Brain Anatomy

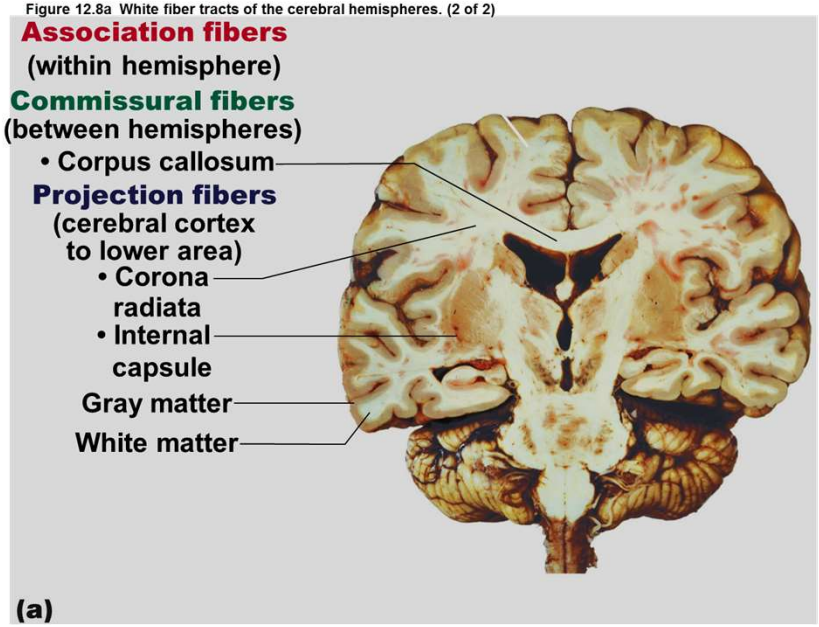
Principal parts of the brain that you need to know:

1. Lobes of the brain
2. Fissures, sulci, gyri
3. Cerebrum, cerebellum, vermis
4. Meninges
5. Falx cerebri and falx cerebelli,
6. Ventricles and cerebral aquaducts
7. Choroid plexus
8. Brainstem (midbrain, pons, medulla oblongata)
9. Thalmus and hypothalamus
10. Corpus collosum
11. Pituitary and pineal glands
12. Basal ganglia
13. Cisterna magna

Hemispheric Lateralization

The corpus callosum allows communication between the right and left hemispheres of the cerebrum

Figure 12.8a White fiber tracts of the cerebral hemispheres. (2 of 2)



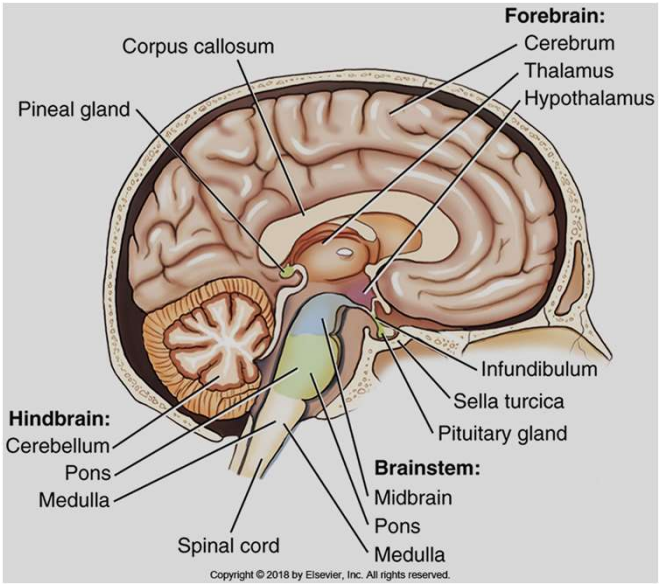
Marieb, E. and Hoehn K. (2013 Human Anatomy and Physiology (9th ed.) Glenview, IL. Pearson Education, Inc. p. 438

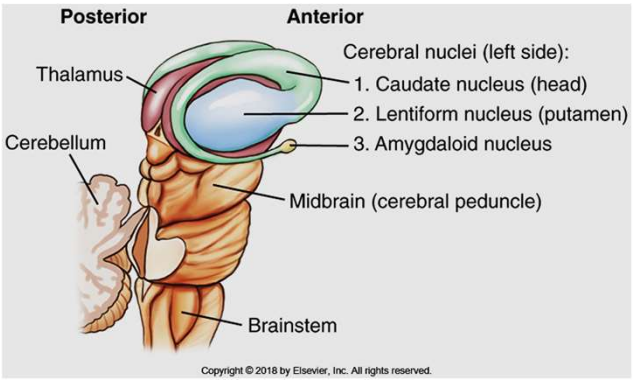
Diencephalon and brainstem

Diencephalon:

- Thalmus : relays sensory info to the cerebral cortex, assigns an emotion to feelings, regulates LOC, regulates complex reflex movements
- Hypothalmus: hormonal "head quarters": controls heart beat, blood pressure, digestion, water balance, body temperature, and sleep cycles and hormone secretion
- Pineal gland: maintains body's "clock" through daily, monthly, and seasonal cycles.

Bontrager Fig. 18.16, and 18.20



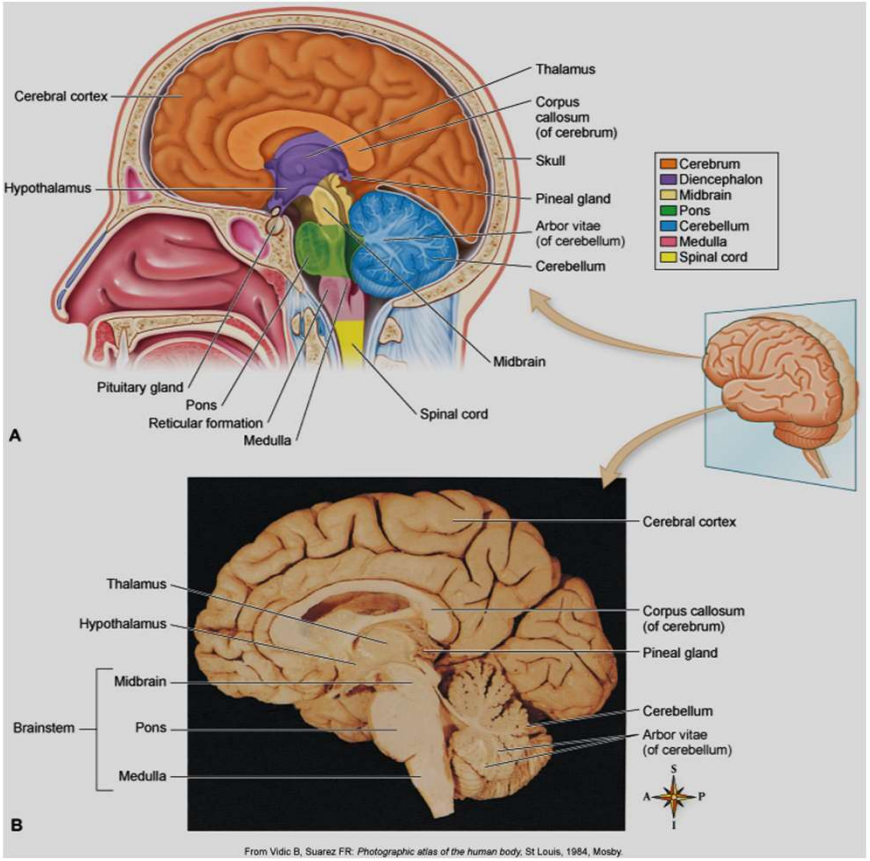


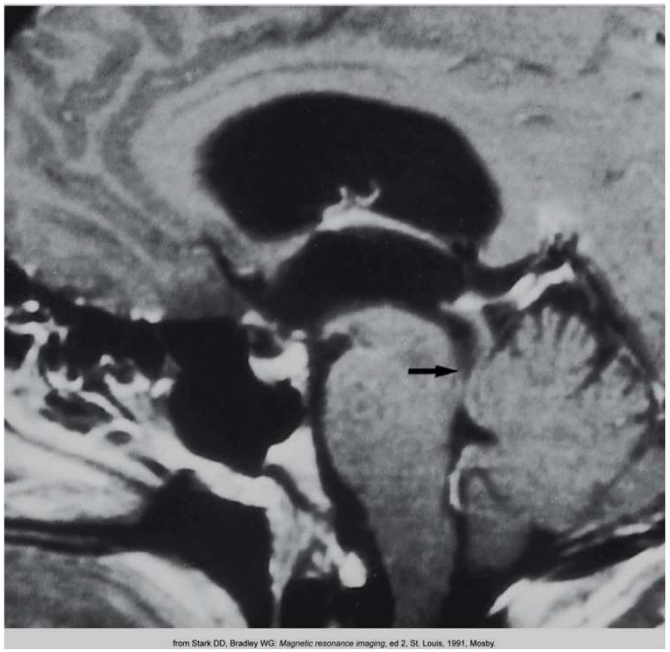
Brainstem

Brainstem:

- Midbrain
- Pons
- Medulla oblongata

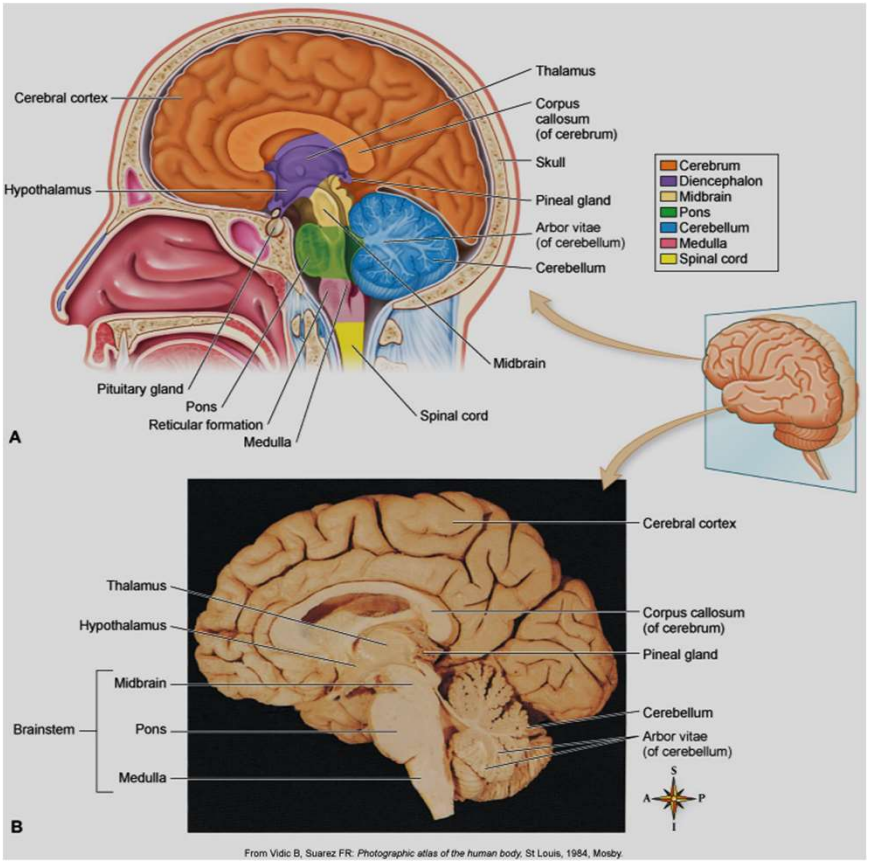
- The "oldest" part of the brain
- Relays sensory and motor impulses between spinal cord and brain.
- Controls heartbeat, respiration and vessel diameter





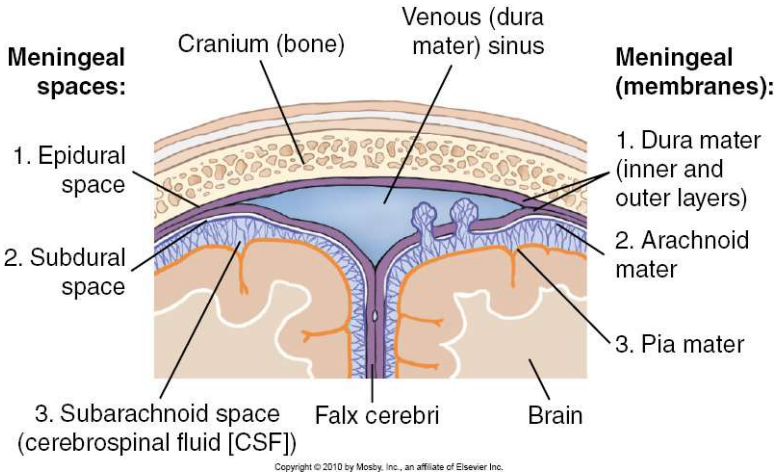
from Stark DD, Bradley WG: *Magnetic resonance imaging*, ed 2, St. Louis, 1991, Mosby.

Eisenberg 8-75

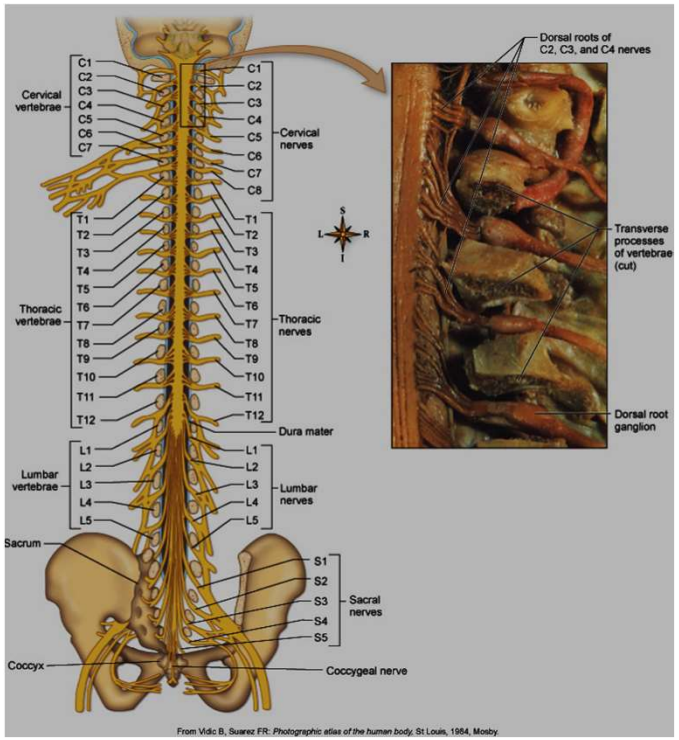


From Vidic B, Suarez FR: *Photographic atlas of the human body*, St Louis, 1984, Mosby.

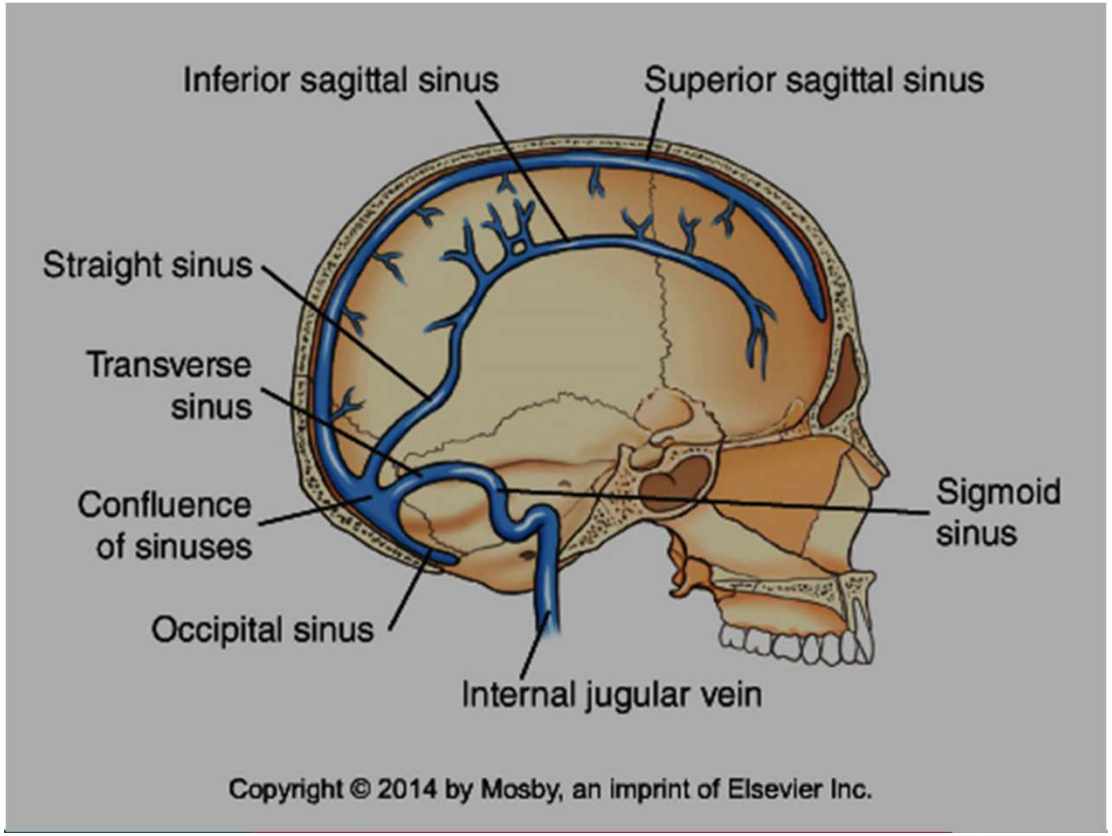
Meninges and falx cerebri etc...



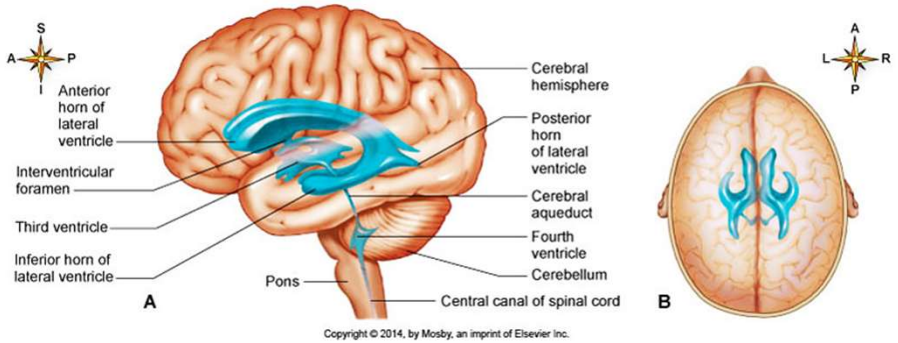
Bontrager 18-3



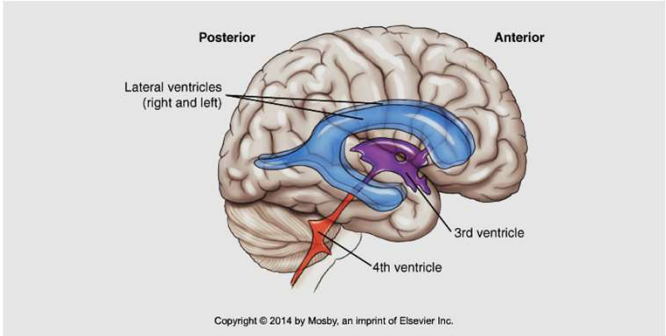
The dural sinuses are venous channels that lie between the two layers of the dura mater



Ventricular system…



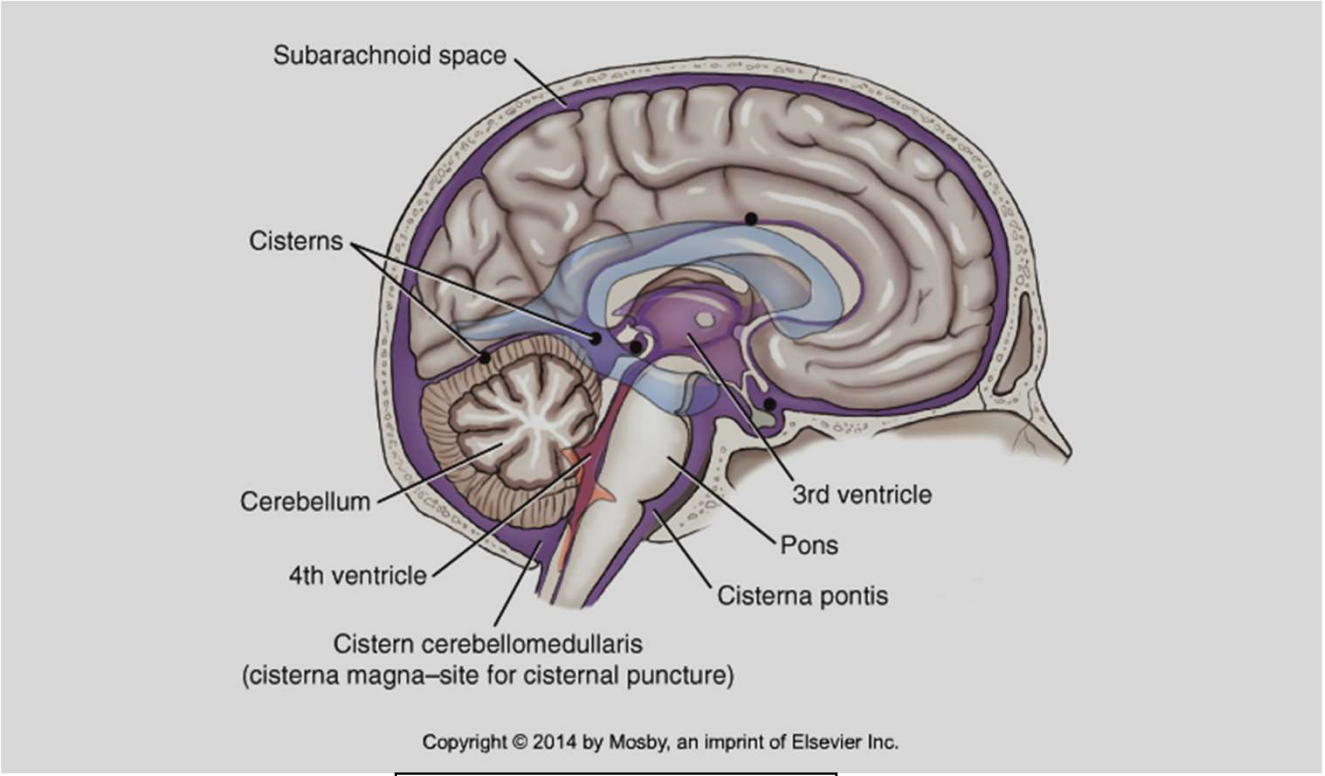
Cerebrospinal fluid (CSF) is made from fluid, filtered out of the blood by a network of brain capillaries known as the choroid plexus



Bontrager 18-7, Patton and Thibodeau 10-20

Flow of CSF…

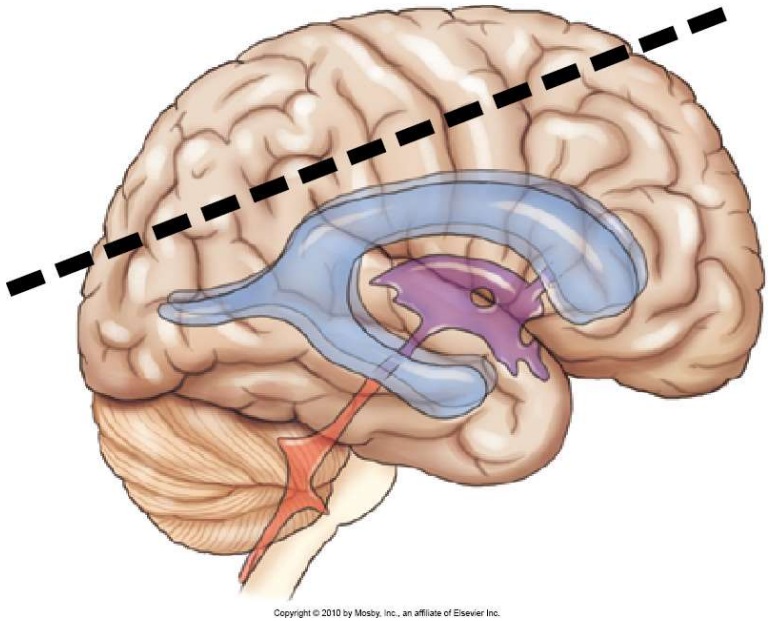
The CSF filled spaces in and around the brain are important in CT, as these fluid filled areas can be used to determine slice level or location.



Bontrager 9th ed. 18.13

How do you think these structures will appear when sliced by a CT scanner?

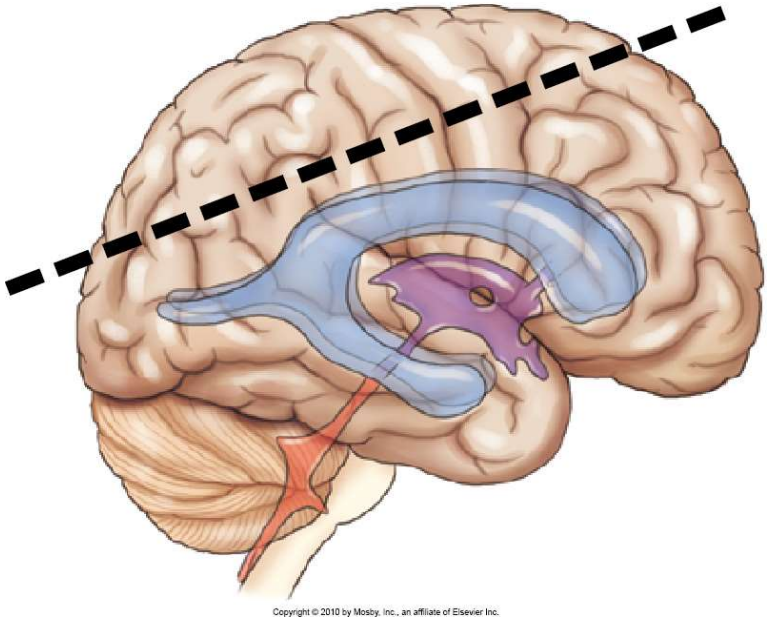
Posterior Anterior



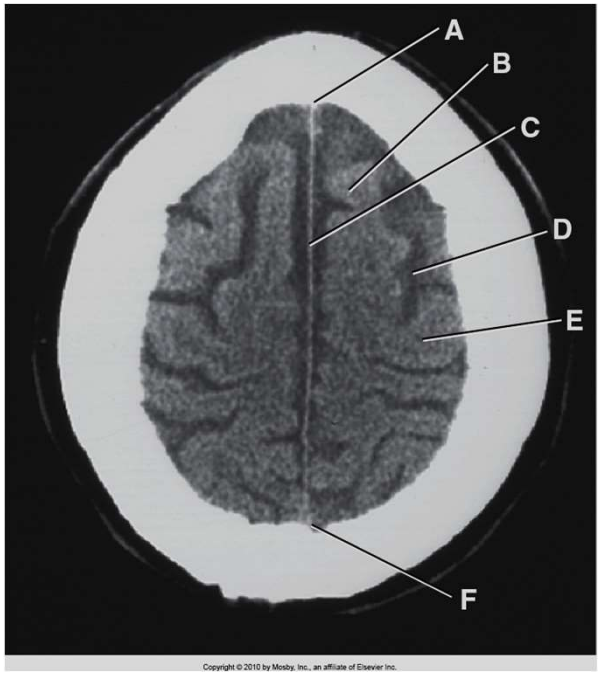
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Bontrager 7th ed. 21-47

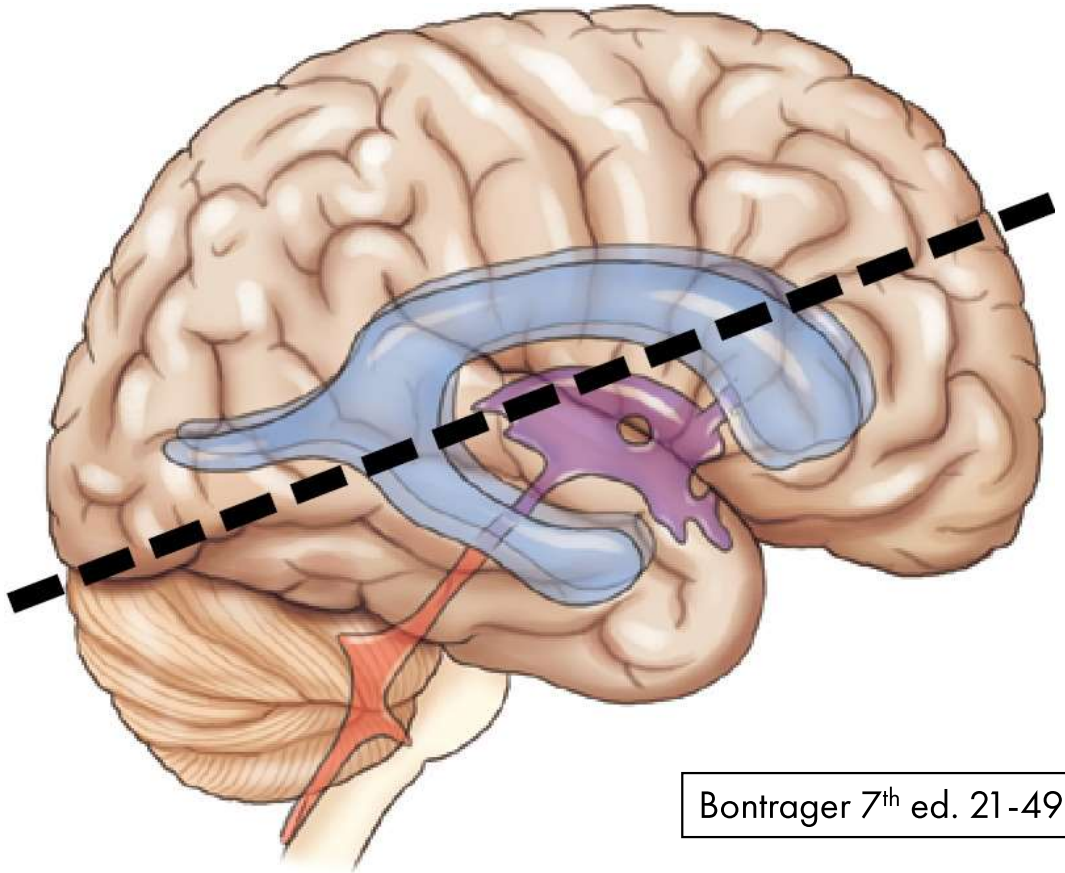
Posterior Anterior



Bontrager 7th ed. 21-47



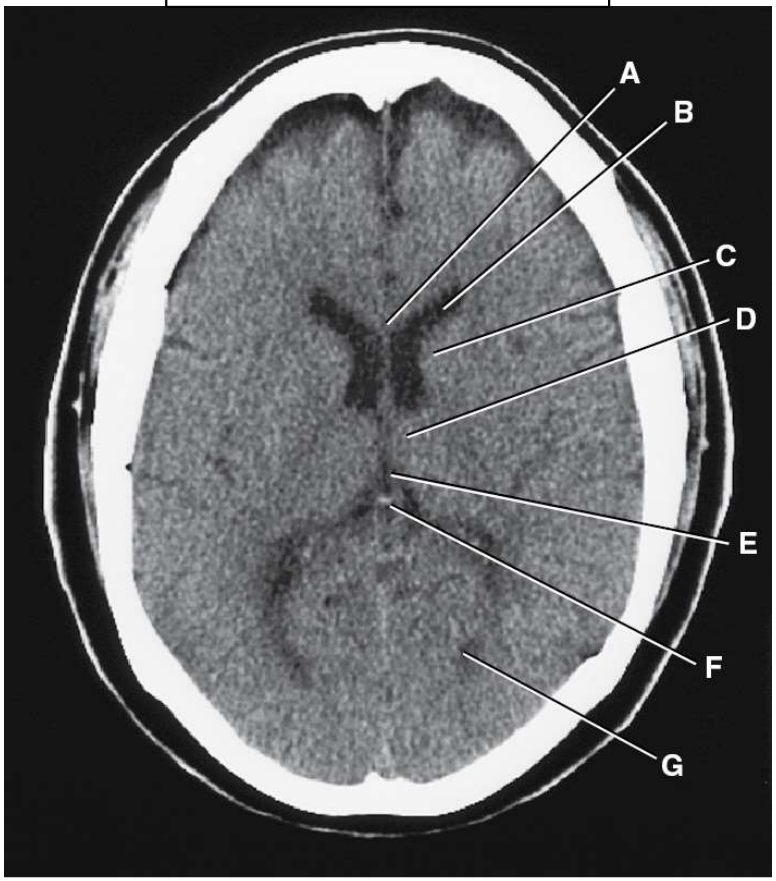
Bontrager 7th ed. 21-46



Bontrager 7th ed. 21-49

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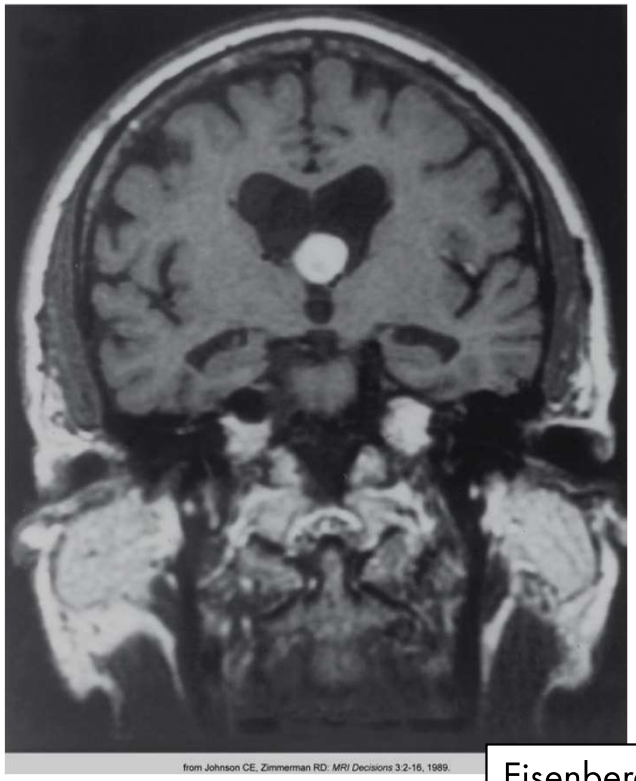
Bontrager 7th ed. 21-48



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Pathologies of the CNS

Hydrocephalus



from Johnson CE, Zimmerman RD: *MRI Decisions* 3:2-16, 1989.



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Eisenberg 8-73, 8-74

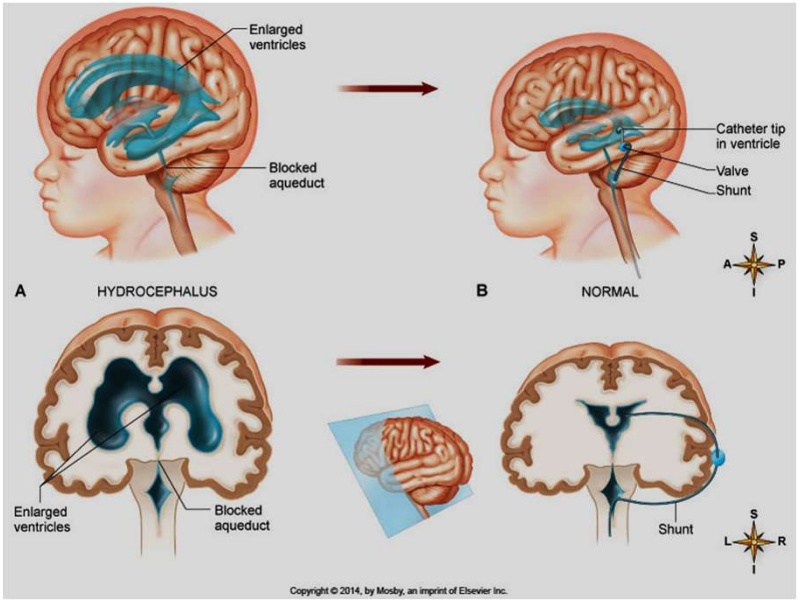


Courtesy of Wikimedia commons

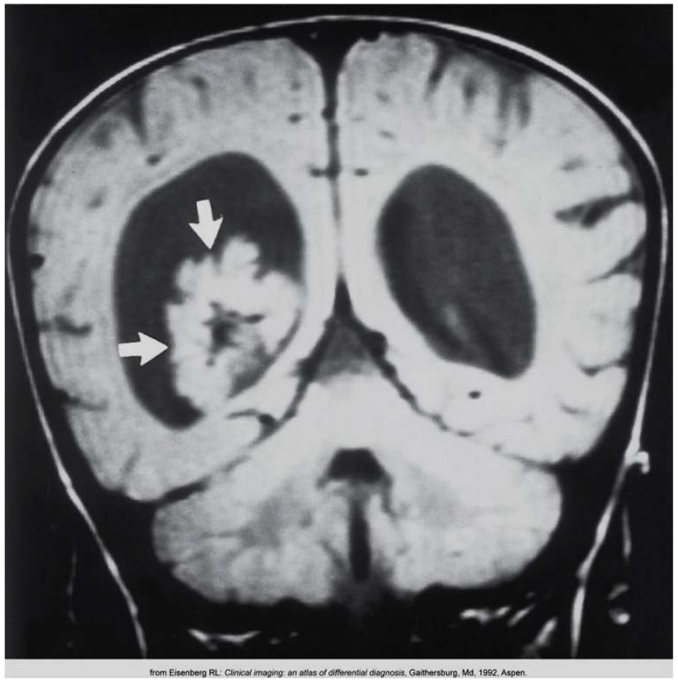
DescriptionBaby with hydrocephalus (9587849190).jpg	December, 1967
Date	24 August 2013, 04:15
Source	Baby with hydrocephalus
Author	simpleinsomnia

- Categories: 1967 photographs
- Hydrocephalus
- Hidden categories: CC-BY-2.0
- Flickr images reviewed by FlickreviewR

Choroid plexus papilloma



Patton and Thibodeau 10-22

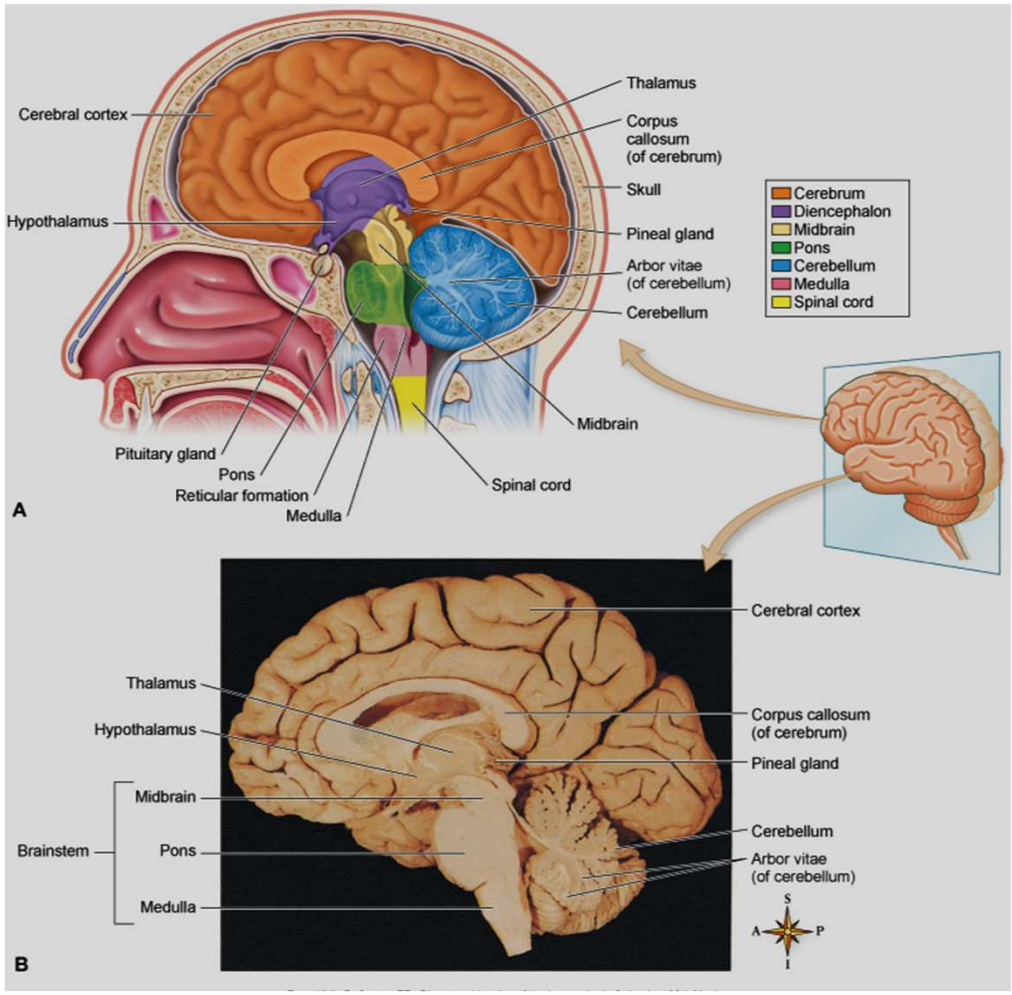


Eisenberg 8-77

Where is the blockage?



Eisenberg 8-75



Traumatic Brain Injuries (TBI's)

https://www.neurosurgeonsofnewjersey.com/cerebral-contusion-intracerebral-hematoma/

Symptoms

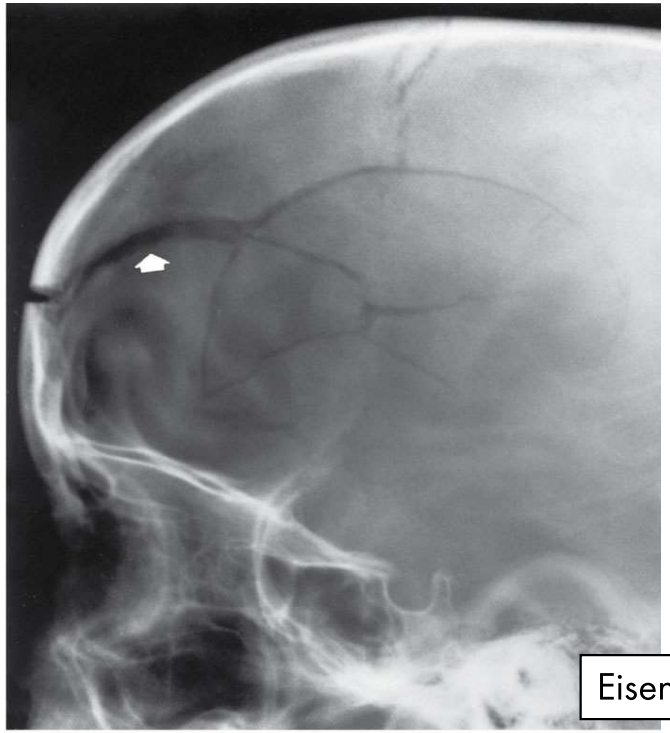
Any type of TBI, no matter how minor it may appear, should be taken seriously. If you experience any loss of consciousness, no matter how brief, a doctor should be seen as soon as possible. Even if unconsciousness does not occur, the several hours that follow are still very important and you should watch for the following symptoms:

•Headache
•Nausea, vomiting
•Slurred speech
•Restlessness
•Increased drowsiness
•Change in pupils
•Confusion about the time or date
•Memory loss
•Change in personality
•Depression
•Irritability
•Other emotional and behavioral problems
•Some people may have seizures as a result of a TBI.

If any of these symptoms occur, a doctor should be seen immediately, for they could mean that the brain is bleeding or swelling.

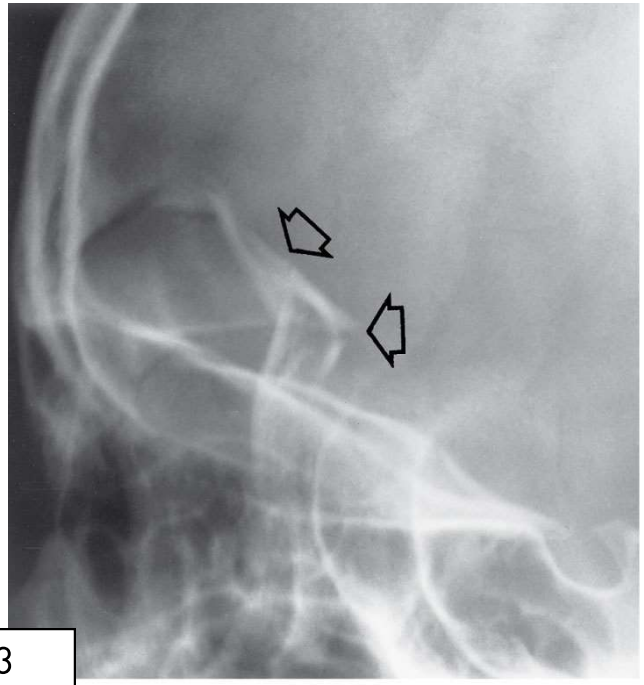
Skull fractures…

A



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Eisenberg 8-33



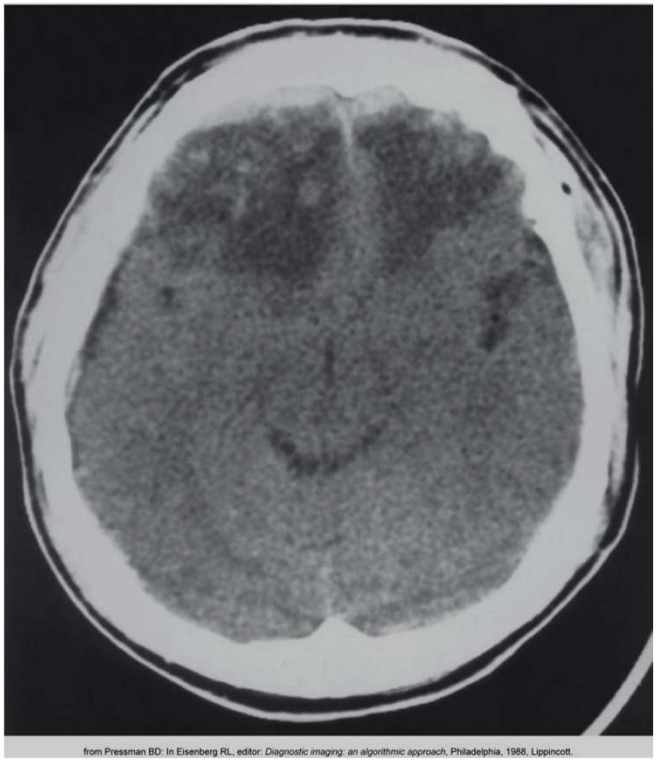
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B



from Pressman BD: In Eisenberg RL, editor: *Diagnostic imaging: an algorithmic approach*, Philadelphia, 1988, Lippincott.

Cerebral contusion…



Eisenberg 8-39

- Bruising of the brain tissue
- Usually caused by the brain coming in contact with the rough floor of the calivarium or a fold in the dura mater
- May cause edema and swelling
- Patient will be monitored for changes in neurologic function

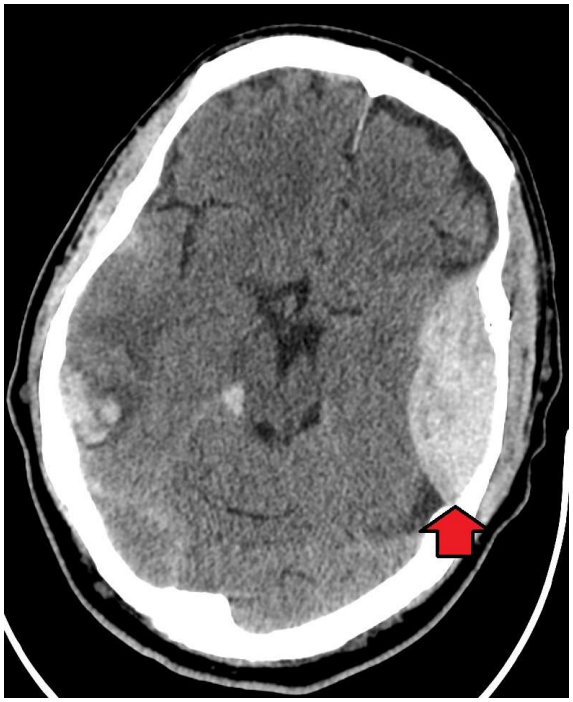
Intracranial hemorrhages...

Epidural Hematoma



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Eisenberg 8-35



Courtesy of Wikimedia commons

DescriptionEpiduralHematoma.jpg	**English:** Epidural hematoma on the persons left (images right) with an associated skull fracture. Also has some bleeding on the persons right.
Date	4 April 2018
Source	Own work
Author	James Heilman, MD

Subdural hematoma


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Eisenberg 8-36


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Eisenberg 8-38

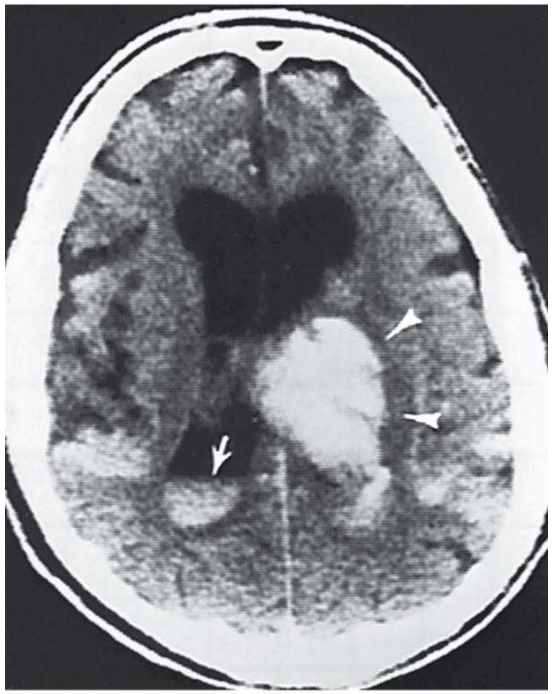
- Bleeding into the ventricular system of the brain is known as a **sub-arachnoid hemorrhage.**

  Radiographic signs: include visualization of falx cerebri, straight sinus, or sagittal sinus, or increased density in the basilar cisterns, cerebral fissure, and/or sulci on CT

  Treatment includes: surgical "evacuation",vessel repair, and/or medication or stent placement for decreasing intracranial pressure

Cerebrovascular accidents

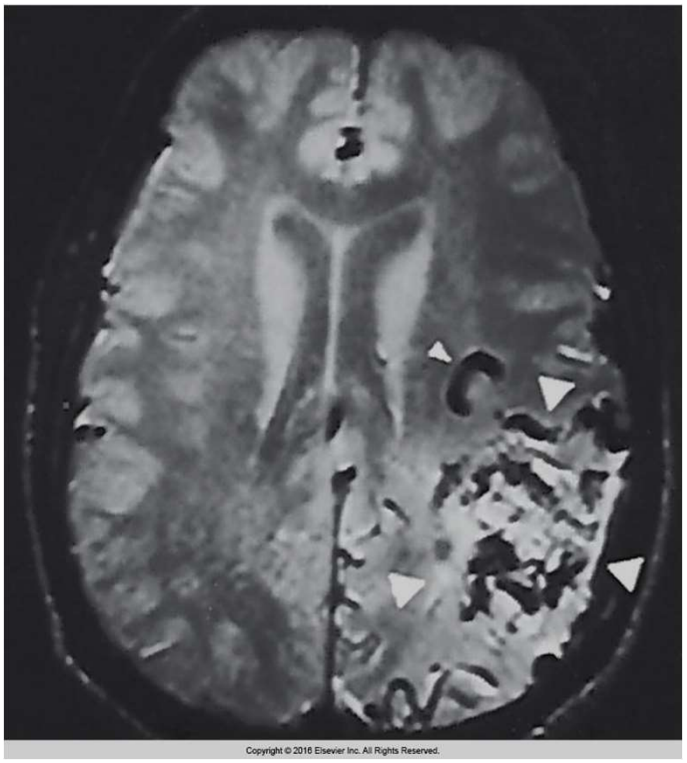

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from Drayer BP: Neuroradiology. In Rosenberg RN, Heinz ER, editors: *The clinical neurosciences*, New York, 1984, Churchill Livingstone.

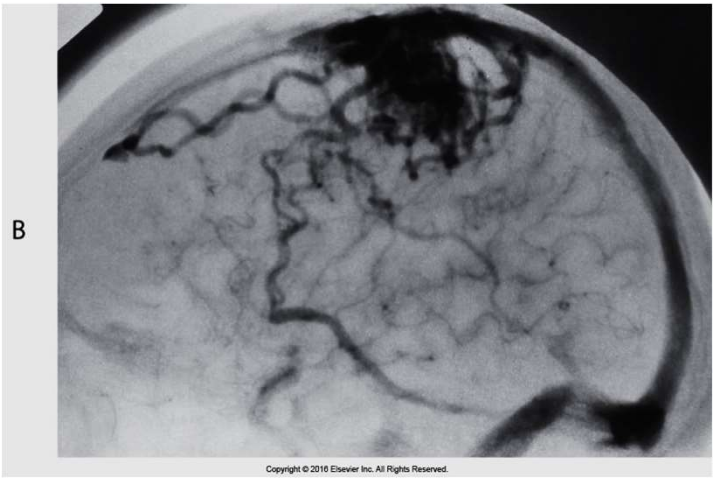
Eisenberg 8-50, 8-58

TIA vs. stroke

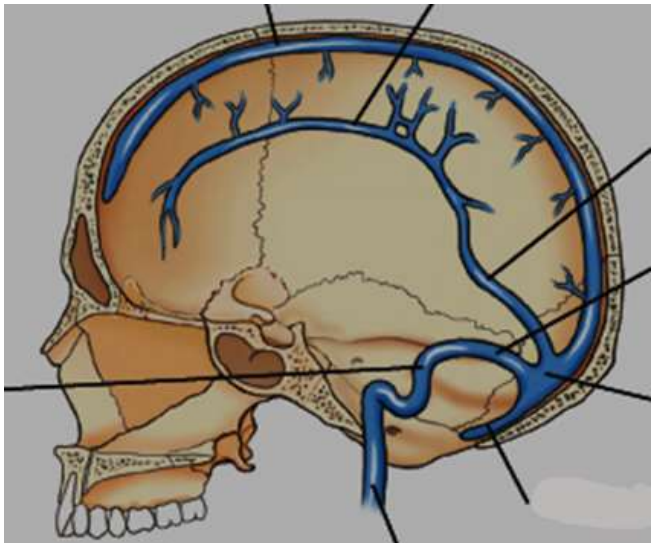
AVM-(arteriovenous malformation)


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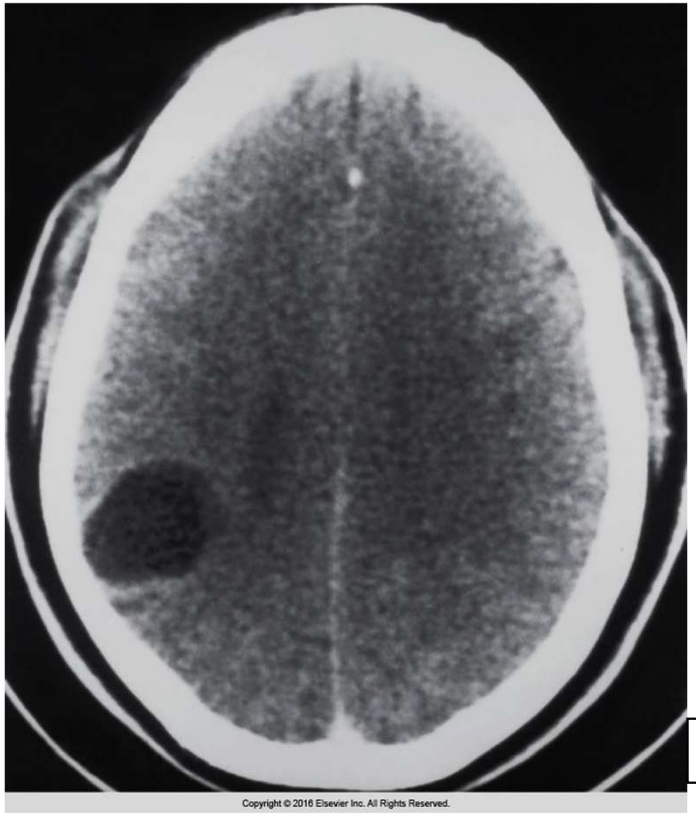
Eisenberg 8-60, 8-61
And Bontrager 17-19



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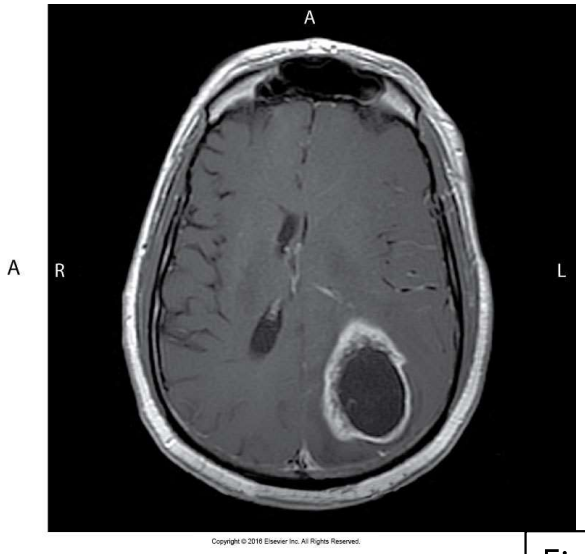


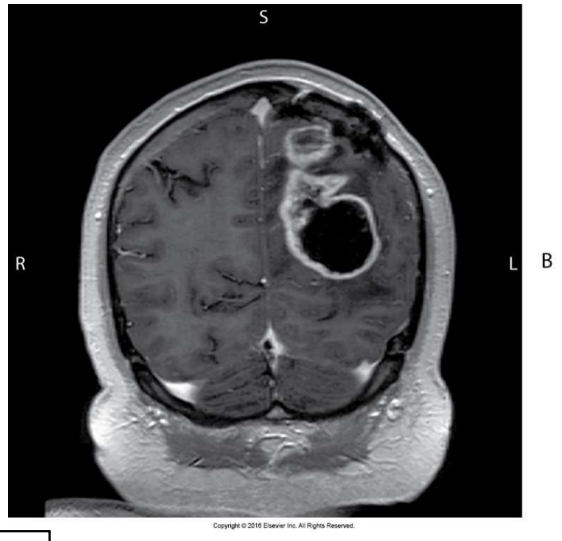
Cystic astrocytoma (glioma)
What protective structure might this affect?


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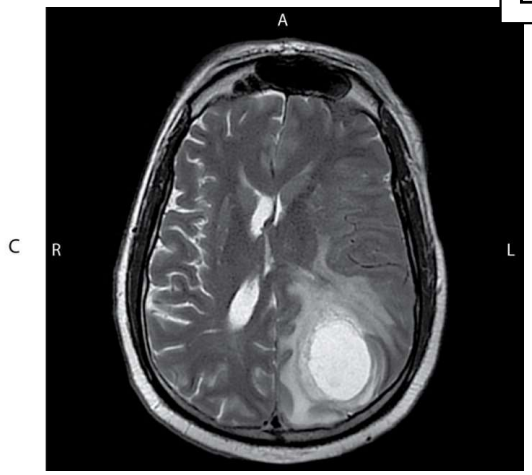
Eisenberg 8-14

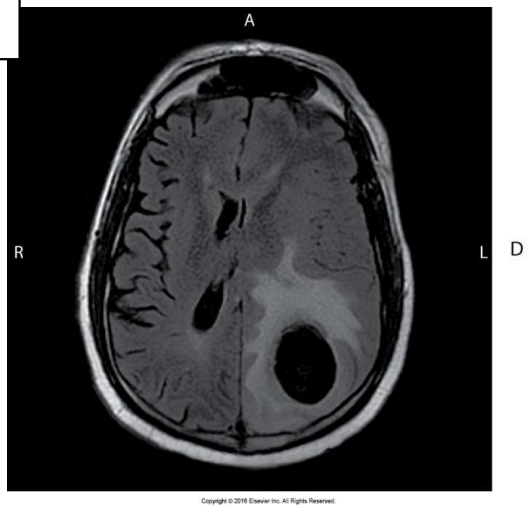
Glioblastoma...





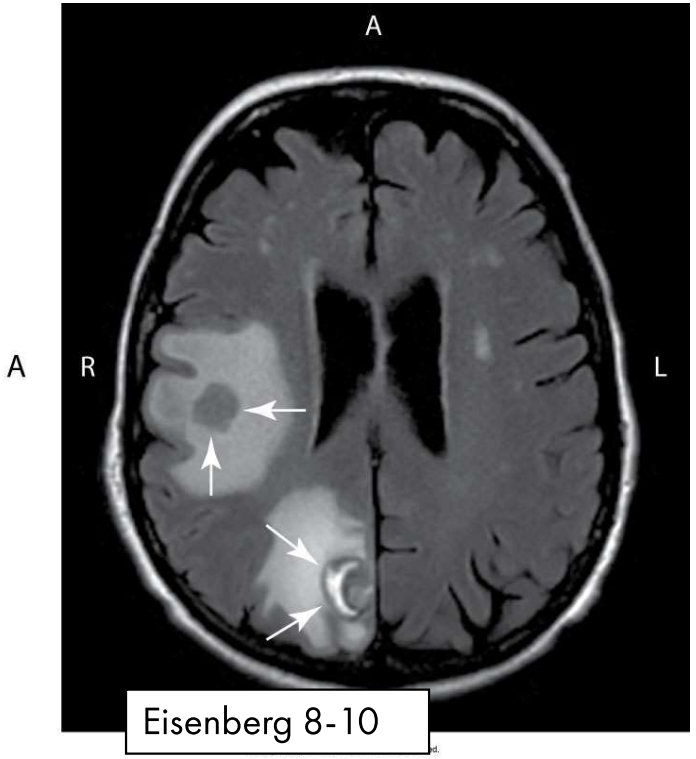
Eisenberg 8-10



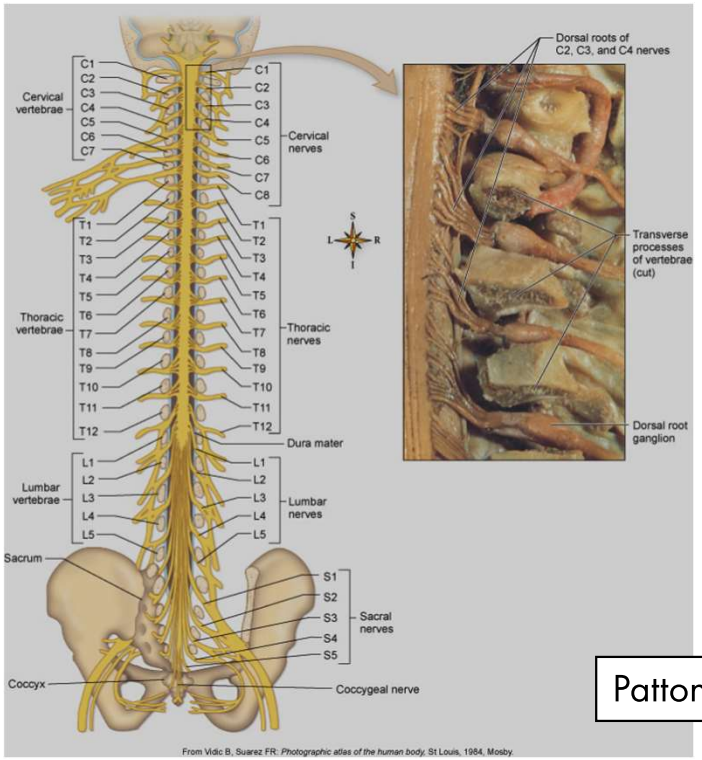


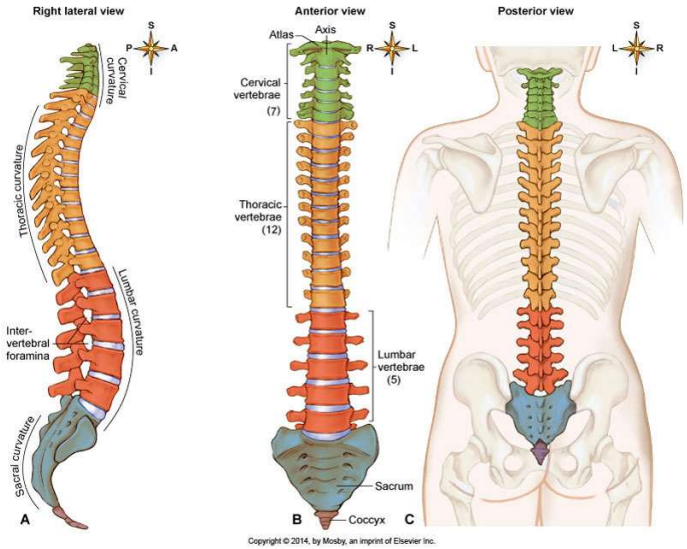


Metastatic carcinoma



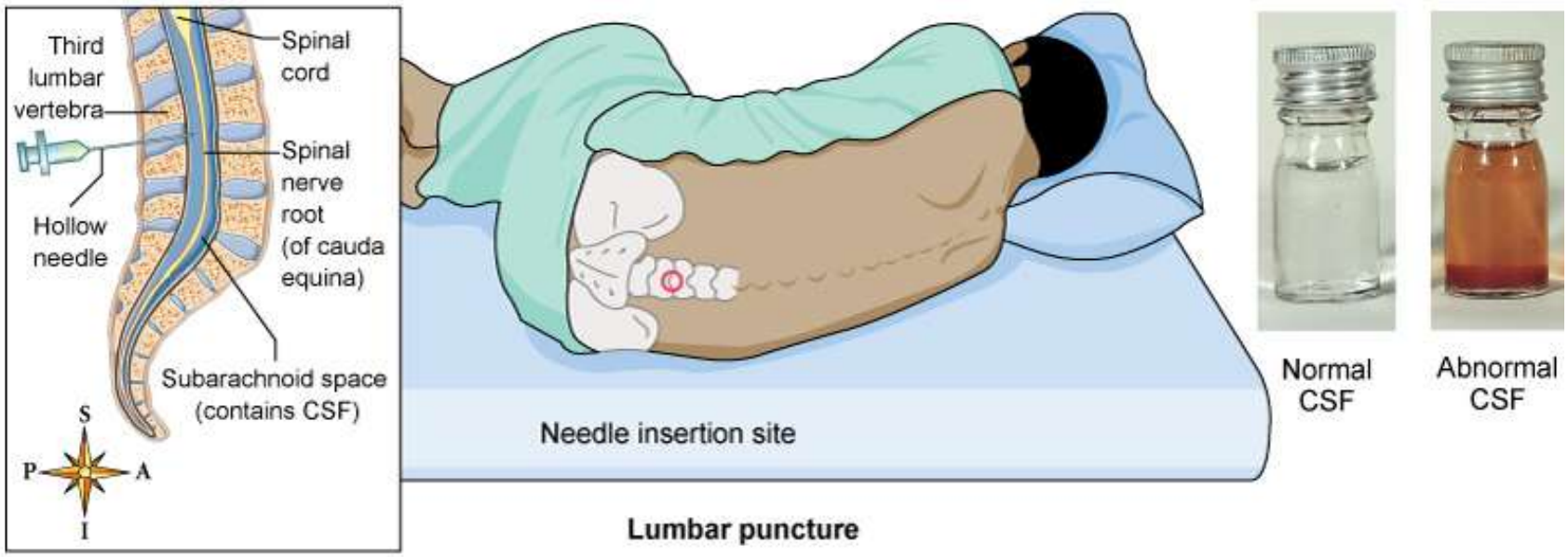
Anatomy of the spinal cord





Patton and Thibodeau fig. 8-14, 10-17

Lumbar puncture/spinal tap



From Forbes CD, Jackson WD: *Color atlas and text of clinical medicine*, ed 3, London, Mosby, 2003.

Patton and Thibodeau pg. 264, 265, and Eisenberg 4-125

Radiographic contrast in the subarachnoid space

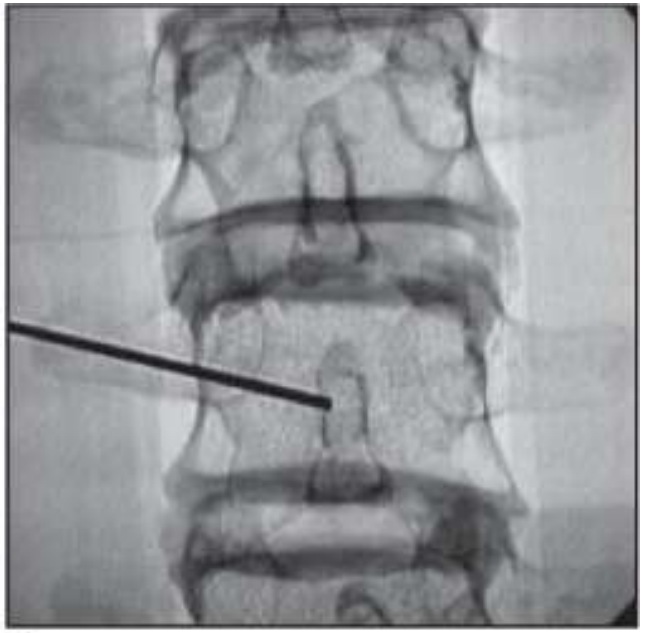
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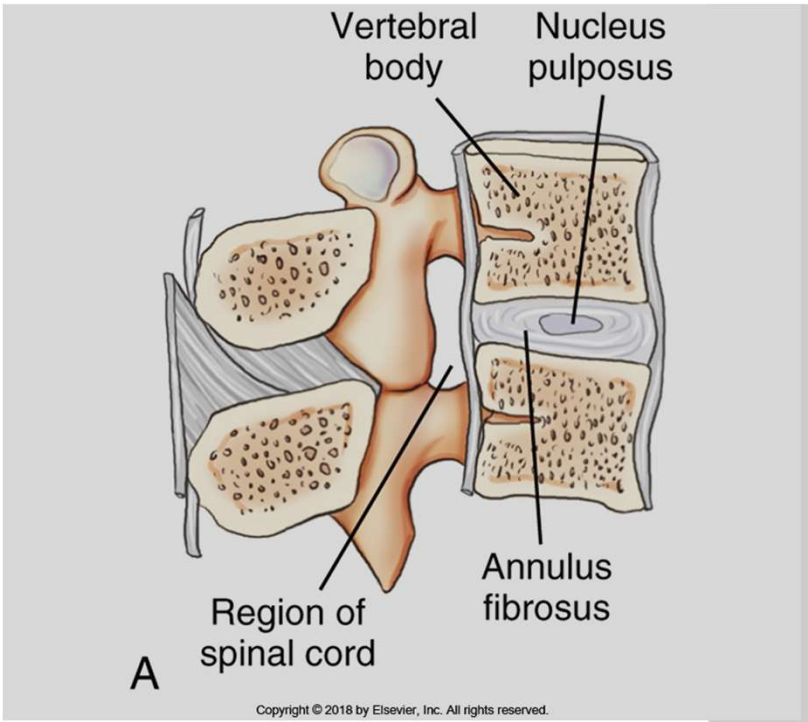
Fluoroscopy guided lumbar puncture.

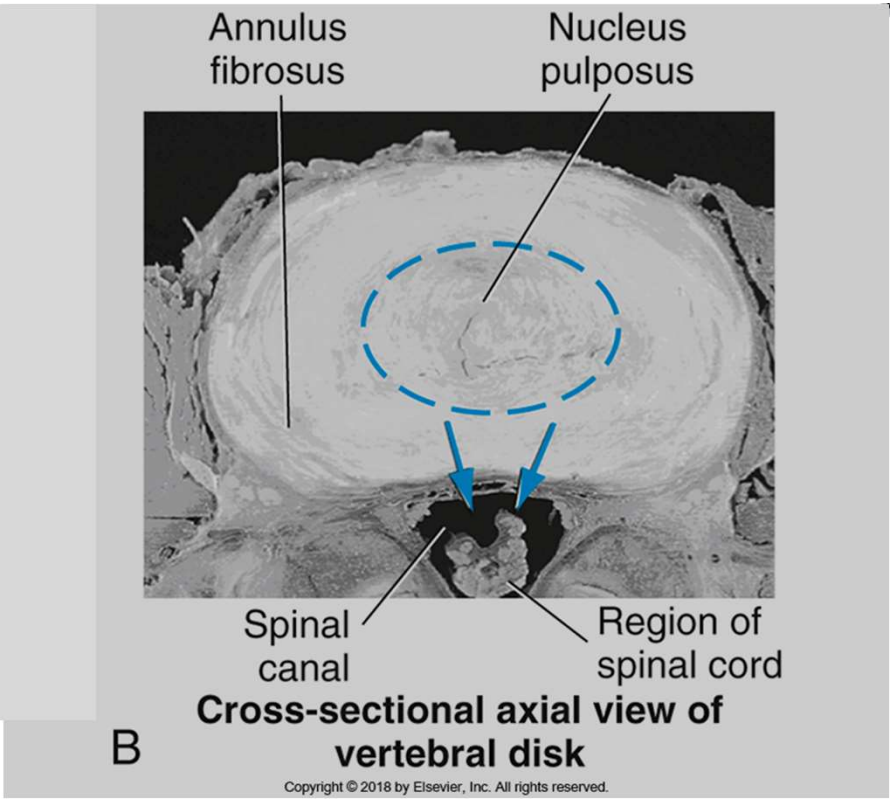




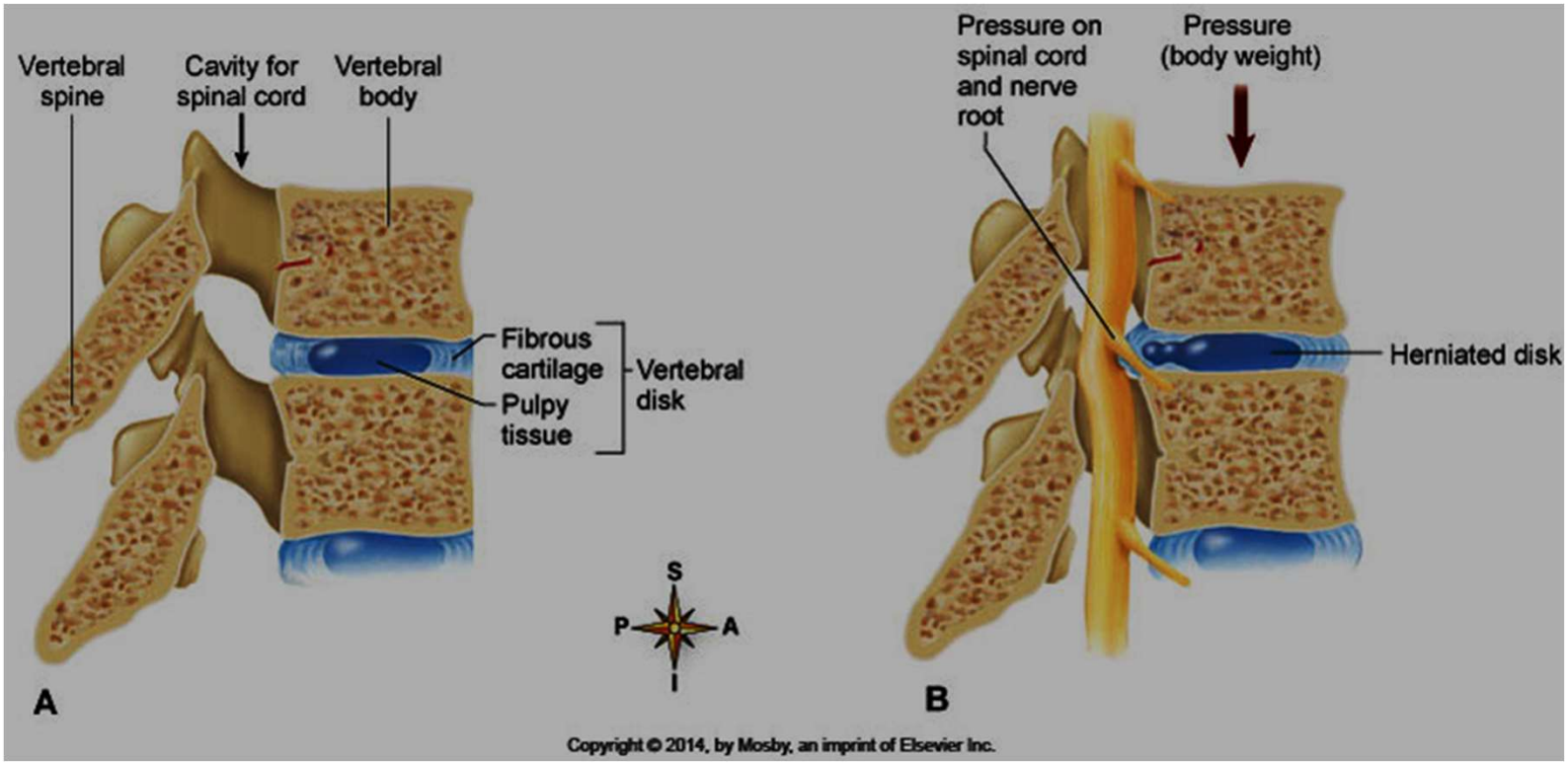
B C

e simulator model. **B:** Lateral radiographic view of the transpedicular puncture at the L3 level. **C:**
ıcture at the L3 level.

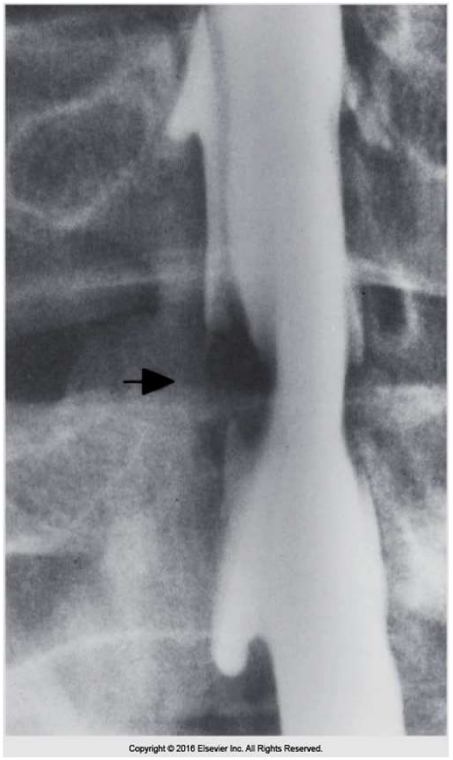


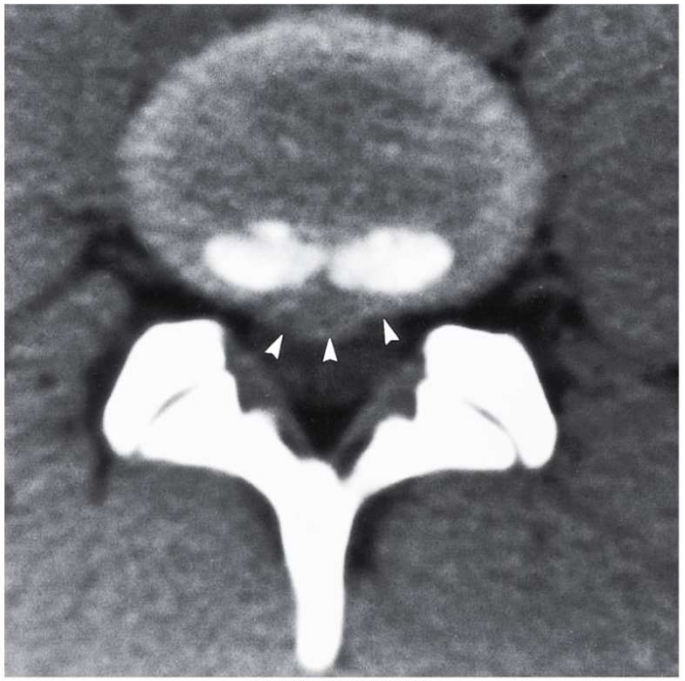


Bontrager 8-9 and 8-10



Patton and Thibodeau fig. 8-26


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Patton and Thibodeau fig. 4-120, 4-122



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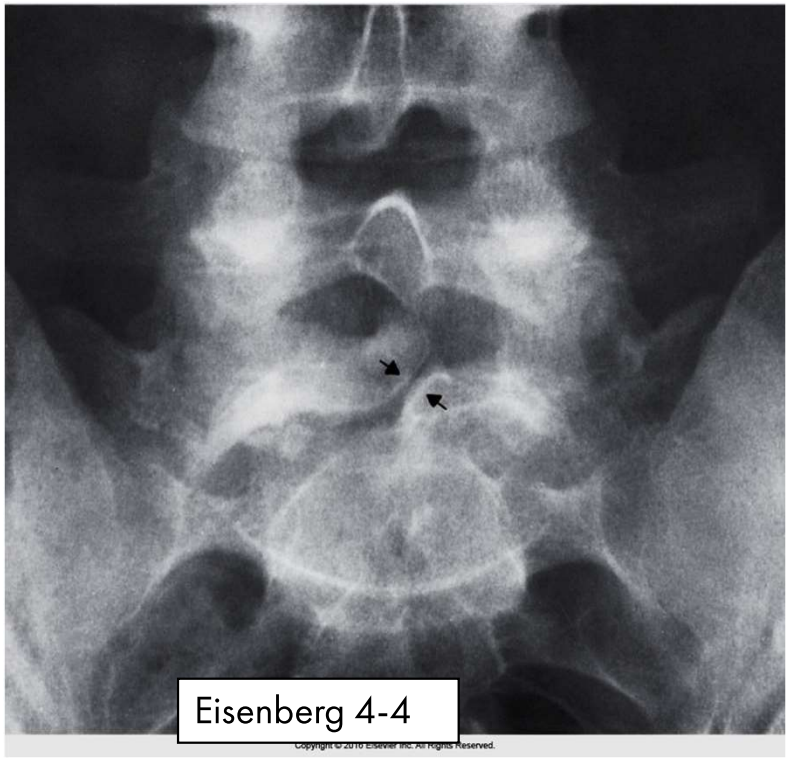
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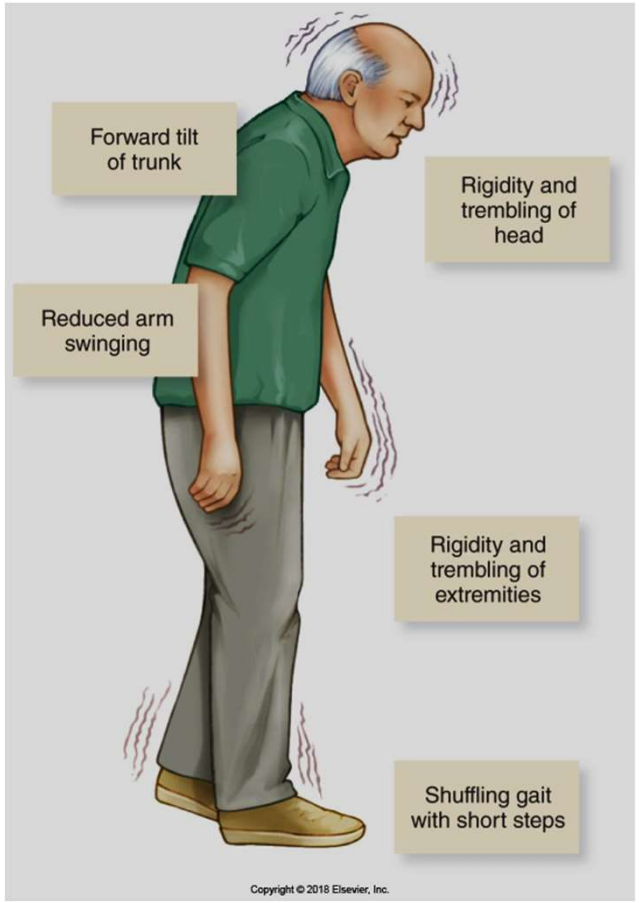
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Eisenberg fig. 4-124, 4-125

Spinal Bifida…



Lack of dopamine leads to Parkinson's disease



- Injections or ingestion of dopamine does not work as the medications fail to cross the BBB.
- A new drug, L-dopa, gives new hope but doesn't' always work.
- Electrical stimulation of brain or transplant of dopamine producing neurons are being tested

Alzheimers ...