Lecture notes for Wednesday October 2, 2002
Outline
- General overview of brain
- Gray & white matter distribution
- Protection of the brain: meninges
- Blood supply to brain
- Blood brain barrier
- Cerebrospinal fluid

The Brain
- Cephal = brain
- Cereb = brain

Regions of the brain (Fig. 14.1)
1. Brain stem
2. Diencephalon
3. Cerebrum: two cerebral hemispheres
4. Cerebellum

Protection of brain Fig. 14.2
- Cranial bones
- NO epidural space
- Cranial meninges:
  - double layer dura mater separated by dural sinus
  - subdural space
  - arachnoid membrane (arachnoid villi)
  - subarachnoid space - CSF
  - pia mater
- Function to provide cushioning and protection

Brain blood supply
- Nerve tissue has increased demand for glucose & oxygen compared to other tissue

Cerebrovascular Accident
(CVA) = Stroke = brain attack
- Resulting from:
  - clot; plaque; hemorrhage (aneurysm)
• Often preceded by Transient Ischemic Attack

**Treatment**
- Blood thinners
- Anticoagulants
- Surgery

**Main causes**
- High blood pressure
- Elevated cholesterol
- Smoking
- Obesity

**Blood-Brain-Barrier**
- Tight junctions between endothelial lining capillaries
- Astrocytes (neuroglia)

=> control permeability

⇒ physical & chemical barrier between blood & neuronal tissue

**Three exceptions**
- Portions of hypothalamus
- Portions of pineal gland
- Capillaries that supply chorid plexuses

**Cerebrospinal Fluid (Fig. 14.3 & 14.4)**
- Produced in the choroid plexuses of the four ventricles
- Formed by filtration of blood plasma across capillaries & ependymal cells (neuroglia)

=> blood-CSF barrier

• Composition different from plasma
• Circulates thru’ ventricles, subarachnoid space & central canal (in spinal cord)
• Drains out thru’ arachnoid villi into sagittal dural sinus

• CSF is produced at the same rate it is reabsorbed to maintain constant pressure.

• Abnormalities in CSF flow (tumor, inflammation) can cause increase in pressure => HYDROCEPHALUS

Functions of CSF

• Mechanical protection

• Chemical protection

• Supply of nutrients and removal of wastes

• Similar to plasma: glucose, proteins, WBC’s & ions