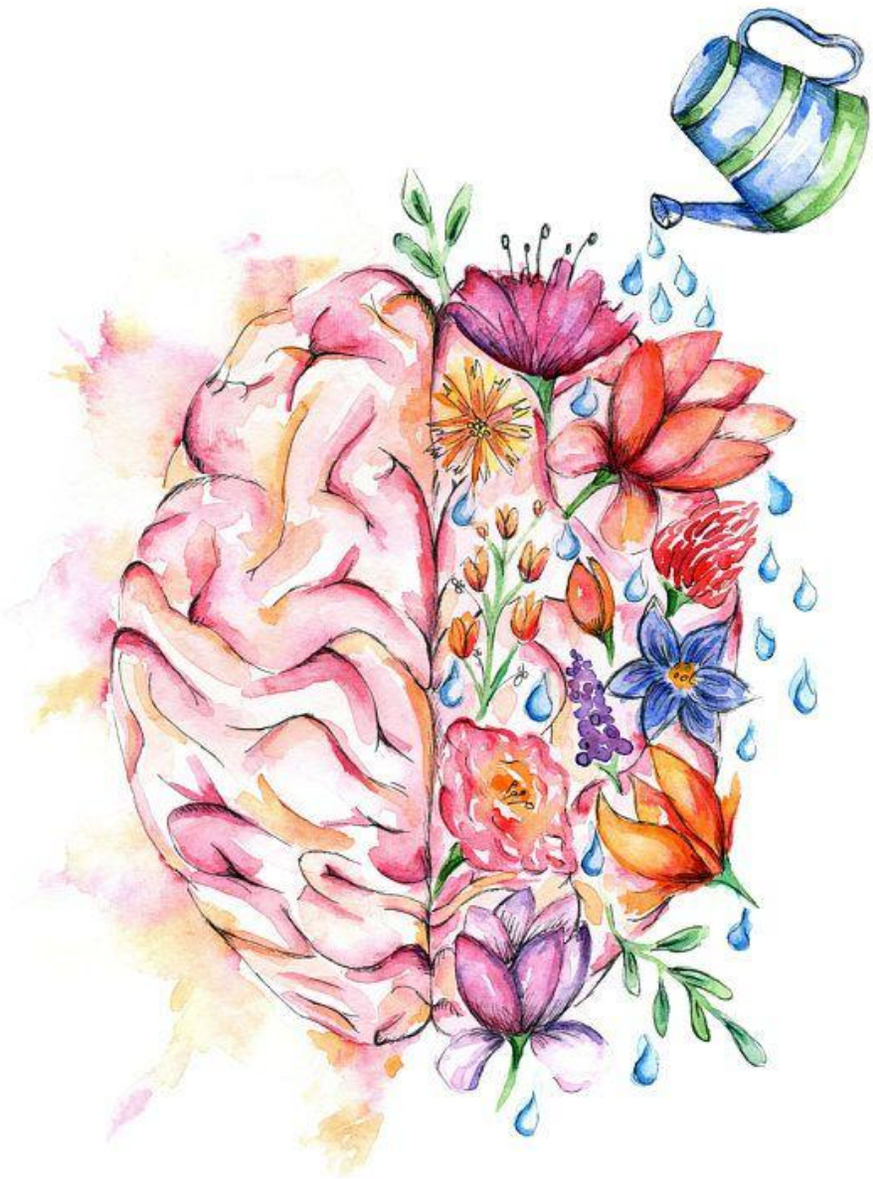
MED437
KING SAUD UNIVERSITY

Team 437 Pathology Practical



Pathology Practical

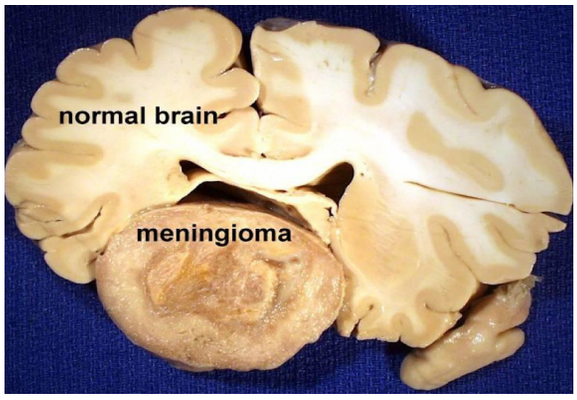
CNS Block

Grey: Notes
Pink: only in girls slides

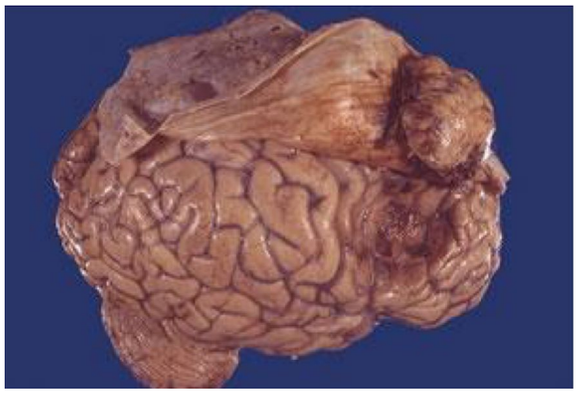
سلايدات العيال هي المصدر الأساسي لعمل التيم واي اختلاف موجود بسلايات البنات تمت اضافته باللون الوردي

Case 1: Meningioma

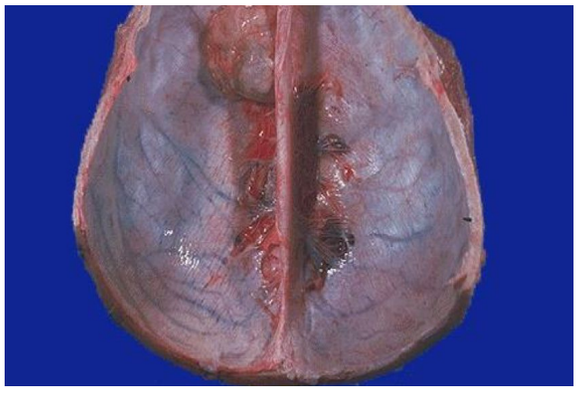
A 43- year old female complained of headache and two attacks of seizures in the past 4 months . Brain MRI revealed a 3 cm extra- axial mass in the parietal region. It was dural- based with mild edema in the surrounding brain tissue.



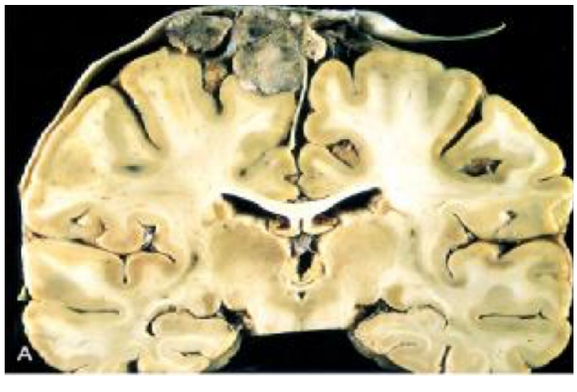
Gross:



- Meningioma beneath the dura has compressed the underlying cerebral hemisphere.
- Meningiomas can be more aggressive and invade (Rarely)
- Meningioma has good prognosis but recurrence may occur.

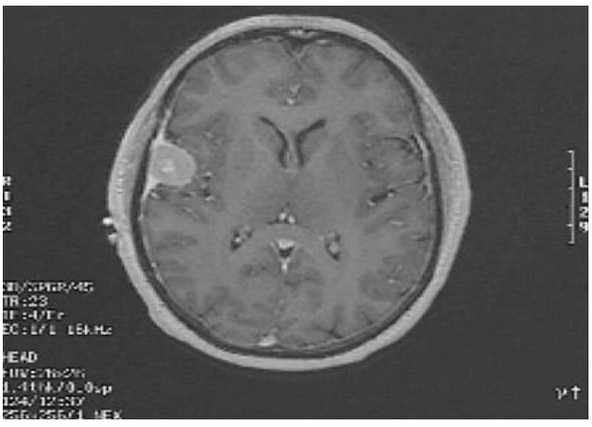


Benign meningioma beneath the dura (dural based), these neoplasms are:
- Slow growing.
- May reach a large size before symptoms lead to detection.



Parasagittal multilobular meningioma attached to the dura with compression of underlying brain.

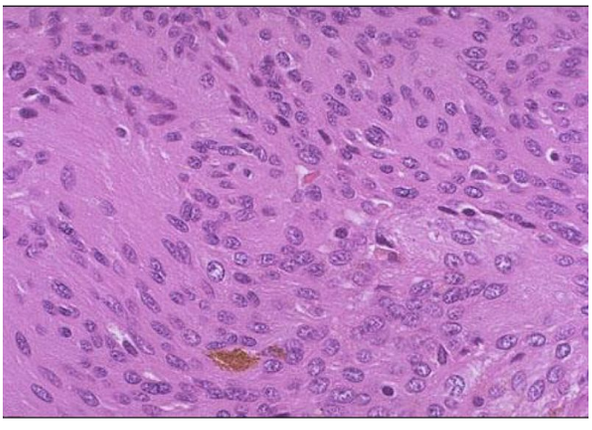
MRI:



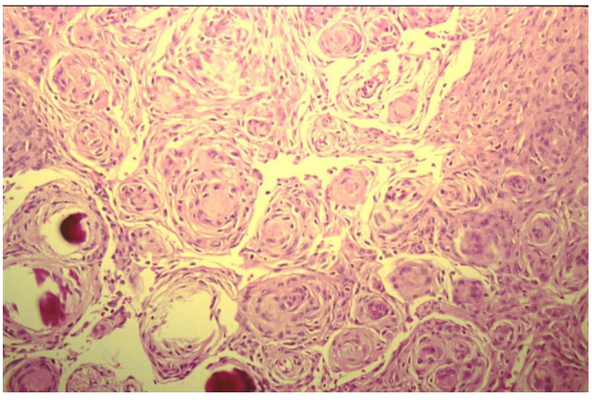
This is an MRI scan demonstrating:
- Dural mass along the lateral brain convexity extending from the dura base impinging upon the cerebral hemisphere (extra axial).

This is consistent with a meningioma

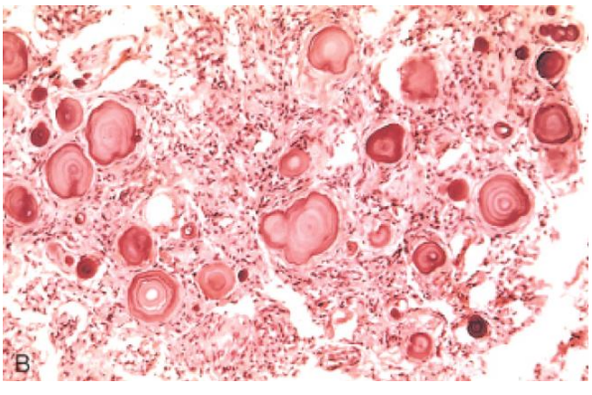
Histology:



Meningioma has (At high magnification):
- Plump pink cells.
- A small amount of brown granular hemosiderin
- May also have psammoma bodies.



- Psammoma bodies. (spherical calcified particles).
- Whorls of fibrocellular or meningothelial cells.
- Oval and spindle or elongated shaped cells.
- Lack mitosis.



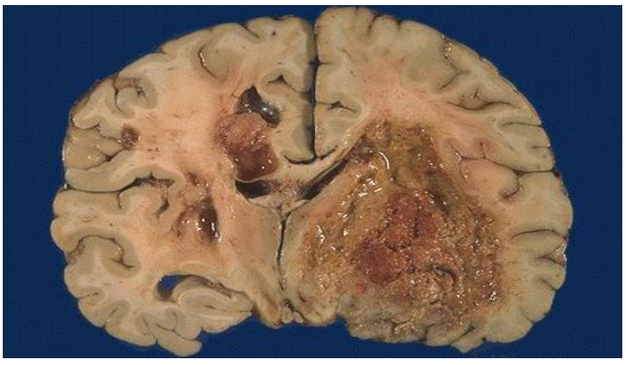
Meningioma with:
- Psammoma bodies.
- Whorled pattern of cell growth.

Case 2: Glioblastoma Multiforme

Previously called GlioBlastoma Multiforme, and sometimes still abbreviated GBM

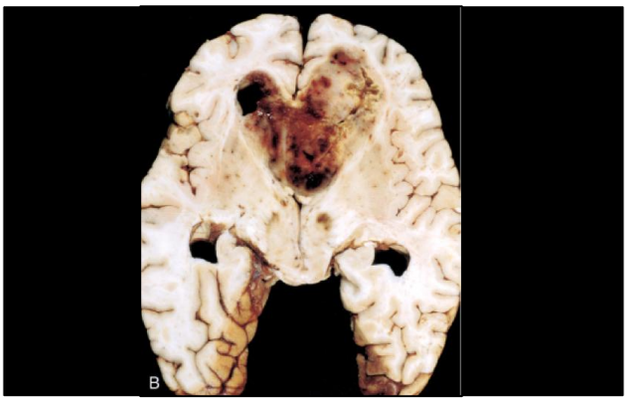
A 55 years old man complained of headache for the last 2 months . Brain MRI reveals a 3 cm frontal intra-parenchymal (intra-axial) space occupying lesion with rim enhancement on contrast studies.

Gross:



Glioblastoma multiforme (GBM) (The worst possible form of Glioma)
These neoplasms are:
- Quite vascular
- Has prominent areas of necrosis and hemorrhage.

Note how this one has crossed the midline to the opposite hemisphere

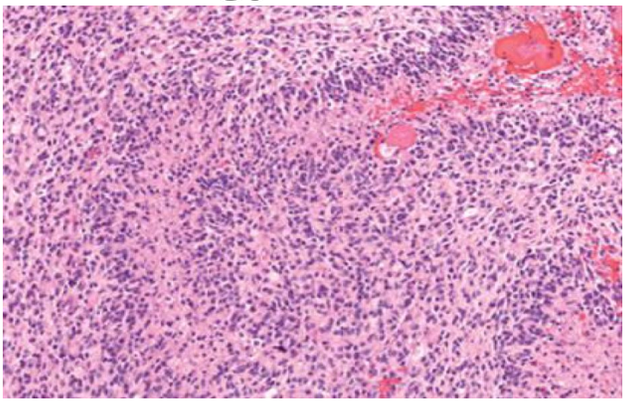


Glioblastoma multiforme (GBM) (The worst possible form of Glioma)
Appearing as a mass that is:
- Necrotic
- Hemorrhagic
- infiltrating

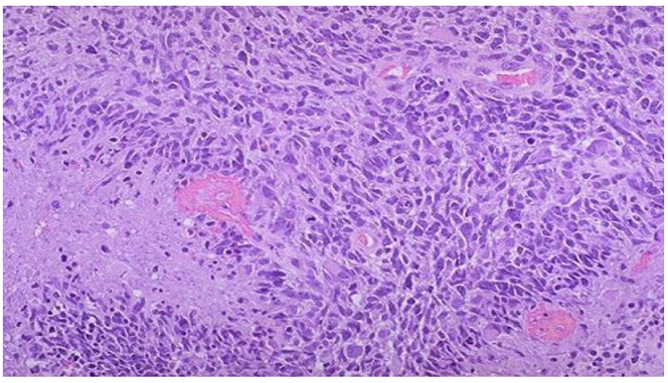
CT scan:

CT scan of a large tumor in the cerebral hemisphere showing:
- Signal enhancement with contrast material
- Pronounced peritumoral edema

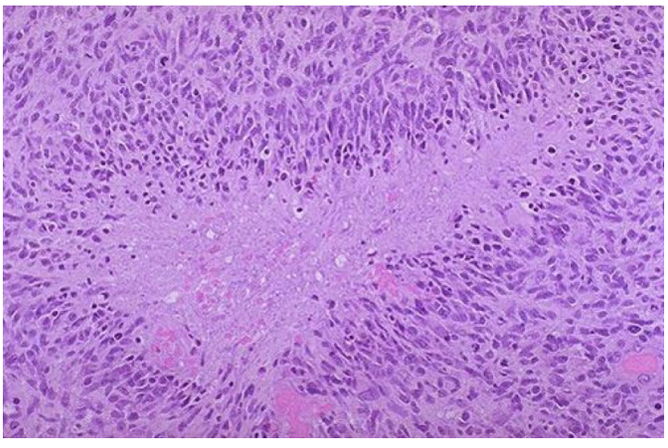
Histology:



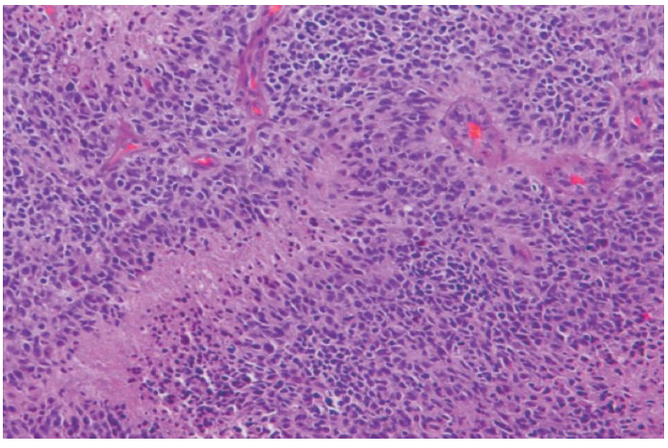
Glioblastoma in a LPF microscopy shows:
- Foci of necrosis
- Pseudopalisading of malignant nuclei
- Endothelial cell proliferation



This glioblastoma multiforme (GBM) demonstrates marked:
- Cellularity
- Hyperchromatism
- Pleomorphism
- Prominent vascularity as well as the area of necrosis at the left with neoplastic cells palisading around it.



Pseudopalisading necrosis of neoplastic cells in a glioblastoma multiforme (GBM), The cells of a GBM can:
- Infiltrate widely, particularly along white matter tracts, and even through the CSF.



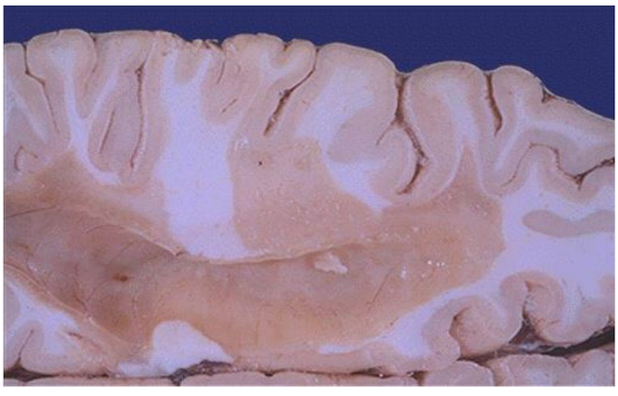
Glioblastoma in a LPF microscopy shows:
- Foci of necrosis
- Pseudopalisading of malignant nuclei
- Endothelial cell proliferation

Same as the first histological section findings but different picture in Female slides

Case 3: Multiple Sclerosis

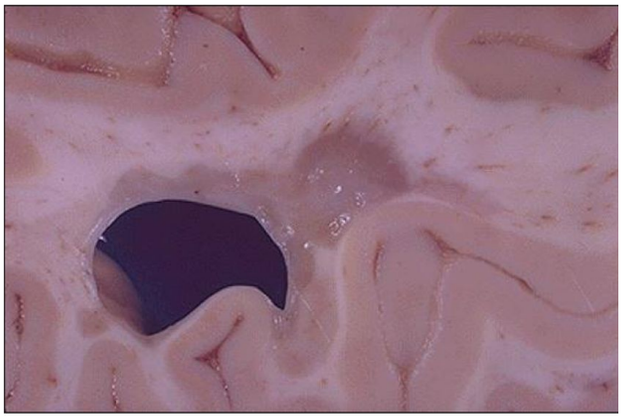
A 27 years old woman presents with a sudden onset of right sided blindness and weakness in her left leg. There is no history of trauma. However, she experienced a similar episode 8 months ago and was diagnosed as aseptic meningitis.

Gross:

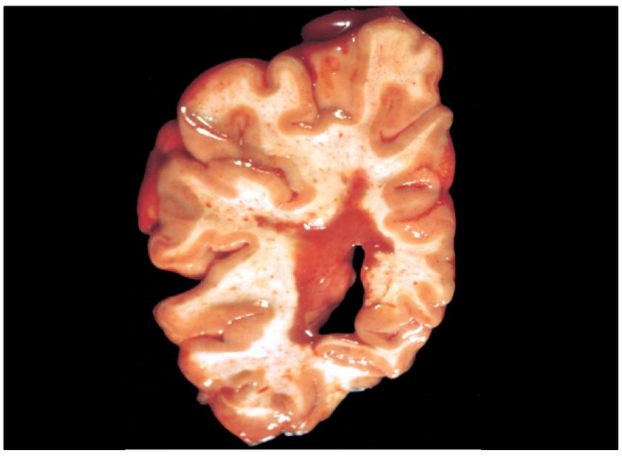


A large "plaque" of demyelination in the white matter.
The plaque:
- Has a grey-tan appearance and it is typical for multiple sclerosis (MS)

The plaque lead to the clinical appearance of transient or progressive loss of neurological function.
The disease is multifocal and the lesions appear over time.

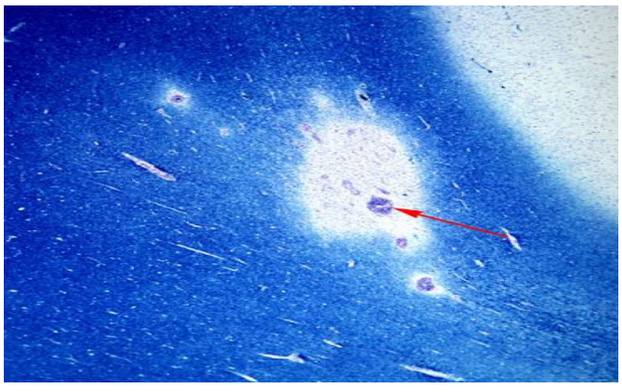


- A demyelinated plaque in a patient with MS.
- The lesions can be seen with MRI scans.
- The appearance in the CSF of increased protein from **IgG** that demonstrates **oligoclonal bands** on electrophoresis (very characteristic for MS)

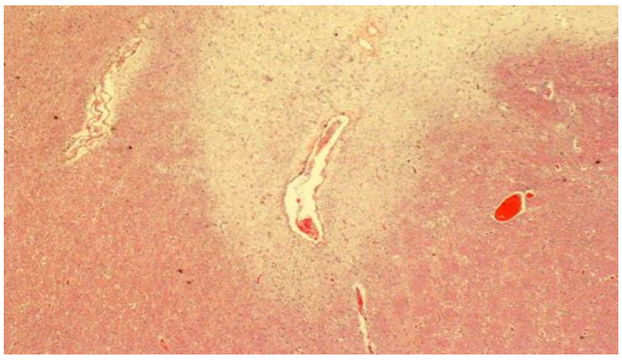


Section of fresh brain showing:
- Brown plaque around occipital horn of the lateral ventricle

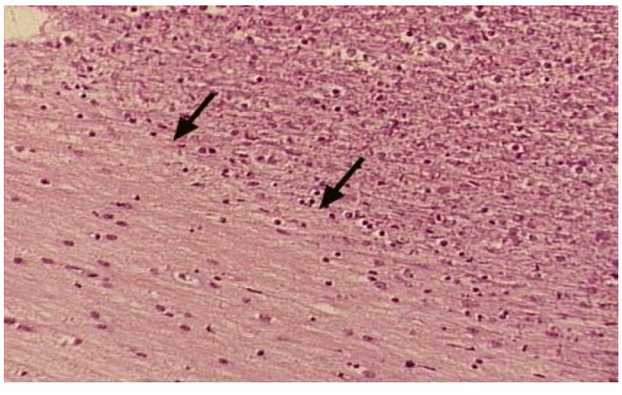
Histology:



This is a myelin stain (luxol fast blue/PAS) of an early lesion.
The lesion is:
- Centered around a small vein (arrow)
- Surrounded by inflammatory cells.

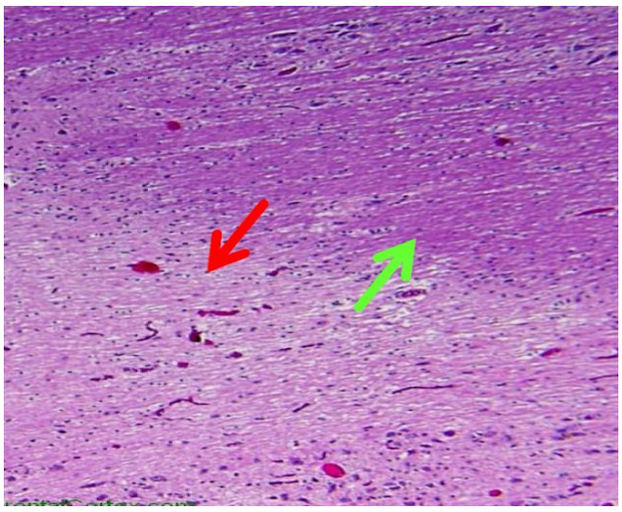


This is an H&E stained sections from a patient with long-standing MS, it shows:
- Lesion which is centered on a vein.
- Very little inflammation around the vein.
- Loss of myelin can be seen even without a special stain (it is lighter pink than the normal white matter surrounding it)

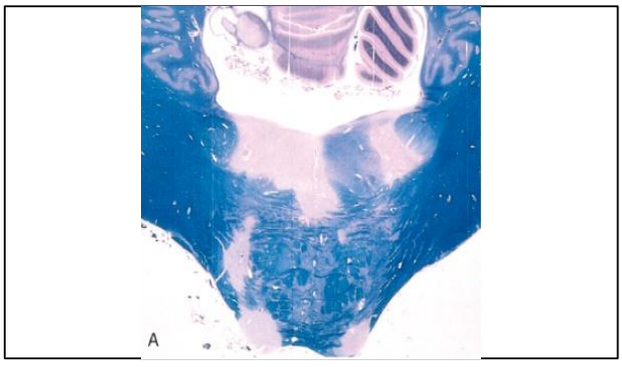


A high power photomicrograph of the MS plaque showing:
- The pallor of the plaque almost devoid of myelin
- Decrease in oligodendroglial nuclei
- Increase of astrocyte nuclei

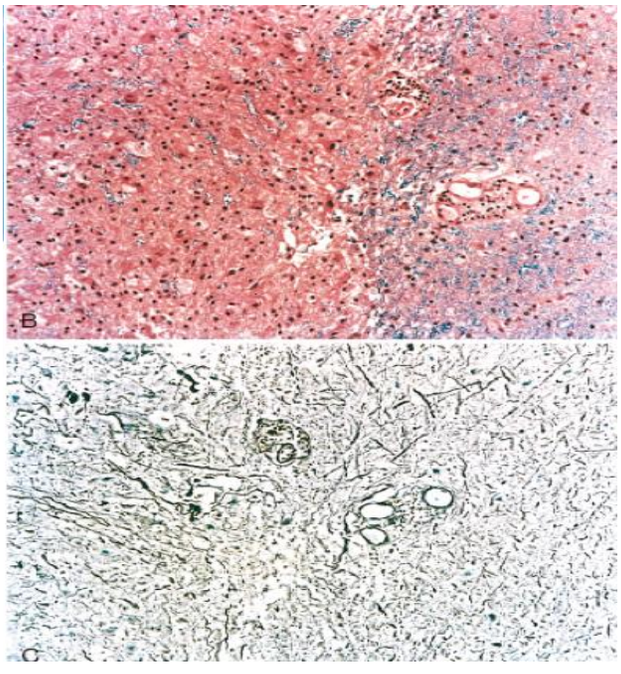
(characteristic of an older MS plaque)



Inactive demyelinated plaque from a brain with MS. There is:
- No active demyelination going on in this plaque.
- The border between the plaque and normal neuropil can be seen
- Normal neuropil is darker (green arrow).
- Pale plaque (red arrow) indicates a lack of myelin.



Unstained regions of demyelination (MS plaques) around the fourth ventricle (Luxol fast blue PAS stain for myelin)



B picture:
Myelin-stained section shows:
- The sharp edge of a demyelinated plaque
- Perivascular lymphocytic cuffs.

C picture:
The same lesion stained for axons shows relative preservation.

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:
- Perivascular and parenchymal infiltration by inflammatory mononuclear cells, and myelin breakdown and phagocytosis by macrophages
- Astrogliosis is not yet profound and axons are relatively preserved
- As the lesion progresses, there are fewer inflammatory cells and more astrogliosis.

Chronic lesions have:
- Few mononuclear cells
- Almost complete demyelination
- Severe astrogliosis
- Oligodendrocyte loss and some secondary axonal loss (advanced cases)

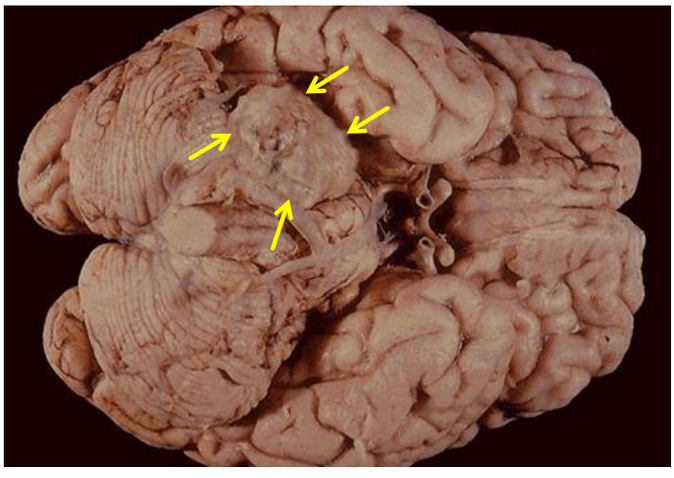
Case 4: Schwannoma

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 .

Gross:

Schwannoma: A nerve sheath tumor that seen most frequently on the eighth nerve (acoustic neuromas), in which case they occupy the **cerebello- pontine** angle (arrows).

Acoustic tumors can be removed, but usually not without damaging the eighth nerve and sometimes the facial nerve and brain stem.

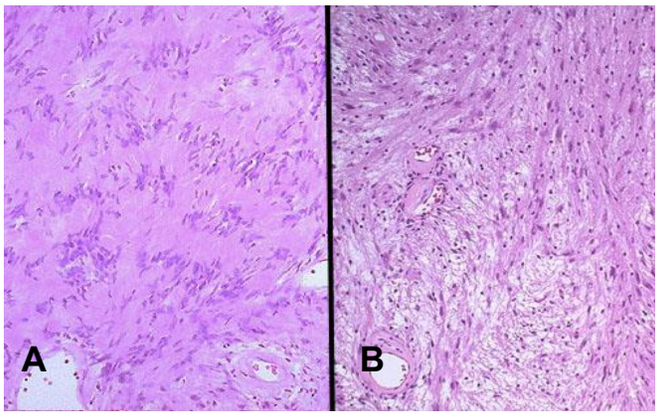


- Acoustic Schwannoma: The mass lesion here is arising in the acoustic (eighth cranial) nerve at the cerebellopontine angle.
- Patients may present with hearing loss.
- These benign neoplasms can be removed.

The cut surface of a schwannoma is:
- Similar to that of many mesenchymal neoplasms
- Has a "fish flesh" soft tan appearance.

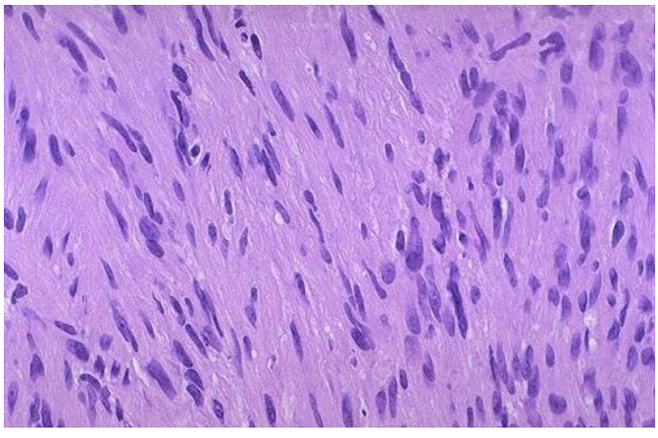
- **Bilateral** eighth nerve schwannomas.
- These are usually seen in **neurofibromatosis type 2 syndrome (NF 2)**

Histology:

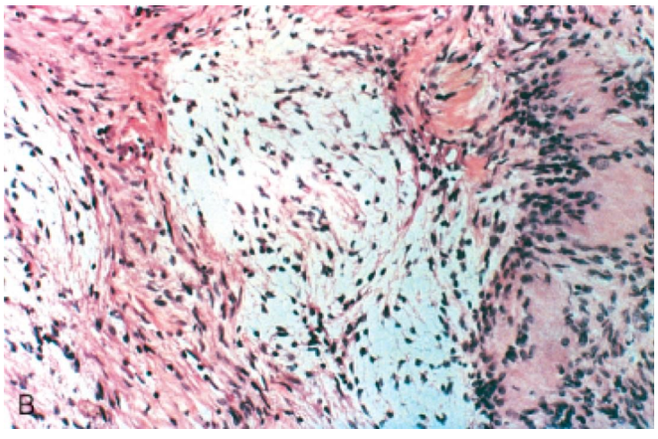


These are the classic microscopic appearances of a schwannoma, which is benign.
A picture:
- More cellular "Antoni A" pattern
- Palisading nuclei surrounding pink areas (Verocay bodies).

B picture:
- "Antoni B" pattern with a looser stroma
- fewer cells, and myxoid change.



The schwannoma is seen here at higher magnification.

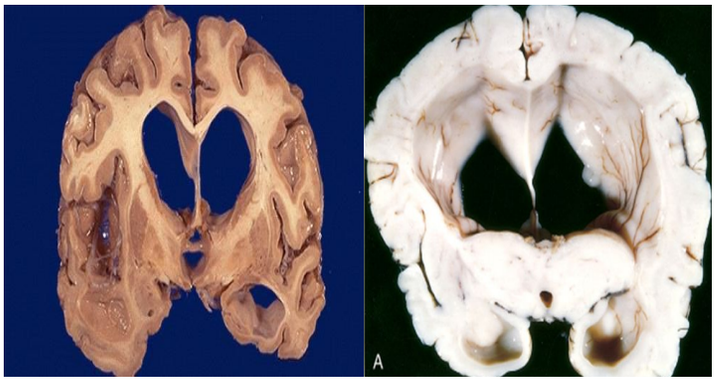


Schwannoma Tumor showing:
- Cellular areas
- Verocay bodies (far right)
- Looser myxoid regions

Case 5: 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 .

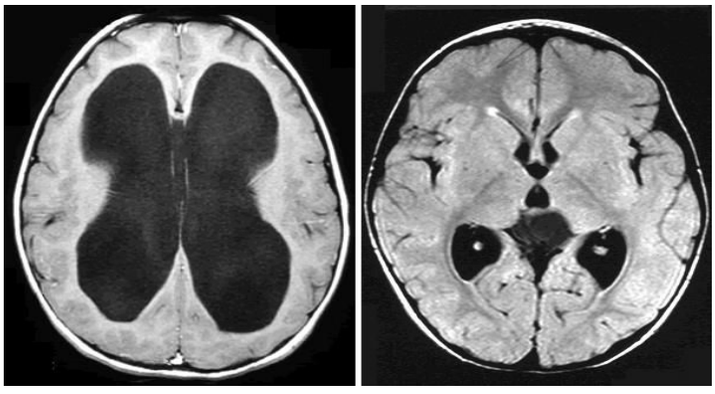
Gross:



Hydrocephalus shows:
- Marked dilation of the cerebral ventricles (lateral ventricles) seen in a coronal section through the mid thalamus.

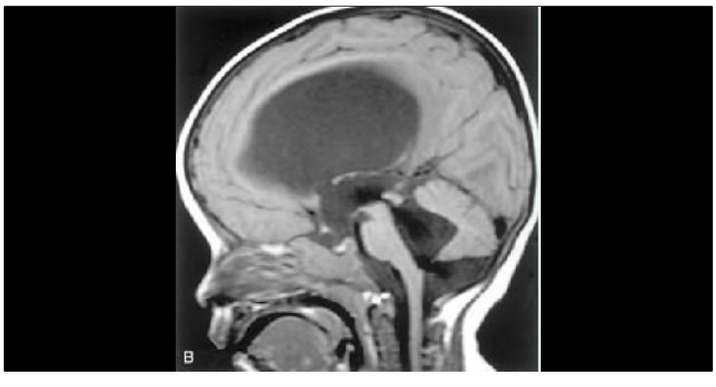
Hydrocephalus can be due to:
- Lack of absorption of CSF
- Obstruction to flow of CSF.

MRI view:



MRI scan of:
- Brain with hydrocephalus (left)
- Normal MRI scan (right).

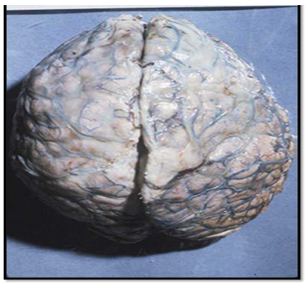
The large dark area on the left is the ventricles, made bigger by a build-up of CSF



Mid Sagittal MRI of a child with communicating hydrocephalus involving all ventricles.

Case 6: Pyogenic (Bacterial) Meningitis

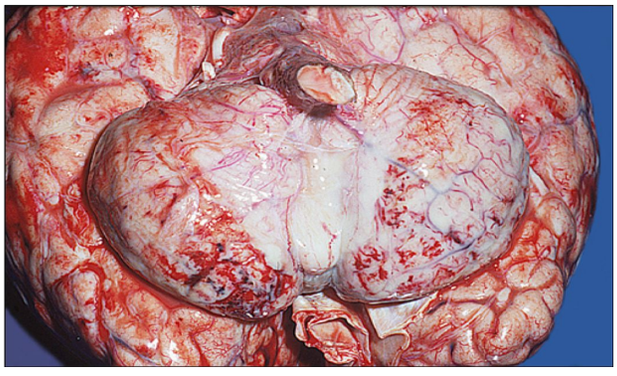
4 years old child who was treated from otitis media and suddenly complained from headache, vomiting, fever and stiff neck. CSF was found to be clouded with abnormal increase of neutrophils, increased protein and absence of sugar. Gram stain of the CSF fluid showed meningococci .



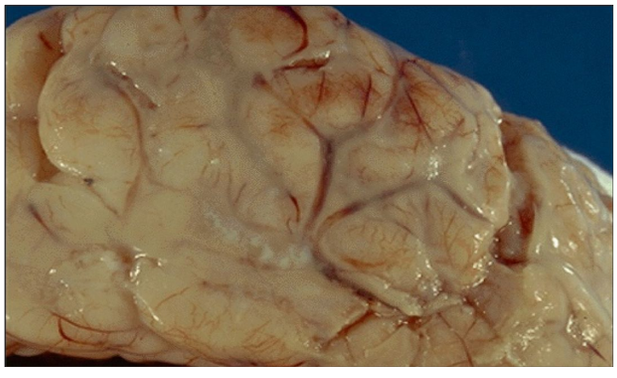
Gross:

Bacterial meningitis is the infection of the:
- Arachnoid membrane
- Subarachnoid space
- CSF

A creamy purulent exudate covers the cerebral hemispheres



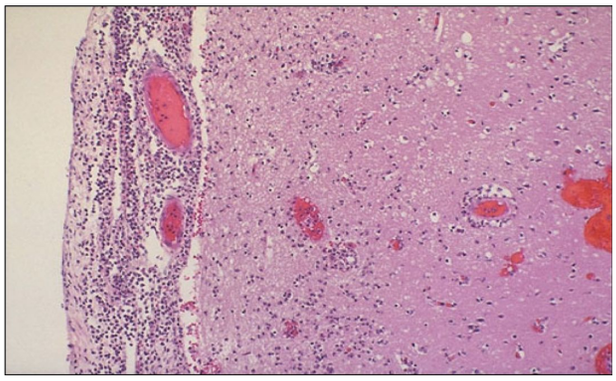
A creamy purulent exudate that:
- Covers the cerebral hemispheres.
- Settles along the base of the brain.
- Around cranial nerves.
- Around openings of the fourth ventricle.



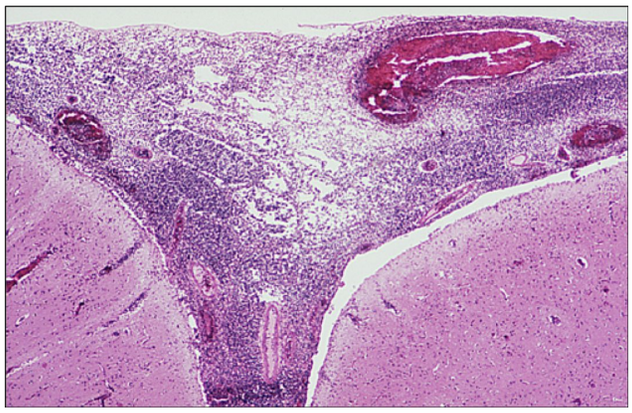
Acute meningitis from bacterial infection, CSF in such cases typically has:
- Low glucose
- High protein
- Many PMN's

A gram stain should be done to identify organisms.

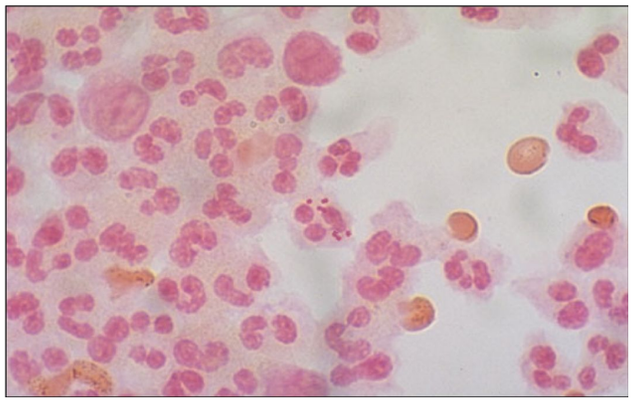
Histology:



This acute meningitis for bacterial infection, shows:
- A neutrophilic exudate is seen involving the meninges with prominent dilated vessels (at the left)
- Edema and focal inflammation (extending down via the Virchow-Robin space) in the cortex (to the right).



There is:
- Neutrophils in the subarachnoid space infiltrate and damage cranial nerves resulting in cranial nerve deficits.
- Invade leptomeningeal vessels causing phlebitis and arteritis
- Thrombosis
- Ischemic infarction.

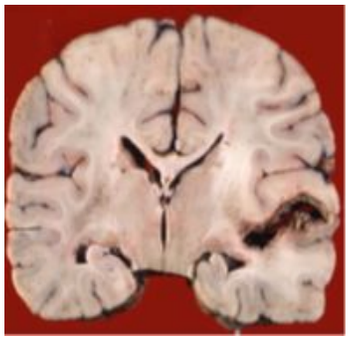


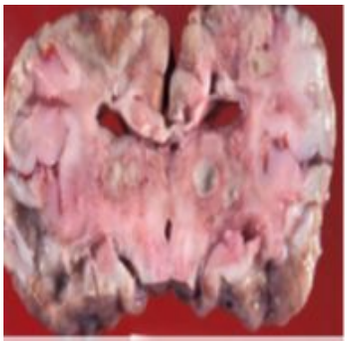
A gram stain of CSF sample reveals:
- Gram negative diplococci within a neutrophil
- Typical for **Neisseria meningitidis**

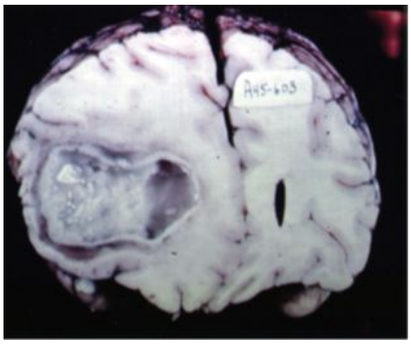
Case 7: Cerebral Abscess

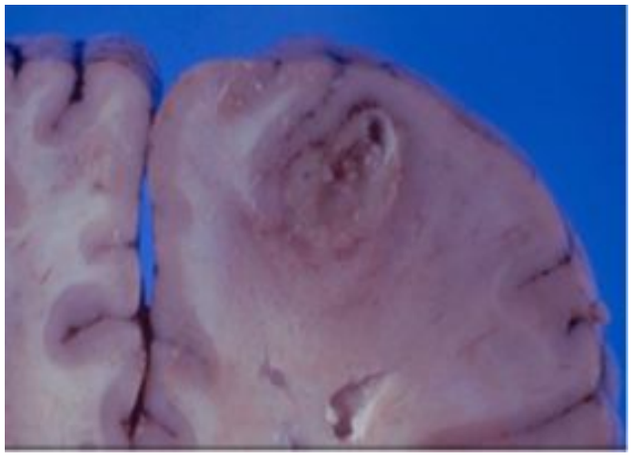
A 35 years old lady complains from otitis media . Suddenly she suffers from headache and convulsions. Brain MRI reveals 5 cm. fluid filled cavity in the temporal lobe. Examination of the CSF shows increased pressure with lymphocytes and increased protein but there is no change of sugar content.

Gross:







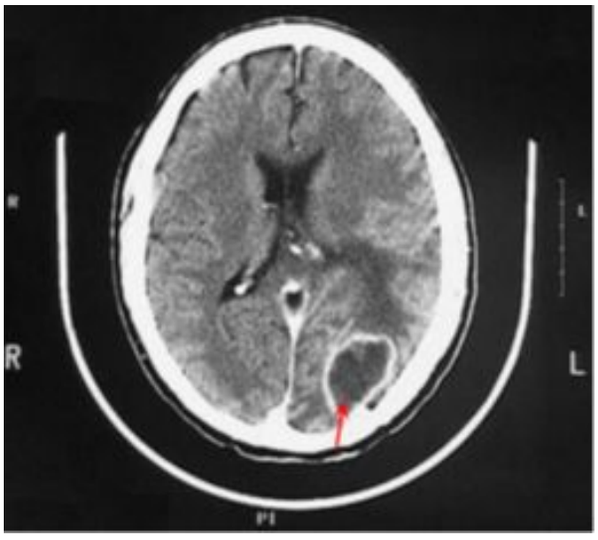


This is a cerebral abscess. There is:
- Liquefactive center with yellow pus
- Surrounded by a thin wall.

Abscesses usually result from:
- Hematogenous spread of bacterial infection

but may also occur from:
- Direct penetrating trauma
- Extension from adjacent infection in sinuses

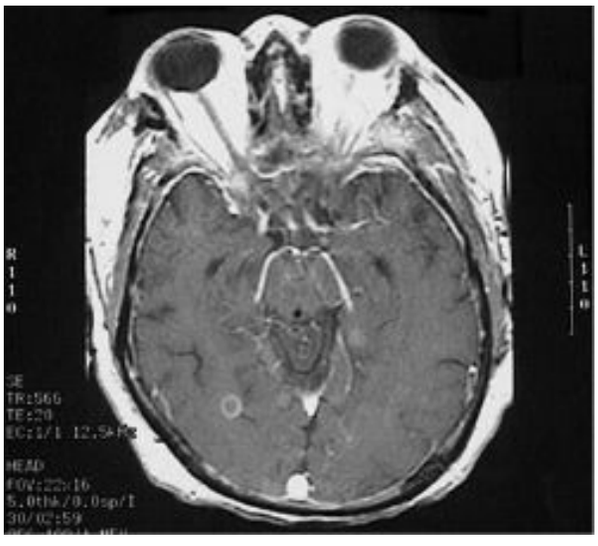
CT:



This CT scan of the head in transverse view demonstrates:

- Abscess in the brain (red arrow) in a patient who had septicemia.

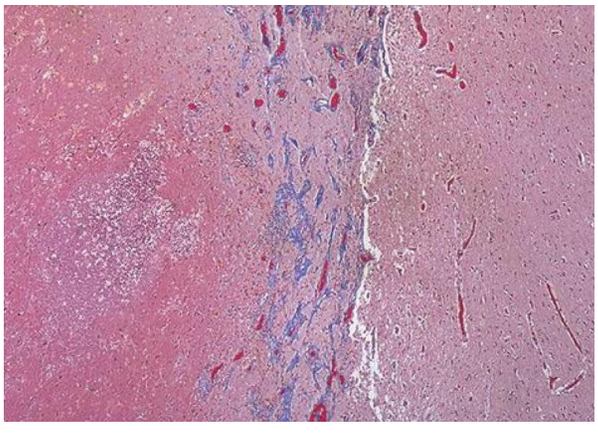
MRI :



This MRI scan of the head in transverse (axial) view demonstrates:

- A small abscess in the brain (Red arrow) in a patient who had septicemia

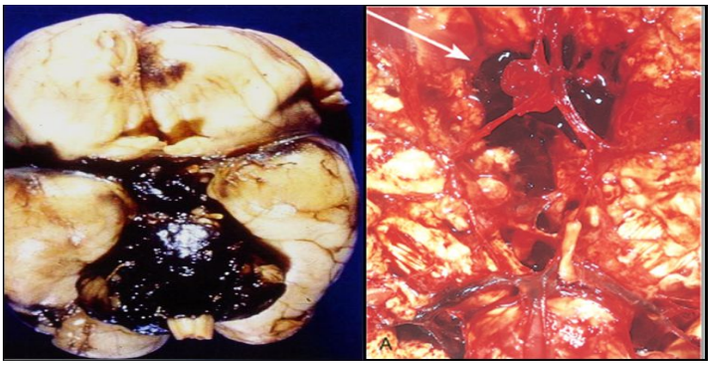
Histology:



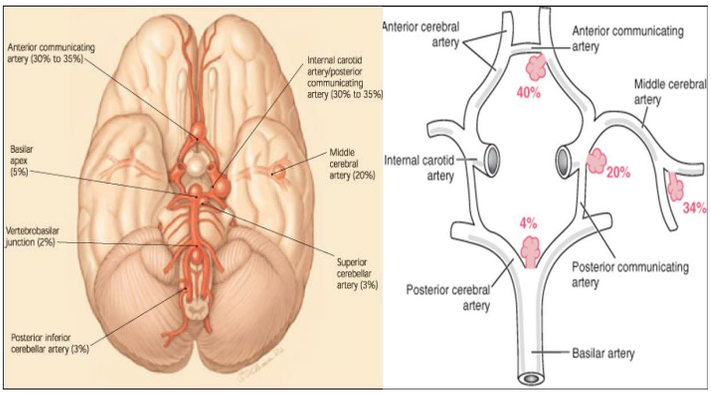
This trichrome stain demonstrates:
- The light blue connective tissue in the wall of an organizing cerebral abscess.
- Normal brain is at the right
- The center of the abscess at the left.

Case 8:Ruptured Berry Aneurysm causing subarachnoid hemorrhage

A previously healthy 31-year-old woman experiences a severe headache and loses consciousness within an hour. An emergent head CT scan reveals extensive subarachnoid hemorrhage at the base of the brain. She is a febrile. A lumbar puncture yields cerebrospinal fluid with many red blood cells, but no white blood cells. The CSF protein is slightly increased, but the glucose is normal.



View of the base of the brain, dissected to show the circle of Willis with an aneurysm of the anterior cerebral artery (arrow).

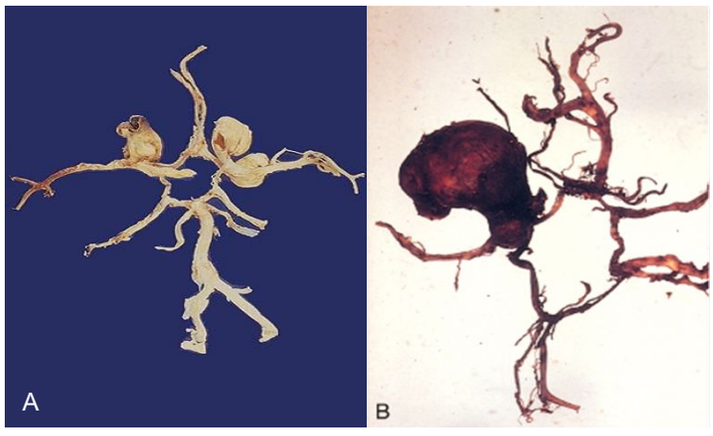


Common locations of intracranial aneurysms:

- Saccular aneurysms most frequently form in **first and second-order arteries** originating from the cerebral arterial circle (**circle of Willis**) at the **base of the brain.**

Common sites of saccular (berry) aneurysms in the circle of Willis

Gross:



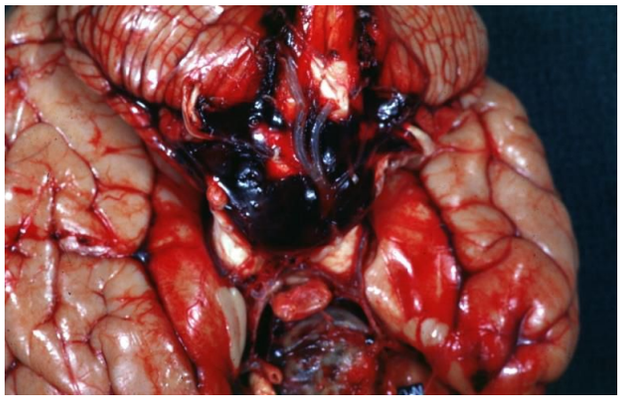
Circle of Willis – Berry aneurysms

A picture:

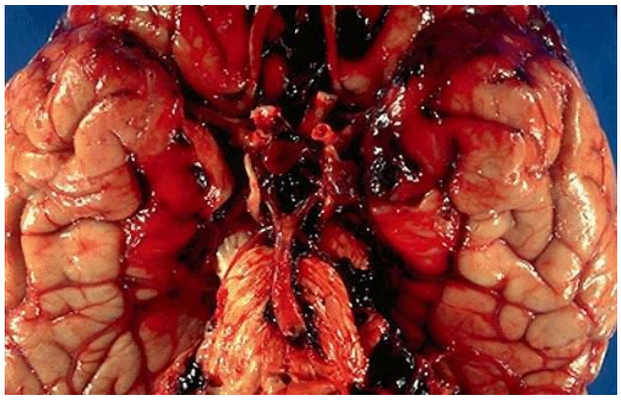
- The circle of Willis has been dissected, and three berry aneurysms are seen.
- Multiple aneurysms are seen in about 20-30% of cases of berry aneurysm.

B picture:

- Dissected circle of Willis to show large aneurysm.

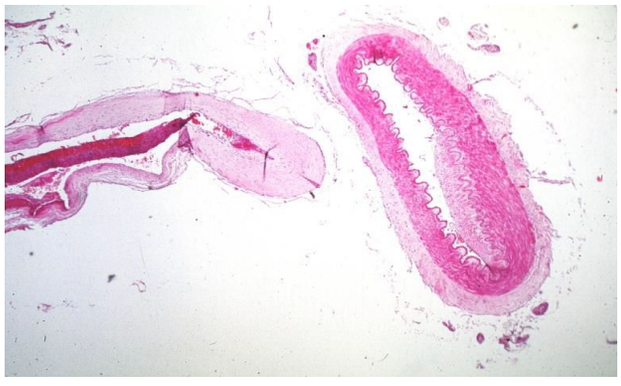


Berry Aneurysm Ruptured- Gross natural color close-up view of base of brain showing:
- Subarachnoid hemorrhage over anterior surface of pons.
- Large aneurysm at top of photo which is located in the right internal carotid artery.

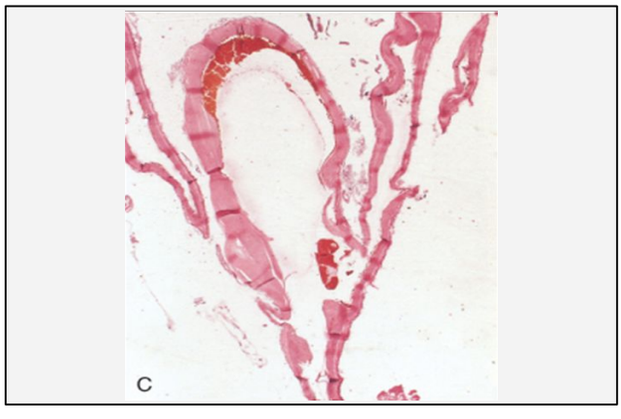


The subarachnoid hemorrhage from a ruptured aneurysm is more of an irritant producing vasospasm than a mass lesion.

Berry Aneurysm - LPF



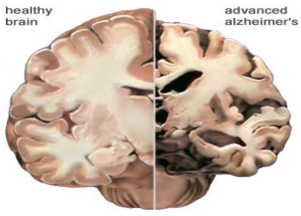
Berry Aneurysm:
- Micro low mag H&E section of basilar artery and adjacent a portion of the aneurysm which was at the posterior inferior cerebellar artery
- Good photo to show lack of medial structures in wall of aneurysm



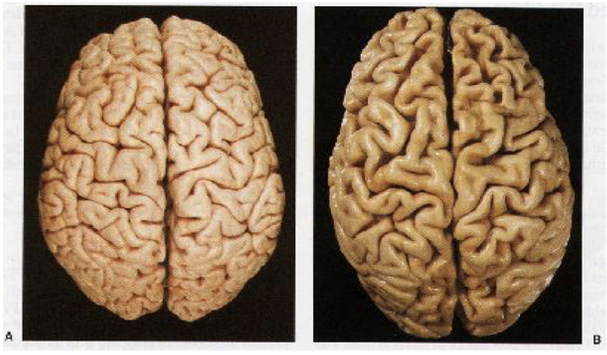
Section through a saccular aneurysm showing the hyalinized fibrous vessel wall.

Case 9: Alzheimer 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.



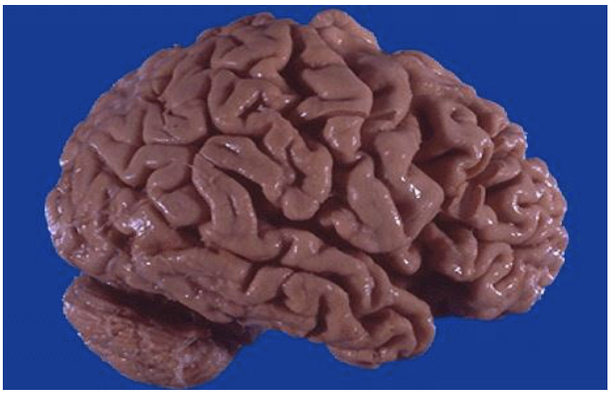
Healthy brain vs Alzheimer's brain:



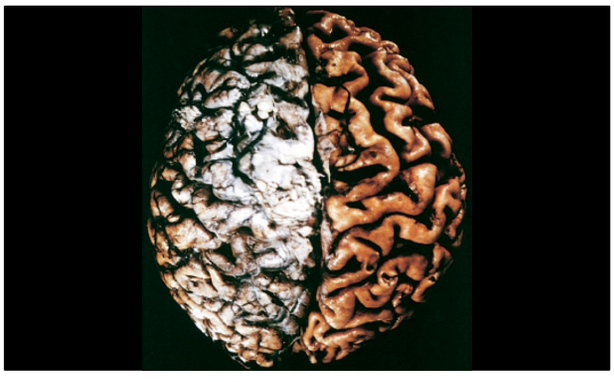
A picture:
- Normal Brain

B picture:
- The brain of a patient with Alzheimer shows:
- Cortical atrophy.
- Thin gyri.
- Prominent sulci.

Gross:

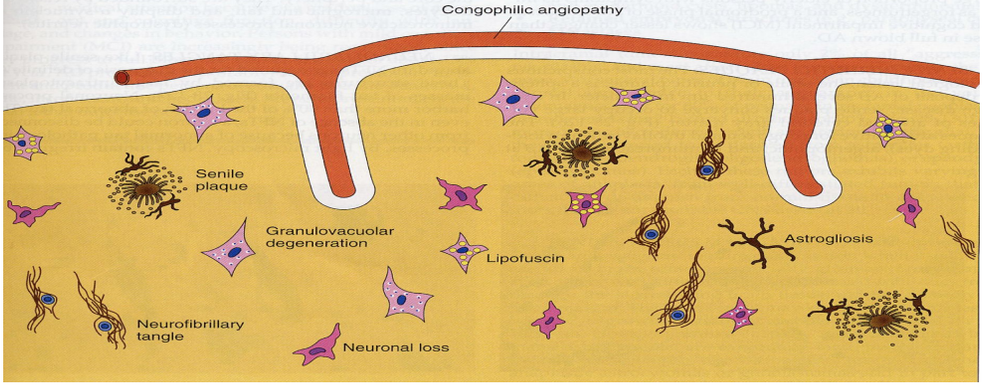


- Cerebral atrophy seen here mainly in the frontal and parietal regions is characterized by narrowed gyri and widened sulci.
- The atrophy seen here was due to senile dementia of the Alzheimer's type (Alzheimer's disease).

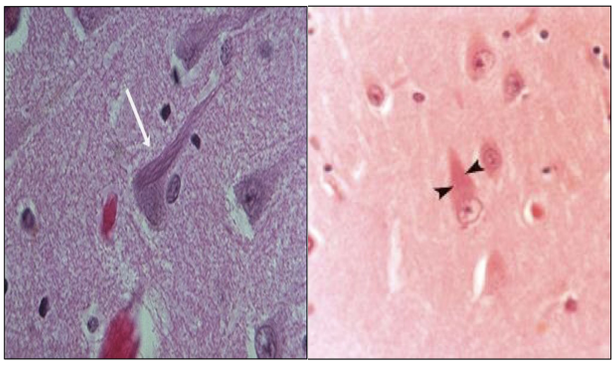


Alzheimer disease with cortical atrophy most evident on the right, where meninges have been removed.

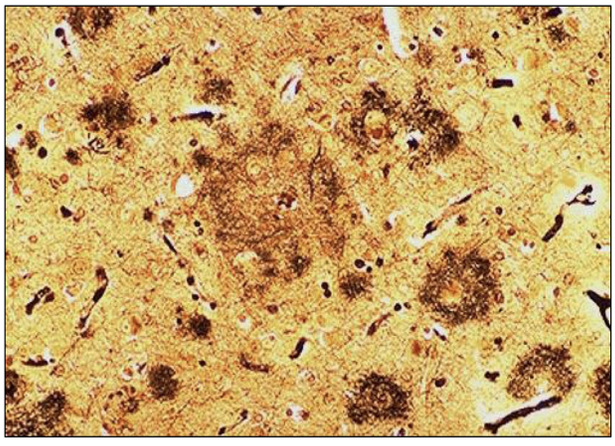
Illustration:



Histology:

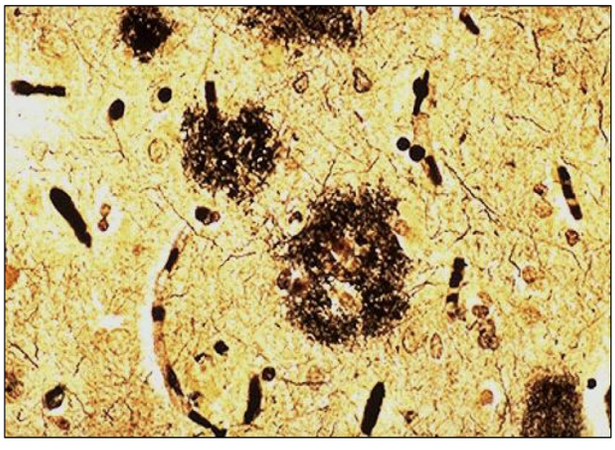


Neurofibrillary tangles - High Power Field (HPF)
- Neurofibrillary tangles (arrows) are present within the neurons.
- They are composed of cytoskeletal intermediate filaments.



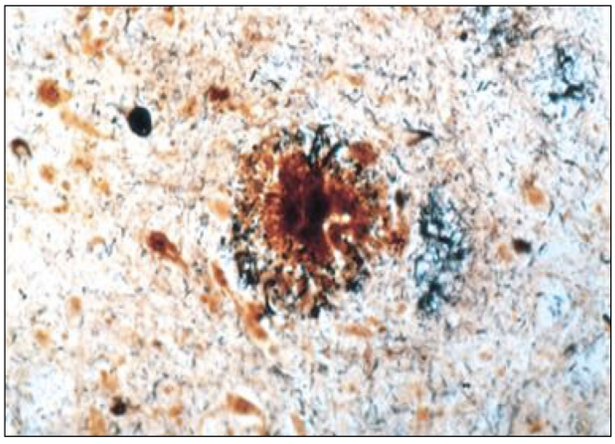
Neuritic plaques - LPF

- The characteristic microscopic findings of Alzheimer's disease include "**senile plaques**" which are collections of degenerative presynaptic endings along with astrocytes and microglia.
- These plaques are best seen with a silver stain.
- As seen here plaques of varying size.



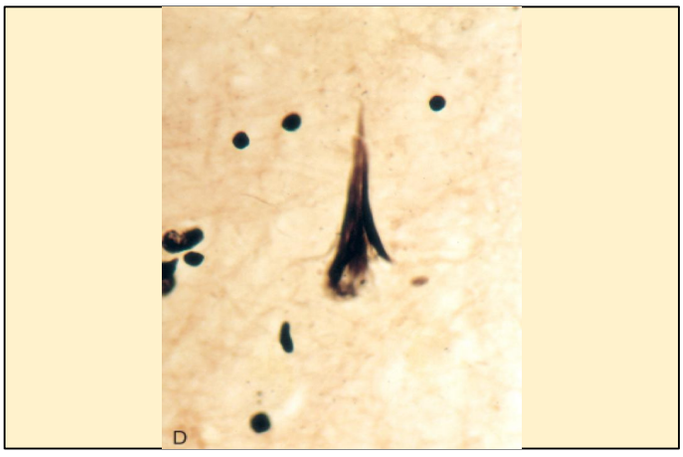
Neuritic plaques - LPF

- Silver stain shows plaques of alzheimer's disease
- Neuritic (senile) plaques are most numerous in the cerebral cortex and hippocampus.
- This dementia is marked mainly by progressive memory loss.

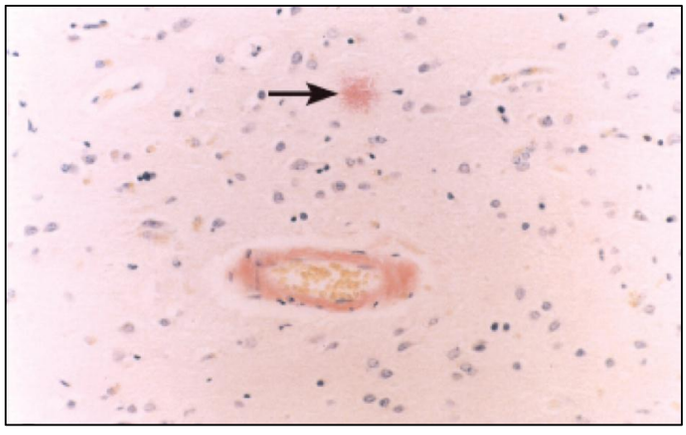


Neuritic plaques - LPF shows:

- A neuritic (senile) plaque.
- Rim of dystrophic neurites surrounding an amyloid core.



Silver stain showing a neurofibrillary tangle within the neuronal cytoplasm



Congo red stain of the cerebral cortex showing:
- Amyloid deposition in the blood vessels
- The amyloid core of the neuritic plaque (arrow)

Macroscopic examination of the brain shows:
- A variable degree of cortical atrophy
- Widening of the cerebral sulci that is most pronounced in the frontal, temporal, and parietal lobes.

Microscopic examination:
- Neuritic (senile) plaques
- Neurofibrillary tangles
- Amyloid angiopathy.

Only Girls slides

MED437
KING SAUD UNIVERSITY

Pathology Practical Team 437

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