

Central nervous system

Congenital anomalies # Neural tube defects:

- ❖ **Spina bifida occulta:**
 - Incomplete closing of the vertebra and membranes around the spinal cord
- ❖ **Meningocele:**
 - Meninges protrudes through small opening
- ❖ **Meningomyelocele:**
 - Herniation of spinal cord and meningeal tissue through vertebral defect

#CNS Infections

1) Acute pyogenic (bacterial) meningitis:

- ❖ **Organisms:**
 - In neonates: Escherichia coli and the group B streptococci.
 - In elderly: Streptococcus pneumoniae and Listeria monocytogenes.
 - In adolescents and young adults: Neisseria meningitidis.
- ❖ symptoms related to meningeal irritation and neurologic impairment, including headache, photophobia, irritability, clouding of consciousness, and neck stiffness.

2) Acute Aseptic (Viral) Meningitis:

an absence of organisms by bacterial culture.

3) Chronic meningitis

#Cerebral herniation

1) Transtentorial:

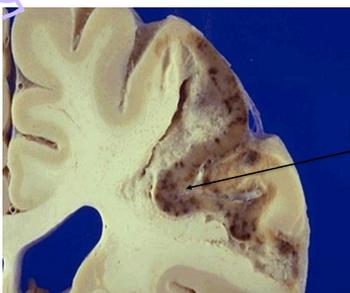
- ❖ The most common type
- 2) **Subfalcine:**
- 3) **Tonsillar:**
 - The cerebellar tonsil herniate into foramen magnum
 - Compress the medulla and respiratory center, may lead to death

#Hypoxia and ischemia to brain

Brain infarct:

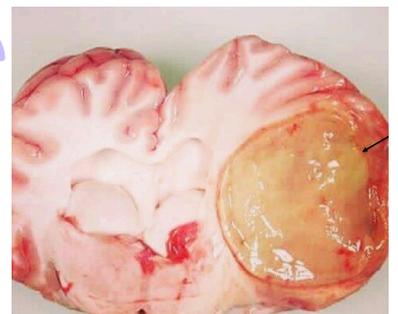
Types:

- 1) **Red infarcts:** multiple, punctate hemorrhage, often associated with embolism.
- 2) **Pale infarcts (non-hemorrhagic):** associated with thrombosis



#Brain abscess

- ❖ Streptococci and staphylococci are the most common offending organisms identified in non immunosuppressed patients.
- ❖ liquefactive center with yellow pus surrounded by a thin wall.



#Demyelinating diseases

- ❖ **Multiple Sclerosis**
 - Is the most common type of demyelinating diseases
 - Can involve any site in the central nervous system (CNS)
 - Optic chiasm and tract (nearly always involved).

#Trauma

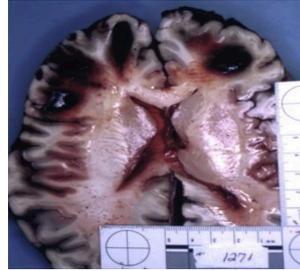
- ❖ Site and consequence:
 - Frontal lobe – Clinically silent
 - Spinal cord – Severely disabled
 - Brain stem – Fatal

Skull fracture:
when an individual falls while awake (such as might occur when stepping off a ladder), the site of impact is often the occipital portion of the skull; in contrast, a fall that follows loss of consciousness (as might follow a syncopal attack) can result in either frontal or occipital impact.

Parenchymal injury:
1) **Concussion:**- from a blow to the head or body, causing the brain to shake inside the skull
2) **Contusion and laceration:** traumatic brain injuries from impacts, involving bleeding/damage to brain tissue
- **Contusion:** Bleeding/bruising of brain tissue, small blood vessels leaking into the brain.
- **Laceration:** A tear or cut in the brain tissue, often involving the dura mater (outer membrane)

Spinal cord injury

Traumatic vascular injury:
❖ Classification according to the site:
1) **Epidural Hemorrhage/Hematoma:** By rupture of one of the meningeal arteries.
2) **Subdural Hemorrhage/Hematoma:** between the dura mater and the arachnoid mater of the meninges. By rupture of a bridging vein.
Intraparenchymal Hemorrhage (Non-traumatic hemorrhage): Hypertension is the major risk factor



#Neurodegenerative diseases

Alzheimer Disease (AD):

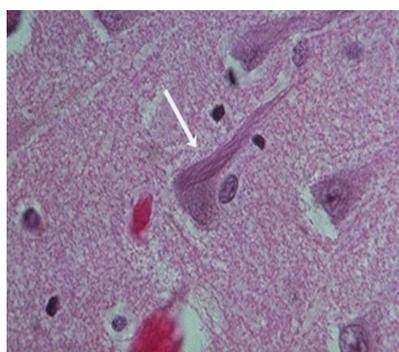
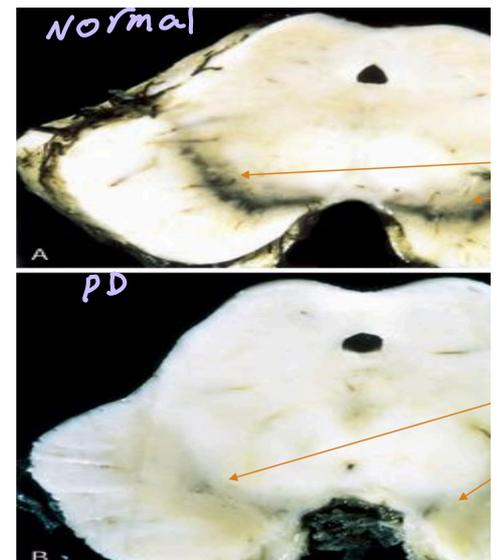
- AD is the most common neurodegenerative disease .
- The fundamental abnormality in AD is the accumulation of two proteins ($A\beta$ and tau) in specific brain regions, likely as a result of excessive production and defective removal.

Morphology:

- Grossly: cerebral atrophy
- Microscopically:
 - 1) Neuritic plaques
 - 2) Neurofibrillary tangles
- Clinically: In the final stages, affected individuals may become incontinent, mute, and unable to walk.

Parkinson disease (PD):

- The second most common neurodegenerative disease after Alzheimer's disease (AD).
- The pathological hallmark being intracellular aggregates of α -synuclein, in the form of Lewy bodies.
- Grossly: Loss of the darkly pigmented area in the substantia nigra.
- Clinically: triad of parkinsonism (resting tremor, rigidity, and bradykinesia).



#Tumors



Meningioma:

- Meningiomas are predominantly benign tumors of adults that arise from the meningotheelial cells of the arachnoid and are usually attached to the dura.
- Site: growing along external surface of brain, spinal cord or rarely, within the ventricular system

Medulloblastoma:

- This malignant embryonal tumor occurs predominantly in children and exclusively in the cerebellum (by definition).
- Medulloblastomas are highly malignant.

Gliomas:

- The most common group of primary brain tumors with glial differentiation, include (astrocytomas, oligodendrogliomas, and ependymomas).

