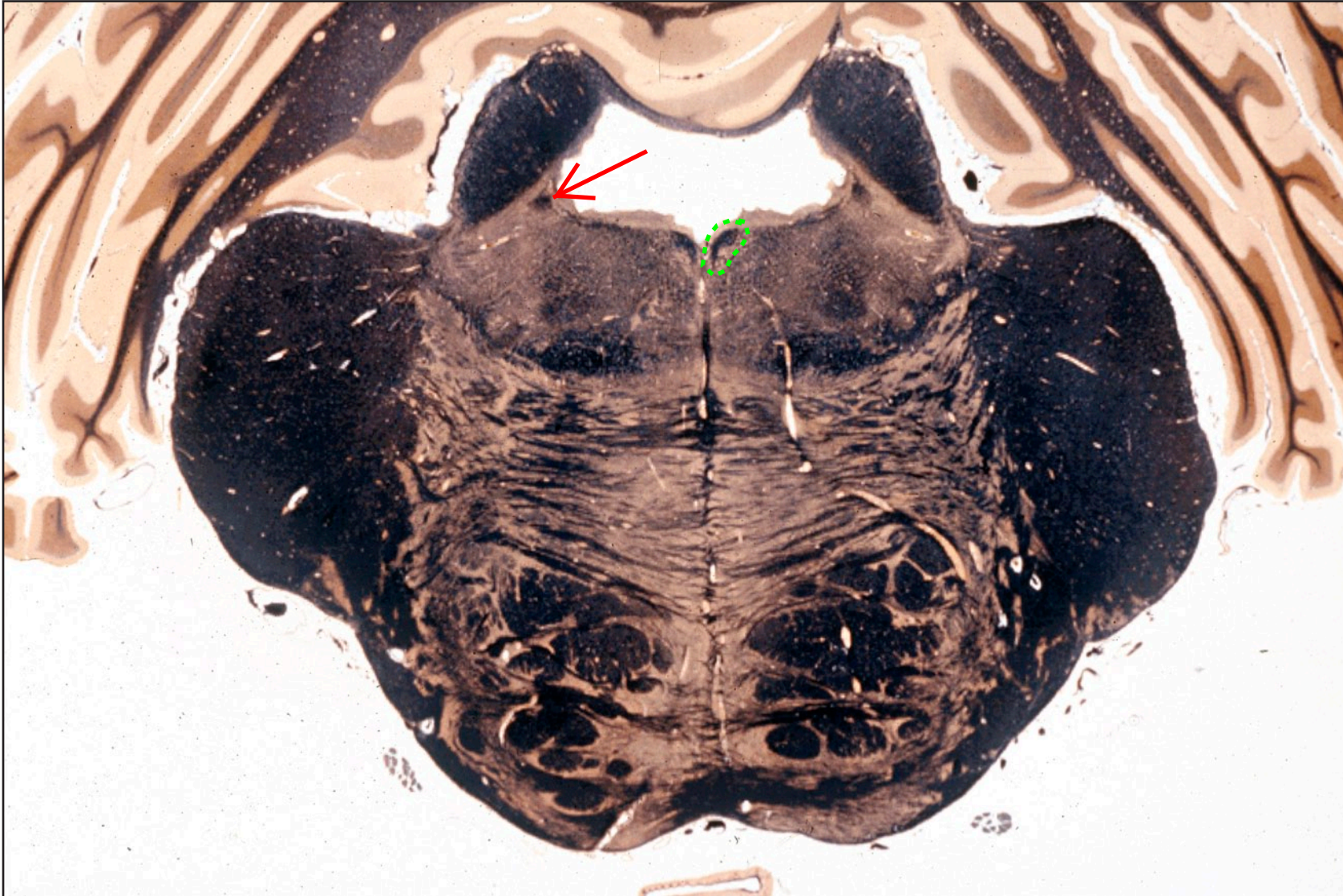
Identify the superior cerebellar peduncles. Predict the neurologic deficits of a patient whose superior peduncle is damaged on the RIGHT close to the cerebellum (i.e. before it decussates). Indicate the approximate locations of the spinothalamic tract, the medial lemniscus, and the corticospinal tract.





# Brainstem A-16

What brainstem region? What tract is circled in green? The tract runs close to the ventricle, and its myelinated axons are particularly vulnerable to damage in multiple sclerosis, a disease that attacks oligodendrocytes and CNS myelin. Predict the neurologic deficits of a patient with an MS plaque damaging the tract on the left. What tract is indicated by the red arrow? Where are the cell bodies of its axons located? What kind of cells are they?

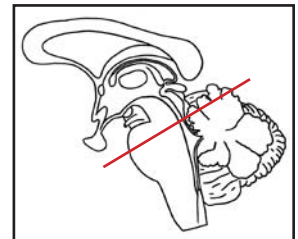






# Brainstem A-17

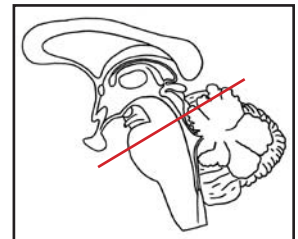
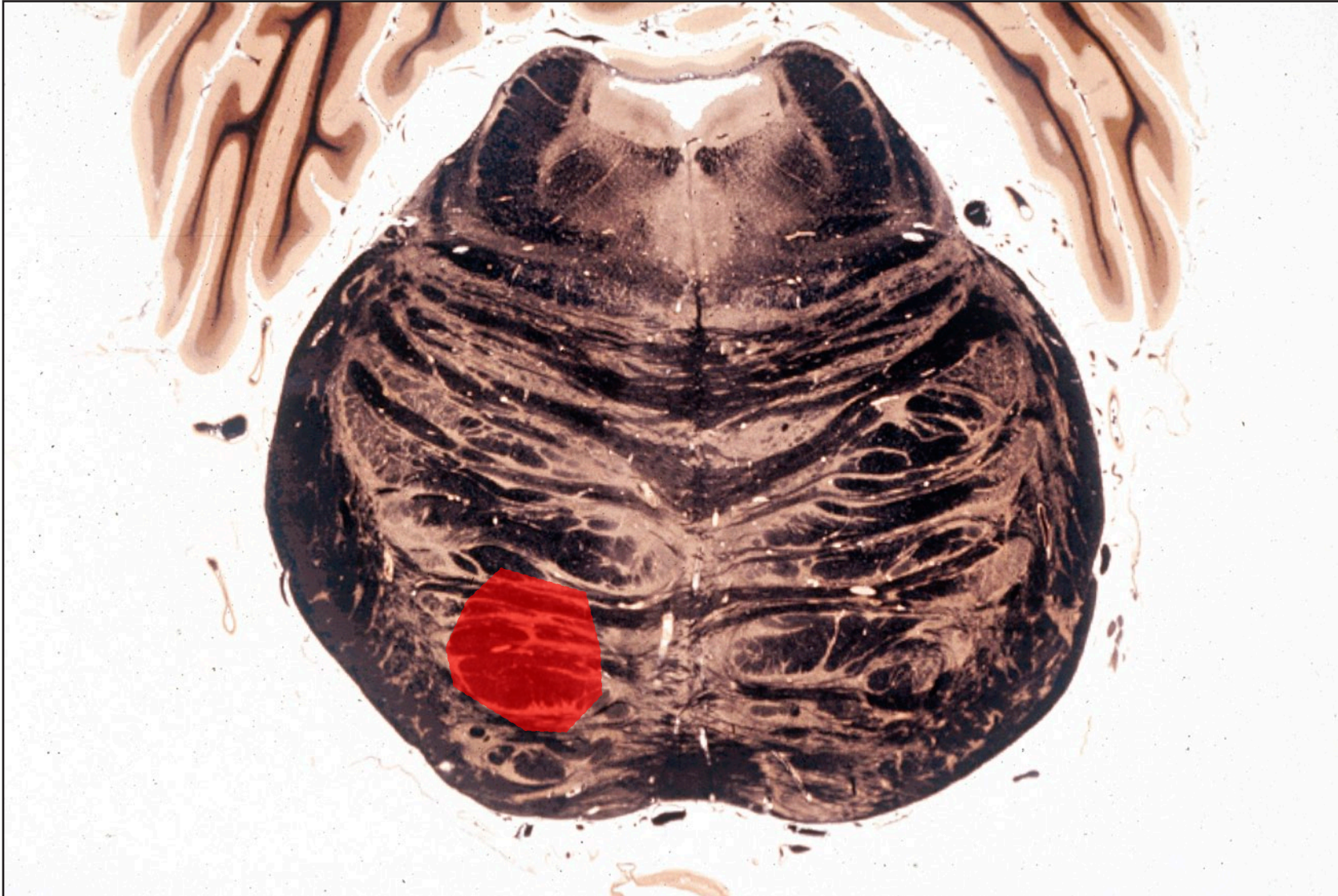
What brainstem region? The spinothalamic tract and medial lemniscus are close together in this region - can you indicate approximately where to find them? Recall that trigeminothalamic axons are also located close by.





# Brainstem A-18

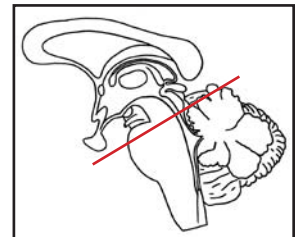
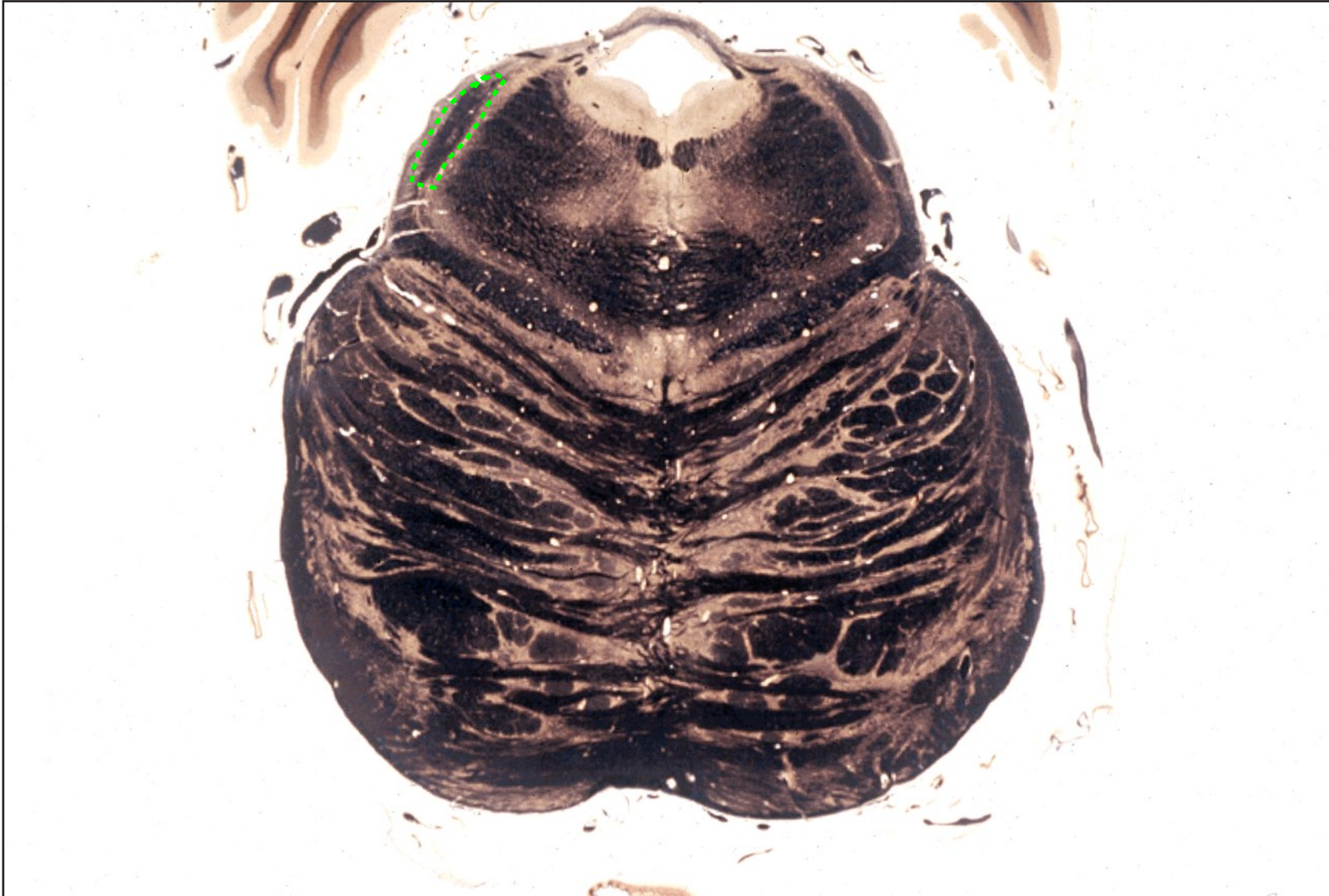
What brainstem region? Identify the superior cerebellar peduncles and the medial longitudinal fasciculus. Explain why a small infarct in the **red** area might produce contralateral weakness of the arm and leg, with exaggerated deep tendon reflexes and a dorsiflexor plantar response.





## Brainstem A-19

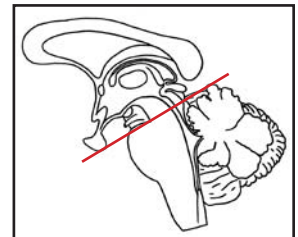
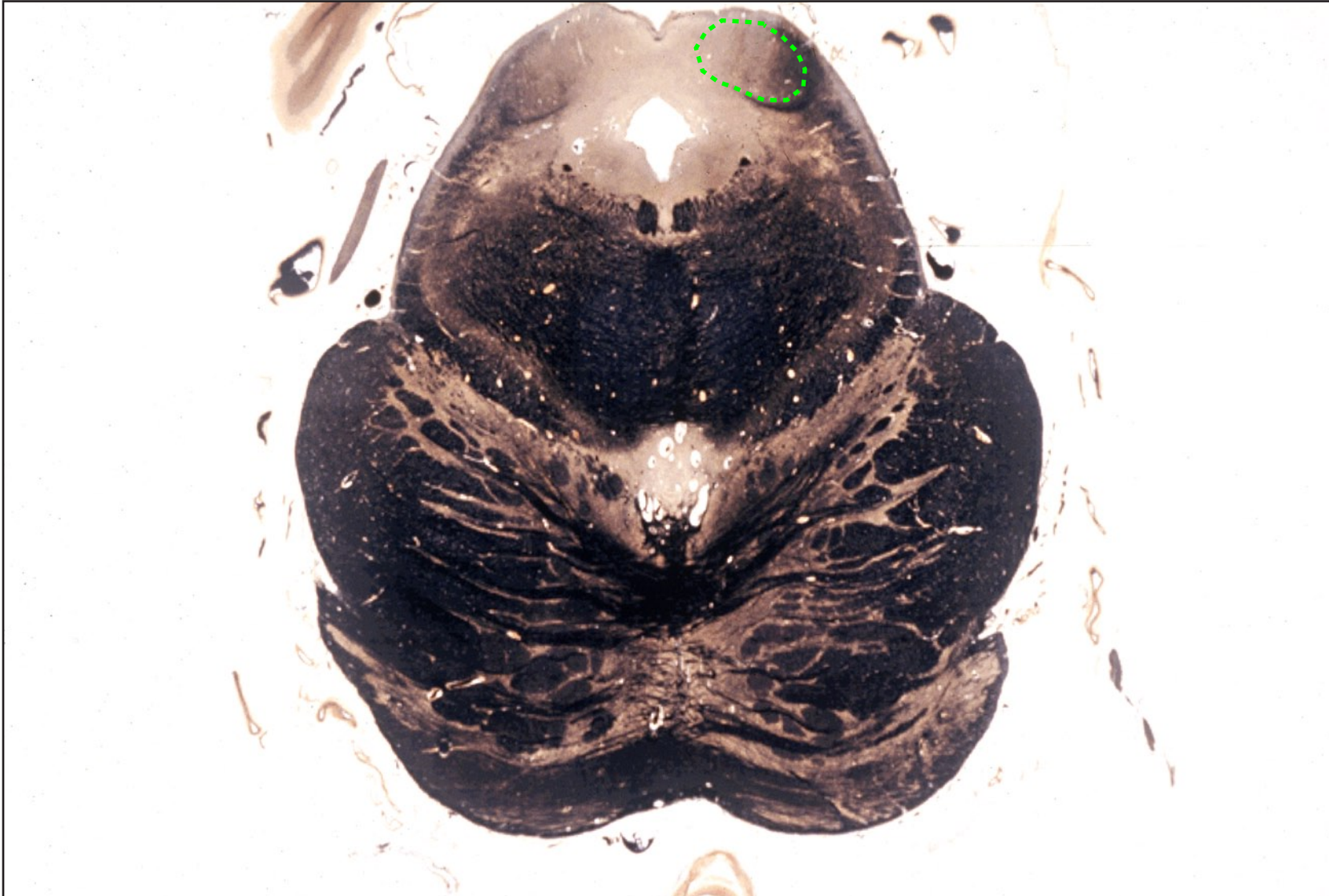
What brainstem region? A cranial nerve exits from this region in an unusual location. What cranial nerve is that, and what is its function? The tract circled in green is part of the auditory system. What is its name, and in what structure do its axons synapse? Identify the medial longitudinal fasciculus (MLF). Part of the decussation of the superior cerebellar peduncle is visible here. Do you see it?





# Brainstem A-20

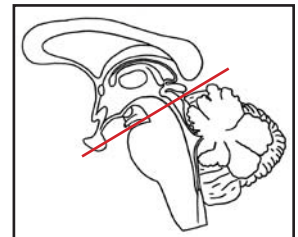
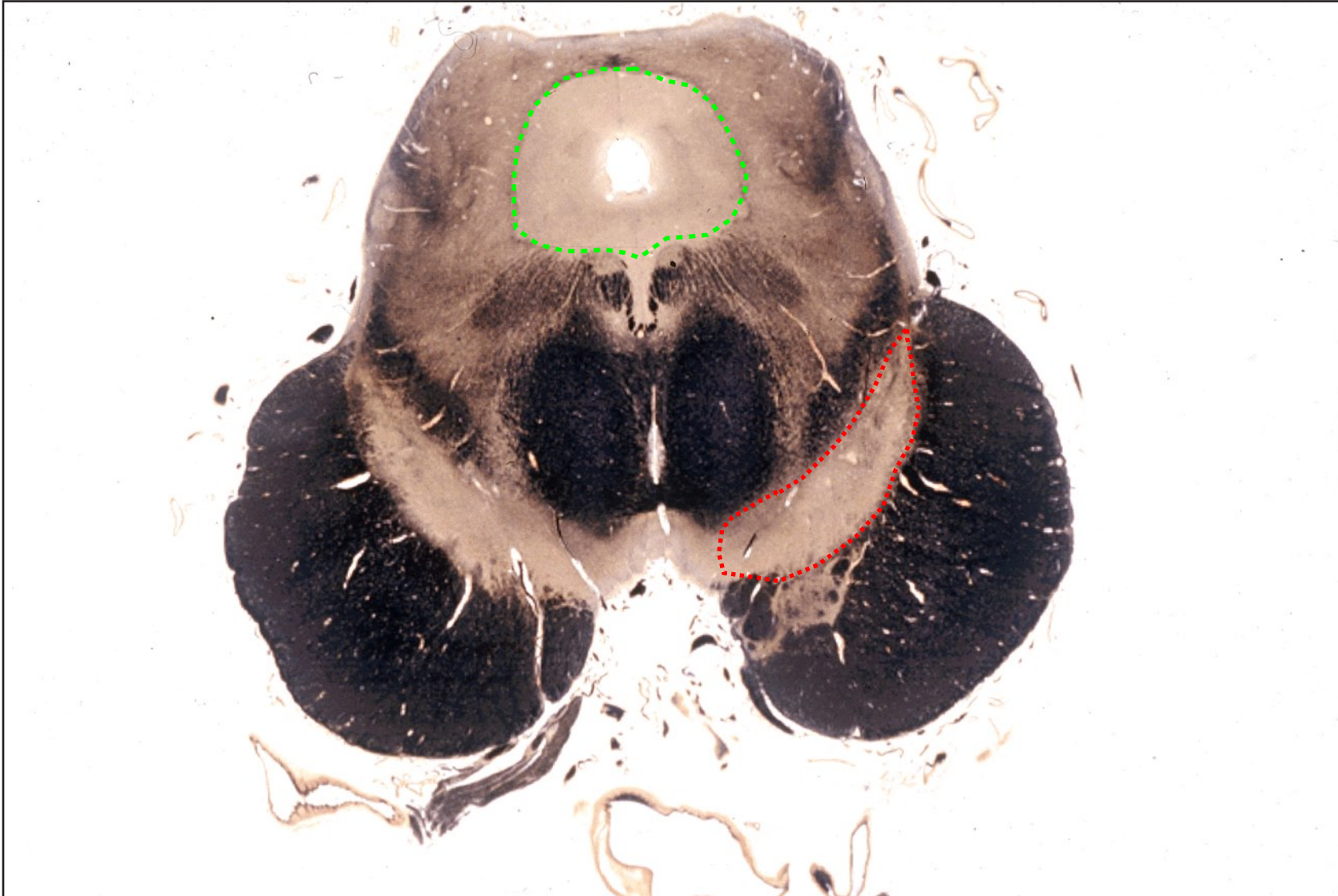
In the center of the reticular formation there's a huge fiber crossing. Locate and identify it. Name two structures in which these crossing axons will synapse.  
What is the primary function of the structure circled in green?





# Brainstem A-21

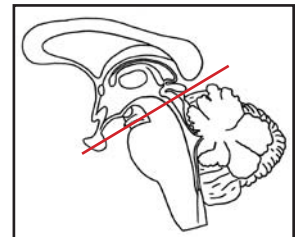
What brainstem region? The region circled in green seems to be involved in systems that modulate (control) pain; can you name it? The trochlear nucleus is present; can you identify it? What structure is circled in red? Indicate the approximate locations of the corticospinal and corticobulbar tracts in the cerebral peduncle.





# Brainstem A-22

What brainstem region? Indicate the approximate location of the reticular formation. In a few words, what are its functions at this level of the brainstem? (Another way to think about this might be, what happens to a patient if the reticular formation in this region is damaged?)





# Brainstem A-23

What brainstem region? The cranial nerve you see here contains both motor and autonomic fibers. Identify these axons where they exit the brainstem, and review what specific structures each type of fibers innervates. Identify the superior colliculus, red nucleus, and oculomotor nucleus.

