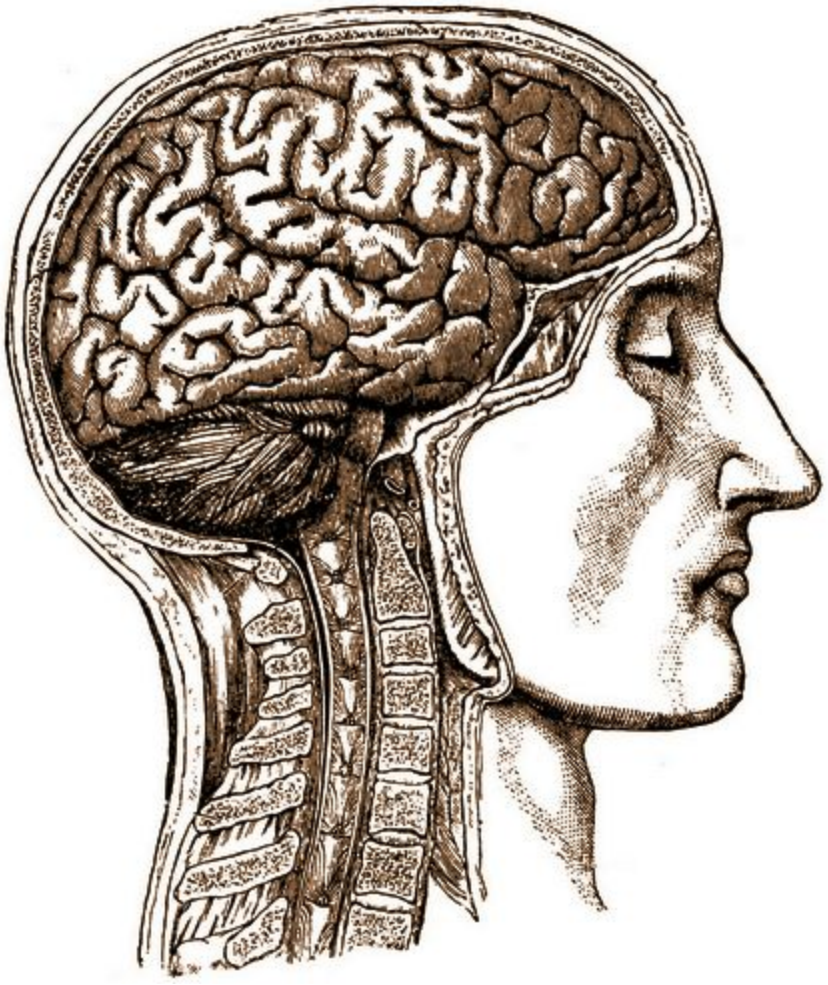
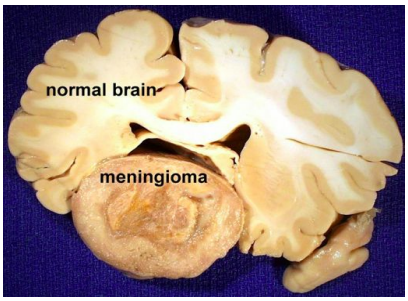
CNS PATHOLOGY OSPE



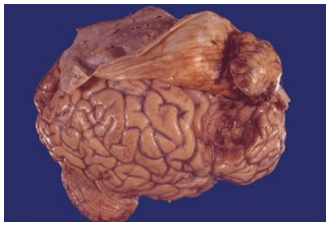
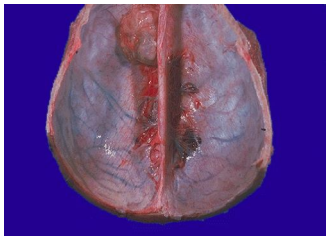
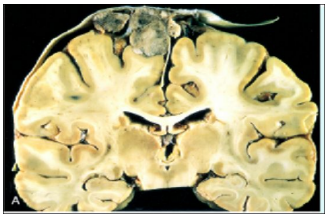
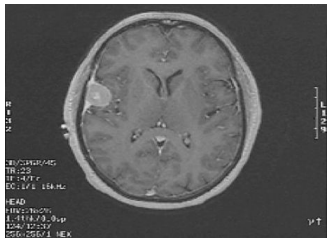
Contents:

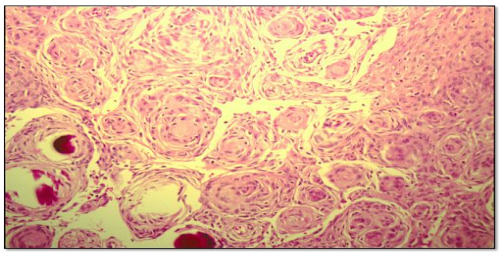
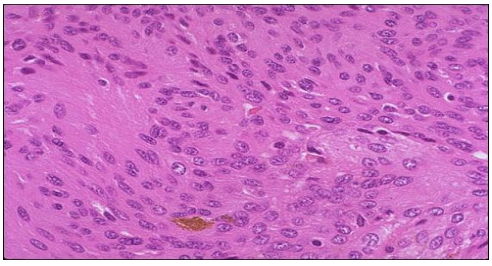
Meningioma

A 43- year old female complained of headache and two attacks of seizures in the past 4 months . Brain MRI revealed a 3 cm extra-axial mass in the parietal region. It was dural- based with mild edema in the surrounding brain tissue.



- **Definition:** Predominantly benign tumors of adults Origin: meningothelial cell of the arachnoid.
- **Clinical features:** 1) *headache 2) seizures*
  - Although most meningiomas are easily separable from underlying brain, some tumors infiltrate the brain.The presence of brain invasion is associated with increased risk of recurrence.
- **Associated with: NF2 on chromosome 22.**

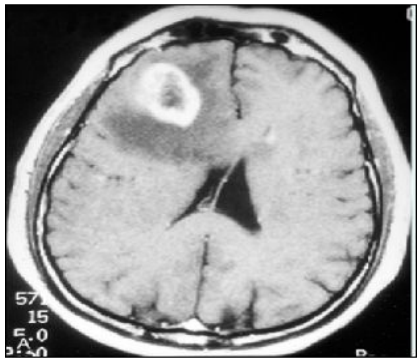
Gross			
			
Well defined mass attached to the base of Dura and compress brain parenchyma.		Parasagittal multilobular meningioma (compression of Brain parenchyma).	- Mri pic show a discrete mass along the lateral convexity. - extending from a dural base impinging upon the cerebral hemisphere.

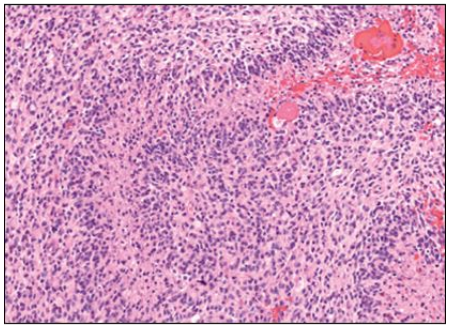
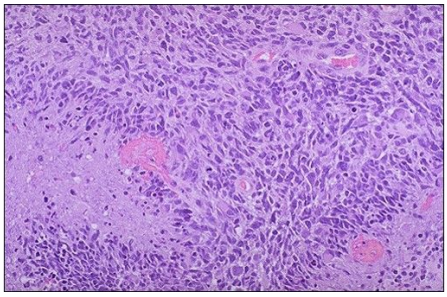
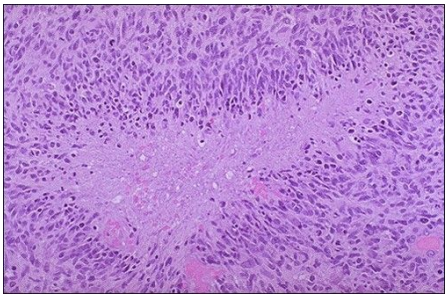
Microscopic	
	
- Whorls Pattern of fibrocellular tissue. - Cells are oval, spindle shape or elongated and lack mitosis. - **Psammoma bodies** (spherical calcified particles).	At high magnification, this meningioma has : - plump pink cells. - A small amount of brown granular hemosiderin (iron Pigment). - psammoma bodies (spherical calcified particles).

Glioblastoma

A 55 years old man complained of headache for the last 2 months . Brain MRI reveals a 3 cm frontal intraparenchymal space occupying lesion with rim enhancement on contrast studies.

- **Definition:** is less differentiated Fibrillary Astrocytoma grade IV
- **Clinical features:** Seizures, vague symptoms, headaches especially in the morning
- **Causes:** Amplification of the epidermal growth factor receptor (EGFR) gene.

Gross	
	
● Irregular mass. ● **Necrosis.** ● hemorrhage. ● crossed the midline to the opposite hemisphere.	● CT scan of a large tumor in the cerebral hemisphere ● showing signal enhancement with contrast material (Rim enhancement), ● peritumoral edema.

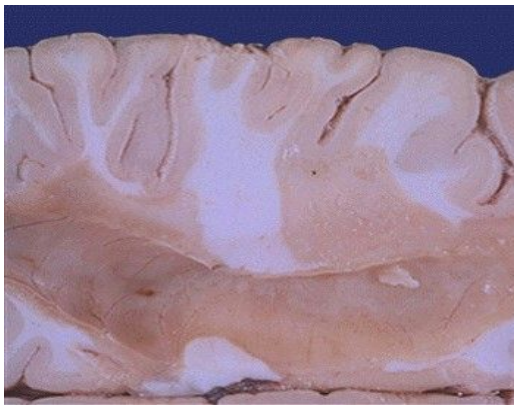
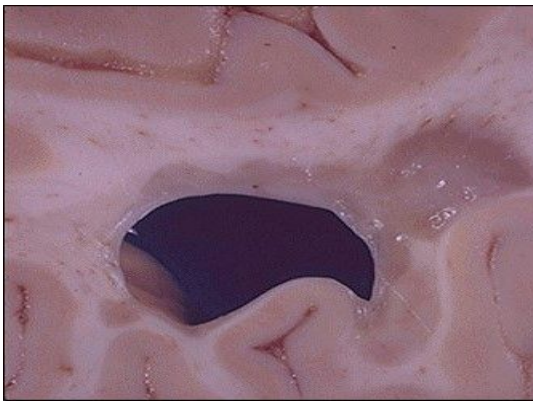
Microscopic		
		
● necrosis and hemorrhage. ● pseudopalisading of malignant nuclei. ● endothelial cell proliferation.	● Cellularity. ● Hyperchromatism. ● Pleomorphism. ● prominent vascularity. ● pseudopalisading necrosis of neoplastic cells.	

- *note The cells of a GBM can infiltrate widely, particularly along white matter & csf*

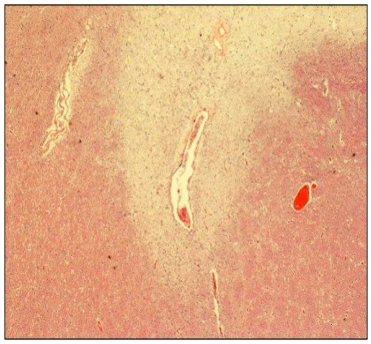
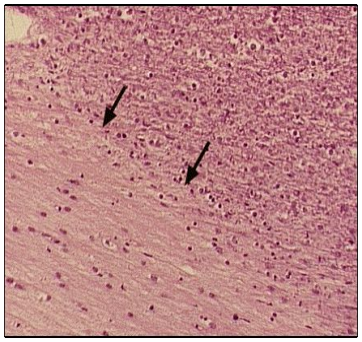
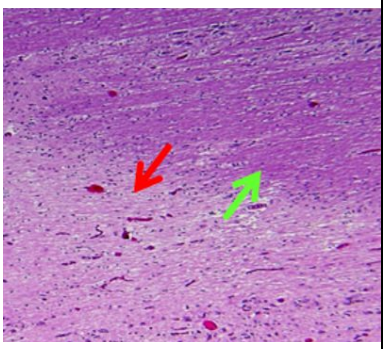
Multiple Sclerosis

- **Definition:** an autoimmune demyelinating disorder characterized by Plaques -->neurologic deficits.
- **Clinical features:** Unilateral visual impairment ,relapsing and remitting episodes of neurologic deficits , motor and sensory impairment of trunk and limbs, spasticity, and difficulties with the voluntary control of bladder function.
- **Causes: type 4 hypersensitivity.**
- **Site of lesion: Periventricular area (White matter).**
- **CSF:** increased protein from IgG that demonstrates oligoclonal bands on electrophoresis. *(very consistent with this diagnosis).*
- **Lesion can be seen with MRI.**

- **Risk factors:** women > men ,when present in a first-degree relative, HLA-DR2.
- **Treatment: Steroids + interferon beta.**

Gross	
	

1. large demyelinated plaque in the white matter.
2. plaque has a grey-tan appearance.
3. multifocal disease and the lesions appear over time.

Microscopic			
			
early lesion	**long-standing (old) MS .**	**older MS plaque**	1. Inactive demyelinated plaque from a brain with MS. 2. border between the plaque – pale .
***This stain: (luxol fast blue/PAS).**	H&E stained	**1-pallor of plaque,** almost devoid of myelin. 2- decrease in oligodendroglial nuclei & increase of astrocyte nuclei (characteristic of an older MS plaque).	red arrow: indicate a lack of myelin. green arrow: normal neuropil – darker.
1- lesion is centered around a small vein (arrow). 2- which is surrounded by inflammatory cells.	1-lesion is centered on a vein. 2-*very little inflammation around the vein*	***Loss of myelin is seen even without a special stain:*** *(it is lighter pink than the normal white matter surrounding it).*	

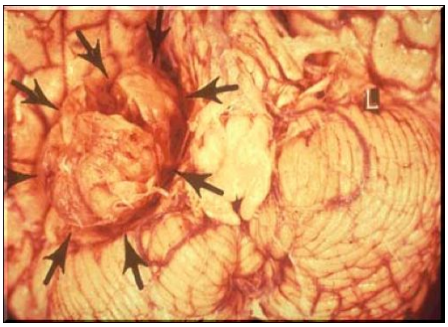
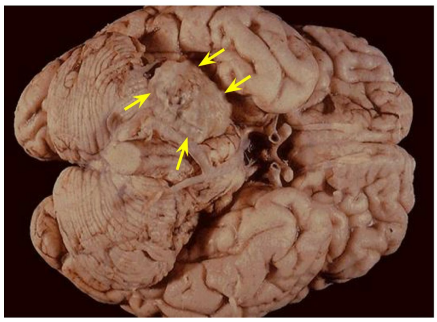
The key microscopic features of Multiple Sclerosis are:	
● Perivenous mononuclear inflammation (lymphocytes, plasma cells and macrophages). ● Loss of myelin and variable loss of oligodendrocytes. ● Relative preservation of axons. ● Reactive astrogliosis (sclerosis).	
Early (acute) lesions are characterized by	**Chronic lesions have few mononuclear cells**
● Perivascular & parenchymal infiltration by inflammatory mononuclear cells, ● myelin breakdown & phagocytosis by macrophages.	● fewer inflammatory cells ● almost complete demyelination.
Astrogliosis is not yet profound	severe astrogliosis.
● axons are relatively preserved.	● some secondary axonal loss in advanced cases. ● can be oligodendrocyte loss

Schwannoma

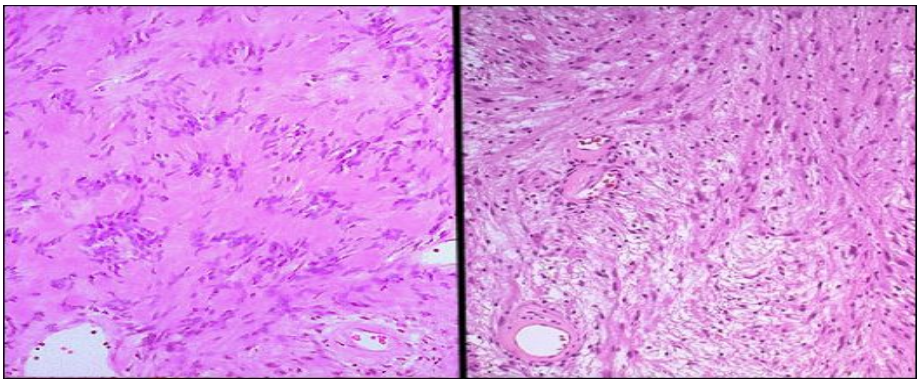
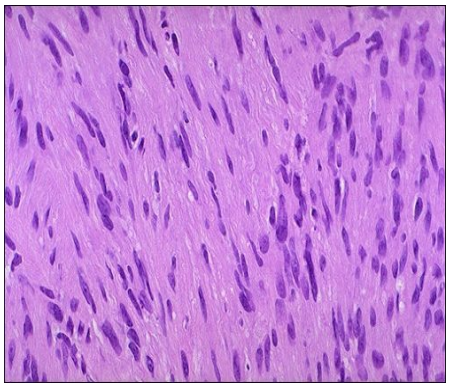
A 39 years old man complains that he had noticed a progressive hearing loss over a 2 years period. Except for occasional headache, he has no other complaints . Evaluation discloses severe sensorineural hearing loss of the left side . MRI shows 1.5 cm. mass at the left cerebellopontine angle .

- **Definition:** Benign nerve sheath tumor seen most frequently on the 8th nerve through cerebellopontine angle.
- **Gentaic** :10% Sporadic schwannomas are associated with mutations in the NF2 gene. **Bilateral acoustic schwannoma is ALWAYS associated with NF2.**
- **Clinical features:** 1) progressive hearing loss. 2) occasional headache
- **Treatment:** Acoustic tumors can be removed, but usually not without damaging the eighth nerve and sometimes the facial nerve and brainstem.

Gross

		
they occupy the cerebello- pontine angle (arrows).	*(Acoustic Schwannoma) The mass lesion here is arising in the acoustic (eighth cranial) nerve at the cerebellopontine angle.*	(cut section) *similar to that of many mesenchymal neoplasms "with a "fish flesh" soft tan appearance"*

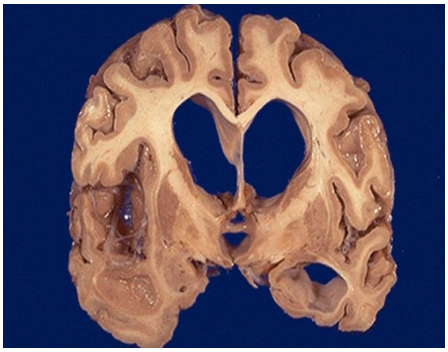
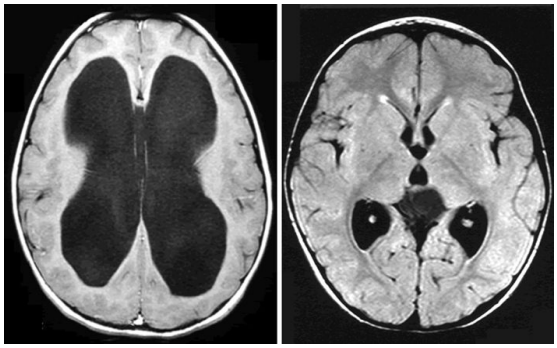
Microscopic

	
- *cellular "**Antoni A**" pattern on the left with palisading nuclei surrounding pink areas (Verocay bodies).* - *On the right is the "**Antoni B**" pattern with a looser stroma, fewer cells, and myxoid change.*	*The schwannoma is seen here at higher magnification*

Hydrocephalus

A 9 months infant was suffering from enlarged head size and admitted to hospital with convulsions, went into coma and died. Autopsy was done and the brain was large with dilated ventricles .

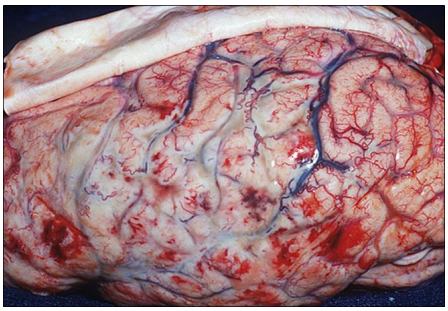
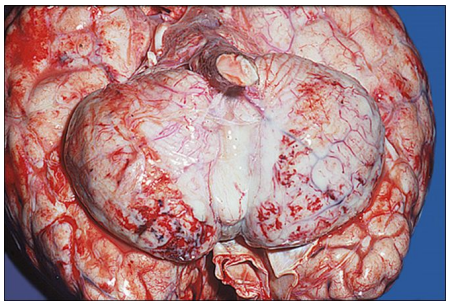
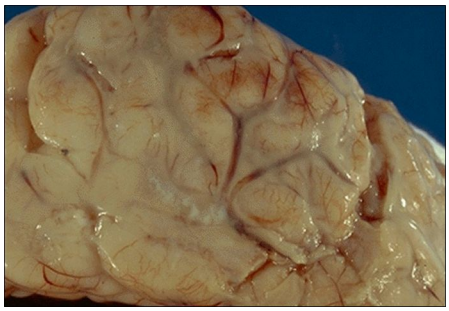
- **Definition:** an excessive amount of cerebrospinal fluid (CSF) accumulates within the cerebral ventricles so the ventricles **become enlarging**
- **Clinical features:** Increased intracranial pressure (ICP) ,Headache Dilatation of the ventricles.
- **Causes:** Obstruction ,Impaired absorption CSF ,Excessive production —such as choroid plexus tumors
- **Risk factors:** Birth weight ,Maternal diabetes, Low socioeconomic status, Male sex,
- **Treatment:** Diuretics and fibrinolytics ,Serial lumbar punctures

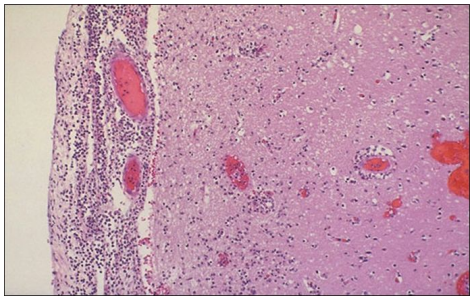
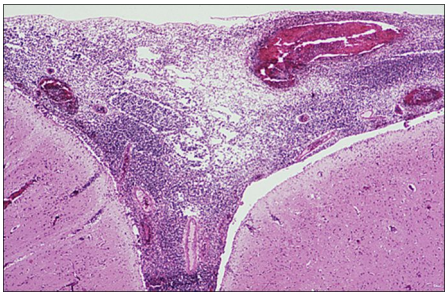
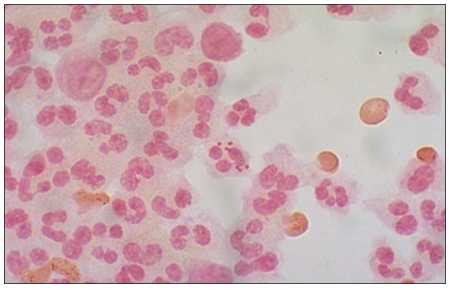
Gross		
		
Note the marked dilation of the cerebral ventricles. *Hydrocephalus can*	*A normal MRI scan (right).* *An MRI scan of a brain with hydrocephalus (left)and shows* *The large dark area on the left is the ventricles, made bigger by a buildup of CSF*	*Mid Sagittal MRI of a child with communicating hydrocephalus, involving all ventricles*

Pyogenic Meningitis

4 years old child who was treated from otitis media and suddenly complained from headache, vomiting, fever and stiff neck. CSF was found to be clouded with abnormal increase of neutrophils, increased protein and absence of sugar. Gram stain of the CSF fluid showed meningococci .

- **Definition: inflammation of leptomeninges with subarachnoid space**
- **Clinical features: Headache - photosensitivity - Fever and stiff neck.**
- **Risk factors: Otitis media Patient (Local Extension) + Trauma (Fracture).**
- **Causes: Meningococci Organisms - Neisseria meningitidis - S.pneumoniae**
- **CSF Finding: Increase of Neutrophils(polymorph), increase of Proteins) and low of glucose**
- **Complication : hydrocephalus , cerebral abscess , phlebitis and vascular occlusion**
- **Treatment: By Antibiotics like: Penicillin, Vancomycin, Gentamicin and Fluoroquinolones.**

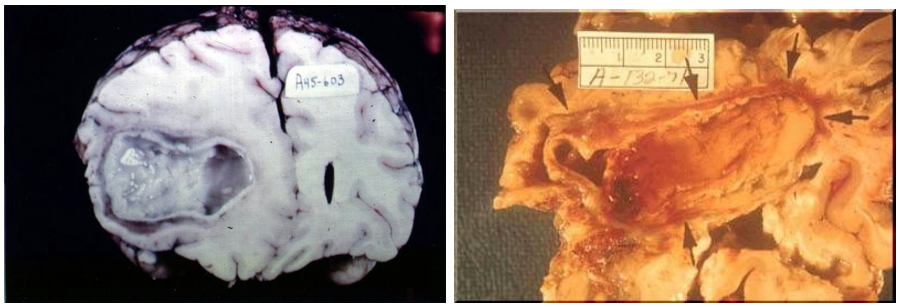
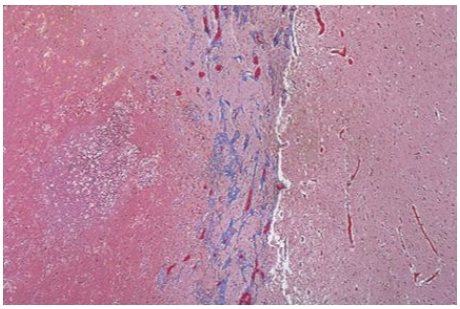
Gross		
		
A creamy purulent exudate covers cerebral hemispheres	A creamy purulent exudate covers the cerebral hemispheres and extended into base of brain around cranial nerve and e the 4th Ventricle.	A creamy purulent exudate covers the cerebral hemispheres

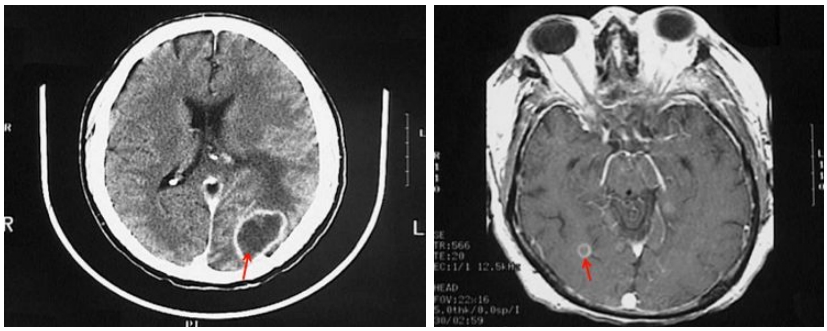
Microscopic		
		
1-neutrophilic exudate. involving the meninges at the left 2-with prominent dilated vessels. 3-Gliosis. 4-Edema and focal inflammation	1-Neutrophils infiltration in subarachnoid 2-Thrombosis and Ischemic Infarction.	a gram stain of CSF sample reveals gram negative diplococci within a neutrophil, typical for Neisseria meningitidis

Cerebral abscess

A 35 years old lady complains from otitis media. Suddenly she suffers from headache and convulsions. Brain MRI reveals 5 cm. fluid filled cavity in the temporal lobe. Examination of the CSF shows increased pressure with lymphocytes and increased protein but there is no change of sugar content.

- **Definition: Abscess caused by inflammation & collection of infected material, coming from local[1] or remote[2] infectious sources - by blood-, within the brain tissue.**
- **Clinical features: progressive focal neurologic deficits, headache, raised ICP, vomiting, confusion, convulsions, coma.**
- **Causes: Streptococci and staphylococci in *non immunosuppressed* populations.**
- **Predisposing conditions: Acute bacterial endocarditis, Loss of pulmonary filtration.**
- **Diagnosis: MRI, CSF sample, CSF culture (determining the organism), CBC is not specific.**
- **Treatment: Lowering the increased intracranial pressure and starting intravenous antibiotics (and meanwhile identifying the causative organism mainly by blood culture studies).**
- **Complications: Herniation, Rupture of abscess into subarachnoid space or ventricle.**
- **Stain: trichrome.**

Gross	Microscopic
	
Well circumscribed cavity filled with yellow pus and lined by thin wall. Showing liquefactive necrosis.	light blue connective tissue in the wall of an organizing cerebral abscess. Normal brain is at the right and the center of the abscess at the left.

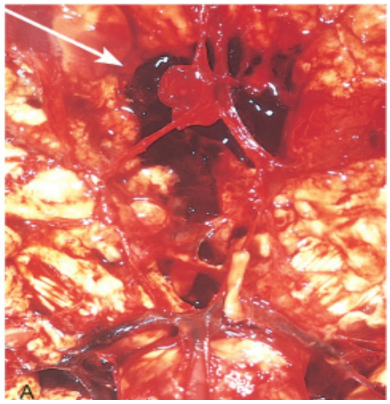
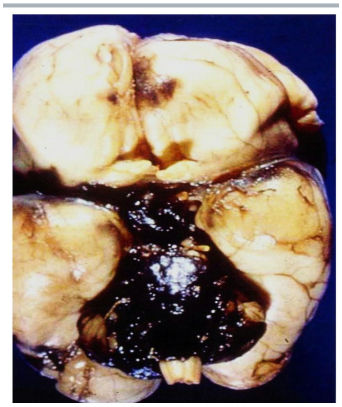
Radiology	
	**Left:** CT scan of the head in transverse view demonstrates an abscess in the brain (red arrow) in a patient who had septicemia. **Right:** MRI scan of the head in transverse (axial) view demonstrates a small abscess in the brain (Red arrow) in a patient who had septicemia.

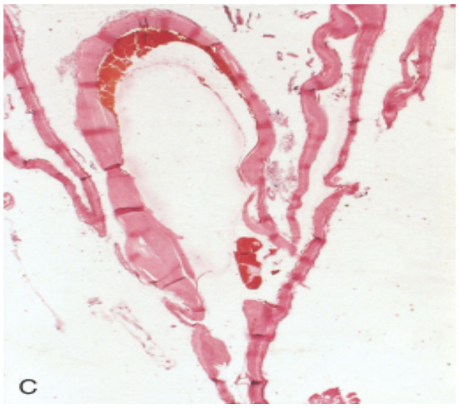
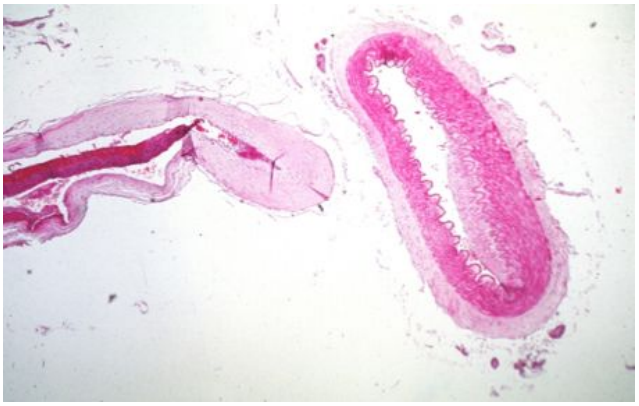
[1] Ear infection, dental abscess, infection of paranasal sinuses, infection of the mastoid air cells of the temporal bone, epidural abscess.
[2] lung, heart, kidney etc.

Berry Aneurysm

A previously healthy 31-year-old woman experiences a severe headache & loses consciousness within an hour. An emergent head CT scan reveals extensive subarachnoid hemorrhage at the base of the brain. Lumbar puncture yields CSF with many RBC's, but no white blood cells. CSF protein is slightly increased, but glucose is normal.

- **Definition: A small aneurysm that looks like a berry at *circle of Willis* in the base of the brain - specially anterior cerebral artery -** ***Multiple aneurysms are seen in about 20-30% of cases of berry aneurysm.***
- **Clinical features of aneurysm rupture: Severe headache, nausea, vision impairment, vomiting, & loss of consciousness.**
- **Risk factors: genetic conditions, hypertension, smoking, excess alcohol consumption, and obesity.**
- **Complication: hemorrhage in the subarachnoid space and Vasospasm leads to more ischemia.**
- **Associated with: Autosomal dominant polycystic disease, Marfan Syndrome.**

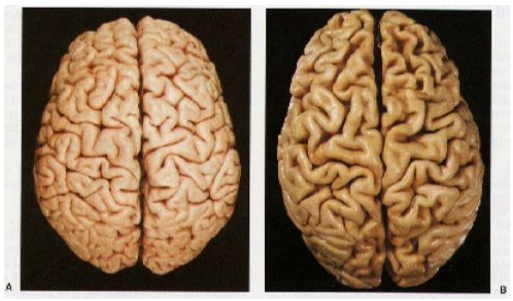
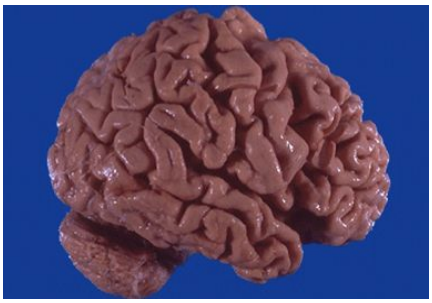
Gross		
		
Arrow: aneurysm within anterior cerebral artery of circle of willis	Large aneurysm of circle of willis	- Rupture of the aneurysm - Subarachnoid hemorrhage

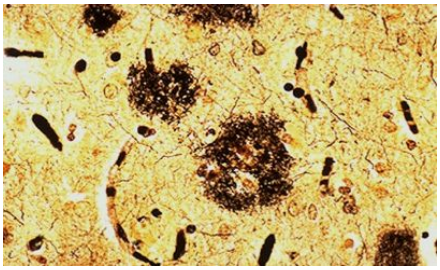
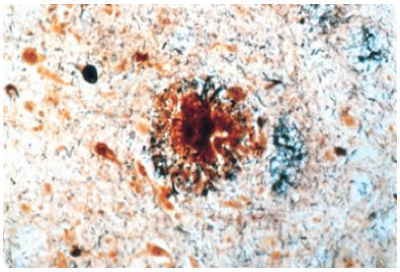
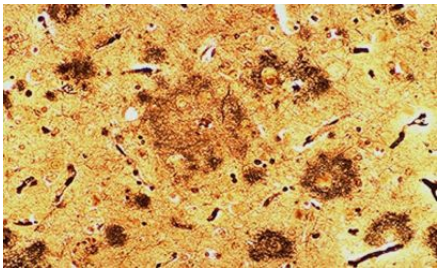
Microscopic	
	
Hyaline fibrous vessel wall & lack of medial structures in wall of aneurysm	

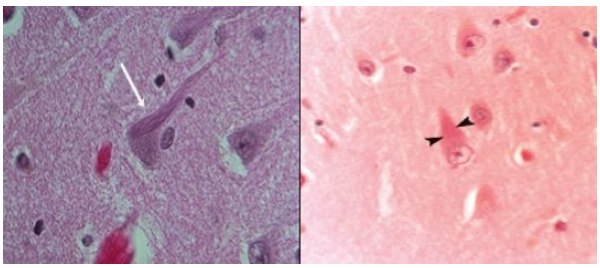
Alzheimer's disease

A 85 years old man complains of progressive loss of memory, disorientation and alterations in mood and behavior since 20 years. He was admitted to hospital because he was disabled and immobile and he died in hospital after one week of admission. Autopsy was done and the brain cortex was found to be atrophied.

- **Definition:** Most common cause of dementia in the elderly.
- **Clinical features:** This dementia is marked mainly by *progressive memory loss*.
- **Causes: Mostly sporadic:** (**ε 4 - ApoE4**) = *increase the risk & lower the age*, (**SORL1**) = late-onset.
- **Risk factors:** Old age.
- **Prognosis:** Death usually occurs from **intercurrent pneumonia.**
- **Stain used:** **Silver stain** for senile plaques.

Gross	
	
A. Normal Brain **B.** Brain of a patient with Alzheimer shows **cortical atrophy** with thin gyri and prominent sulci	Cerebral atrophy seen here mainly in the frontal and parietal lobes.

Microscopic		
		
Neuritic (senile) plaques are most numerous in the **cerebral cortex** and **hippocampus**	Neuritic (senile) plaque with a rim of *dystrophic neurites* surrounding an *amyloid core* (Beta amyloid).	**Senile plaques:** collections of degenerative presynaptic endings along with astrocytes and microglia



Neurofibrillary tangles (arrows) are present within the neurons. They are composed of cytoskeletal intermediate filaments. (Tau protien)

For any suggestions or questions please don't hesitate to contact us on: Pathology434@gmail.com

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Ask us: www.ask.fm/Pathology434

Good Luck! :)

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