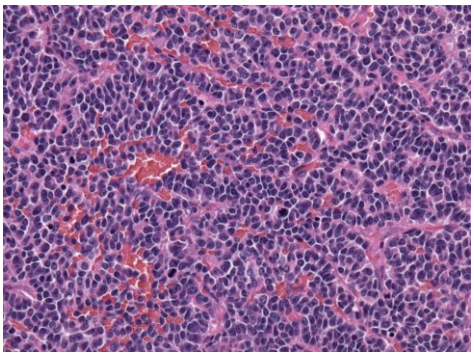
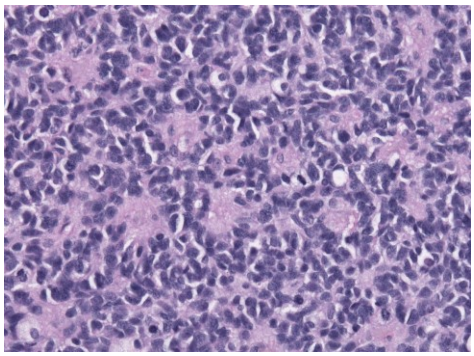
Brain Tumors

Pathological finding	Tumor
Pseudorosette	Ependymoma, SEGA
Rosenthal fibers	Pilocytic astrocytoma
Rosettes	Medulloblastoma
Wet Keratin	Craniopharyngioma
Psammoma bodies	Meningioma
Fried egg	Oligodendroglioma

Medulloblastoma

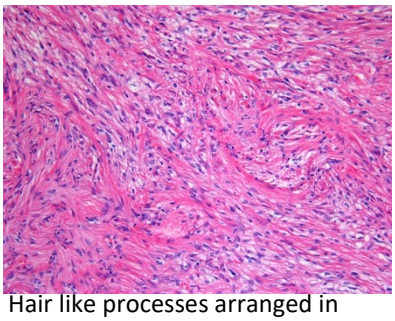
- Kids, midline, Cerebellum, diffuse contrast enhancement
- Can seed in CSF (drop mets) but rarely involve meninges
- On MRS, there is a choline and taurine peak
- Stains positive for Synaptophysin
- Rosettes formation



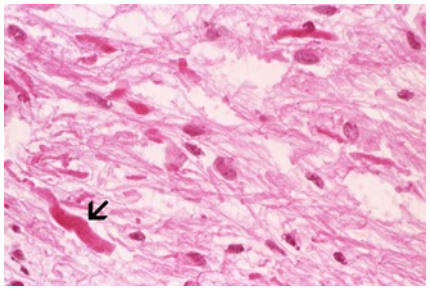


Pilocytic astrocytoma:

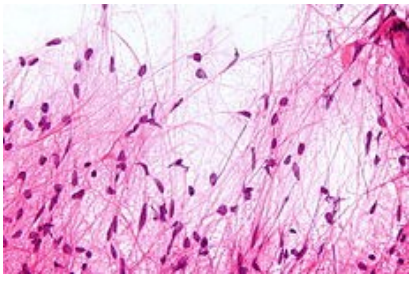
- Kids, cystic with an enhancing mural nodule.
- Can occur in optic tract in patients with NF1
- Associated with BRAF gene mutation
- Pathology: Cells with long processes - Rosenthal fibers (intense red deposits formed of hyaline)



Hair like processes arranged in bundles, resemble mats of hair



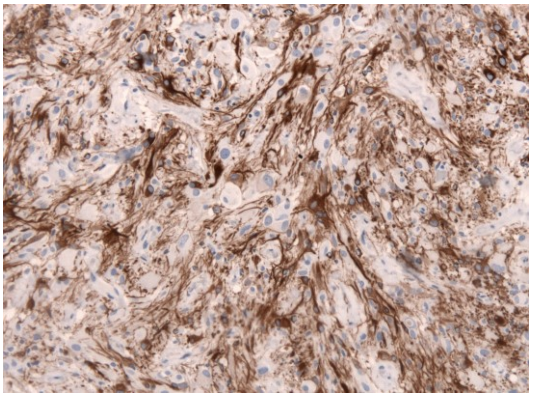
Rosenthal fiber

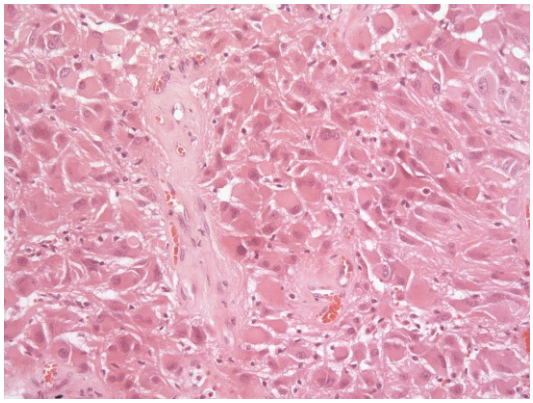


Smear of pilocytic cells

SEGA:

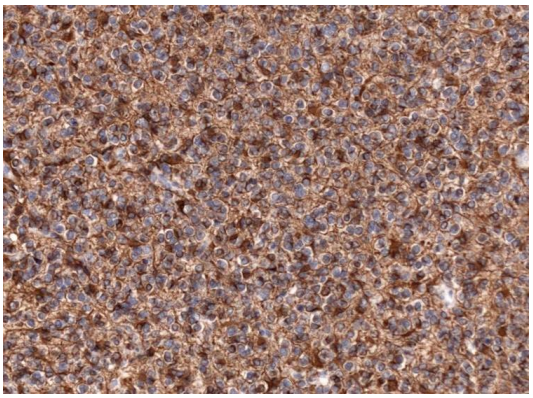
- In patients with TS (TSC1 in ch 9q34 and TSC2 in ch 16)
- Pathology: large polygonal cells with abundant eosinophilic cytoplasm, perivascular pseudo-rosettes



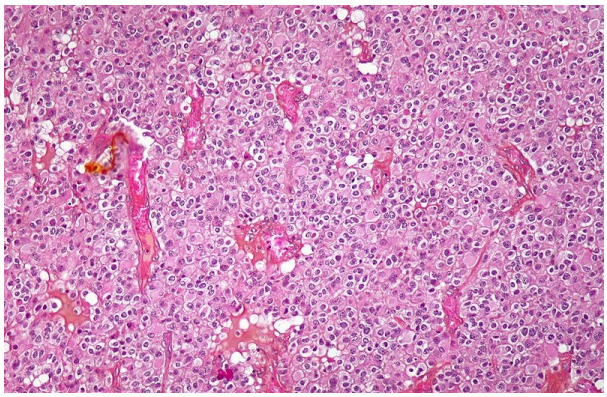


Oligodendroglioma:

- Adults, lobar, associated with IDH mutation
- Anaplastic (Grade III) associated with allelic loss at ch 1p and 19q
- Pathology shows rounded nuclei, prominent cytoplasm with clear halo (Fried egg)



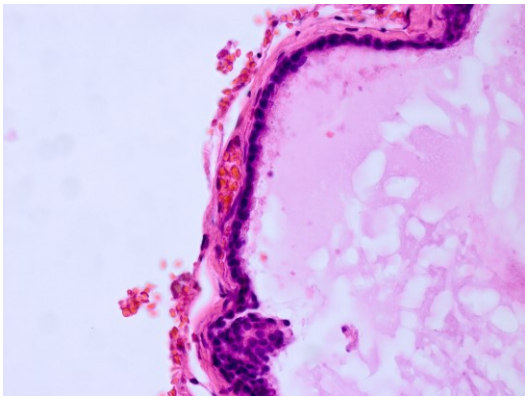
GFAB stain



H&E

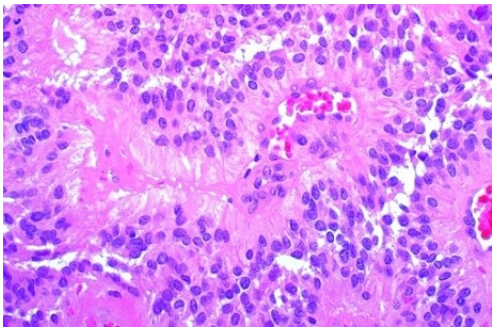
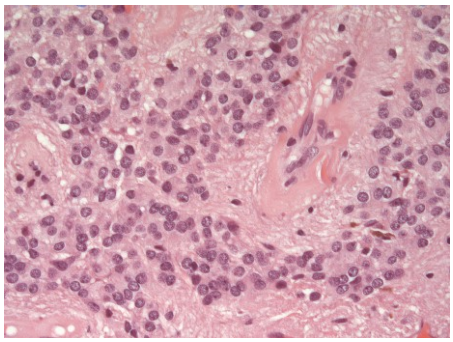
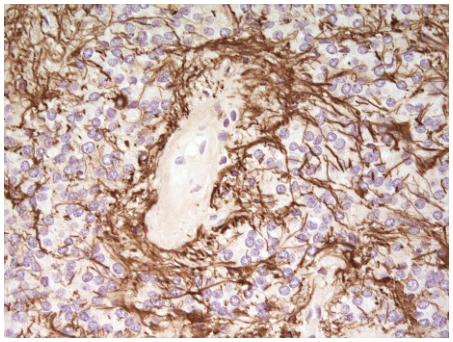
Colloid cyst:

- Usually arise in the 3rd ventricle close to the foramen of Monroe
- MRI: isointense on T1, hyperintnse in T2
- Pathology shows simple cuboidal or columnar epithelium, full of proteinaceous material



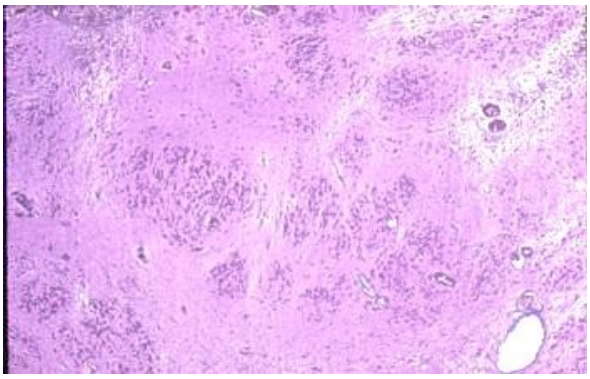
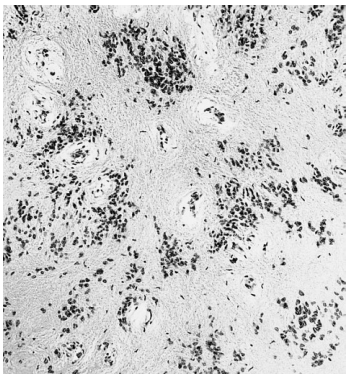
Ependymoma:

- Usually arise in 4th ventricle (children) or spinal cord (adults)
- Can seed through CSF
- Pathology: perivascular pseudo-rosettes (Ependymal cell processes directed towards vessel wall with formation of perivascular anuclear zones of GFAP+ fibrillary processes)

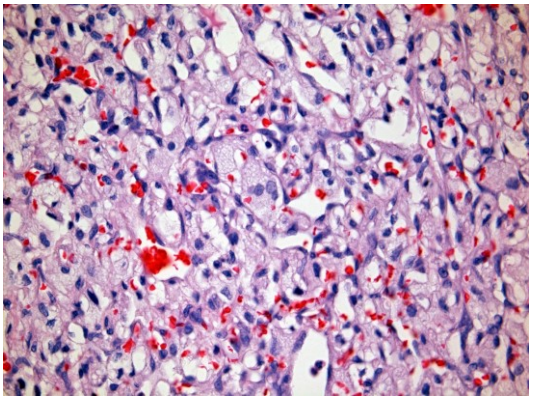
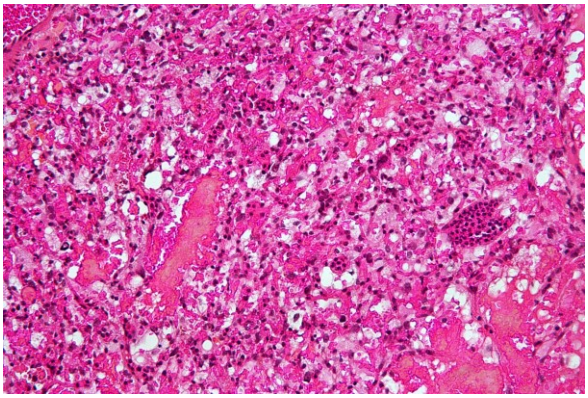
Subependymoma:

- Arise in 4th ventricle in adults, doesn't enhance
- Clusters of cells embedded in dense glial fibrillary background, there may be pseudorosette

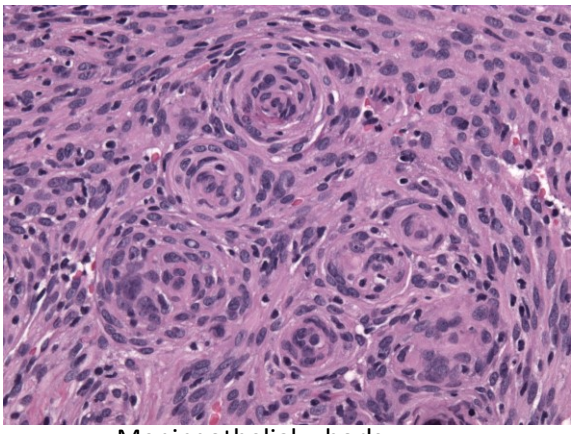
Hemangioblastoma:

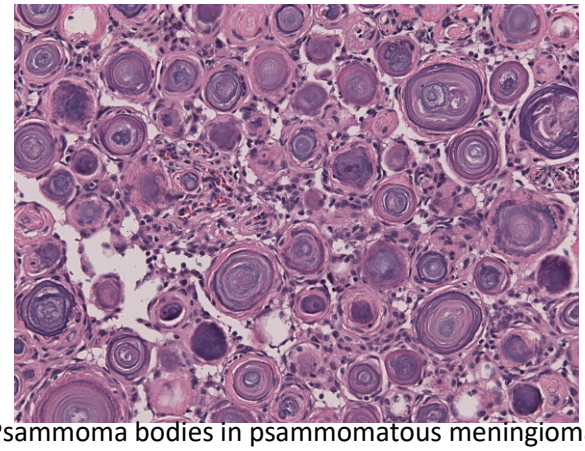
- Cystic cerebellar tumor in adults with nodule of blood vessels, can involve the spine in VHL
- Pathology: vacuolated cells and vascular structures (packed thin walled vessels and large neoplastic cells with pink to clear cytoplasm with fine vacuoles containing PAS+ lipid)

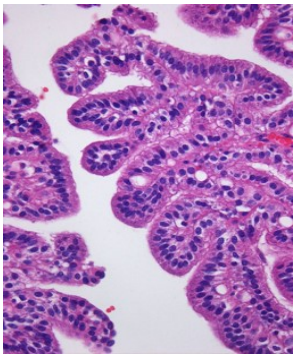
Meningioma:

- Pathology shows: Psammoma bodies (laminated calcific concretions) and whorls formation (cells arranged in whorls)


Meningothelial whorls


Psammoma bodies in psammomatous meningioma

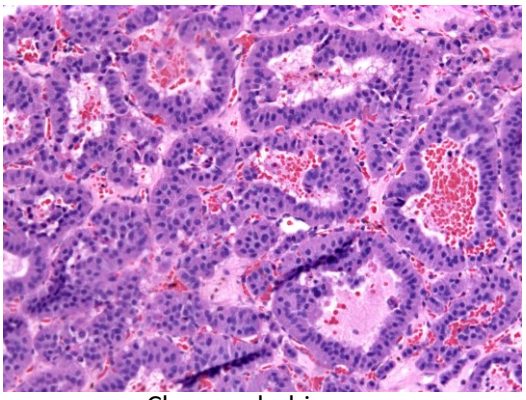
Choroid plexus papilloma:

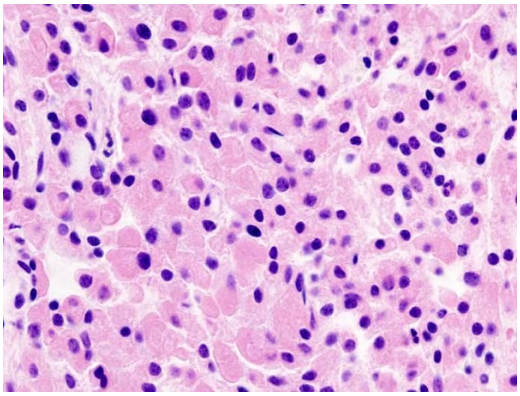


- Arise in lateral ventricle in children, homogenous enhancement
- Pathology: papillary or villous architecture (single layer of epithelial cells overlying a fibrovascular core)

Pituitary adenoma:

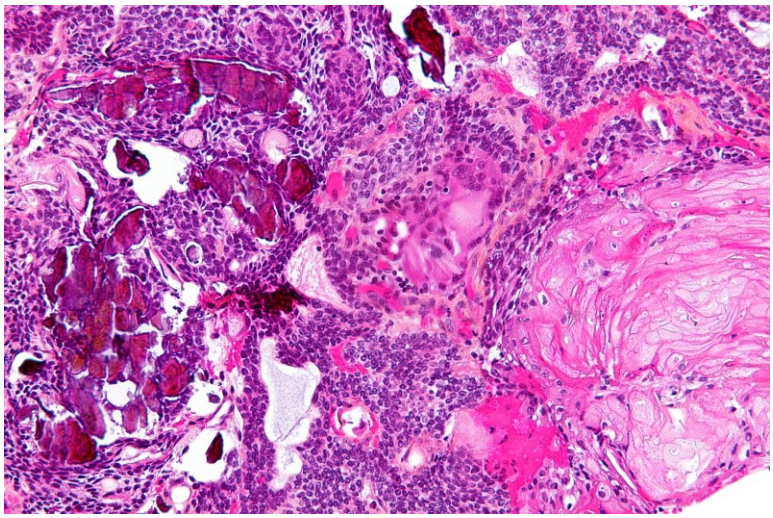
- Rounded or polygonal cells, rounded nuclei, cytoplasm either chromophobic, acidophilic or basophilic according to hormone production


Chromophobic


GH Producing (acidophilic)

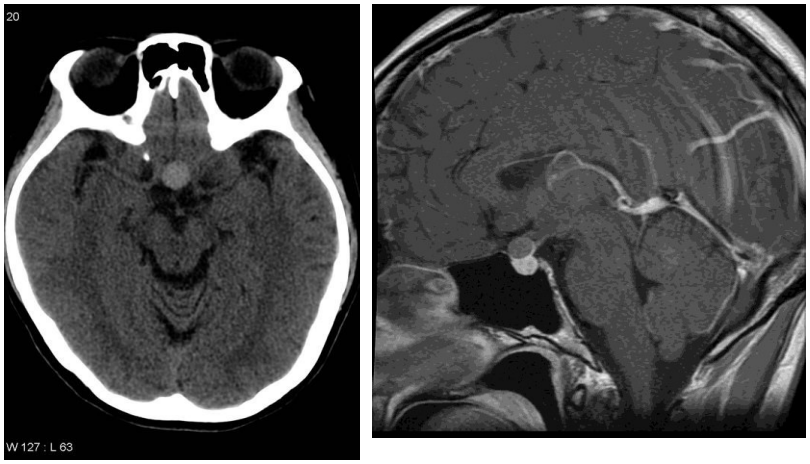
Craniopharyngioma:

- Supra-sellar tumor in children, usually calcified
- Pathology: Keratinocytes in spheres called “wet Keratin”.

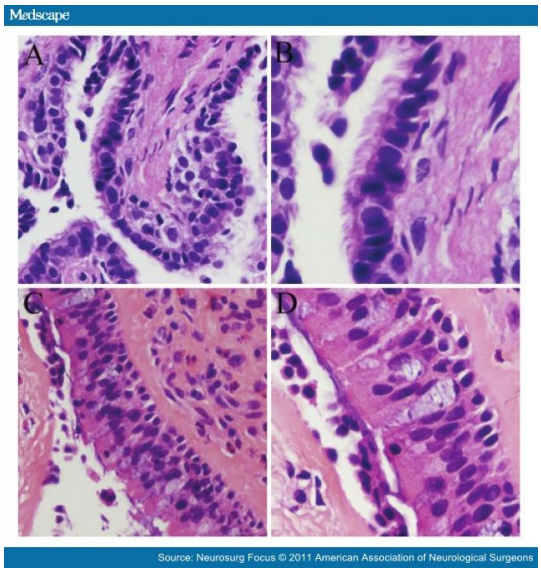


Rathke’s cleft cyst:

- Supra-sellar cystic tumor, <u>isointense, non-enhancing</u>
- Pathology: cyst lined with ciliated columnar epithelium with goblet cells.



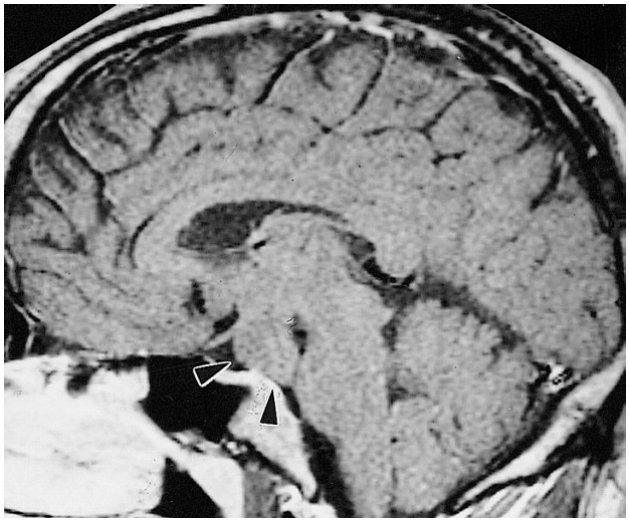
Pictures from Radiopedia

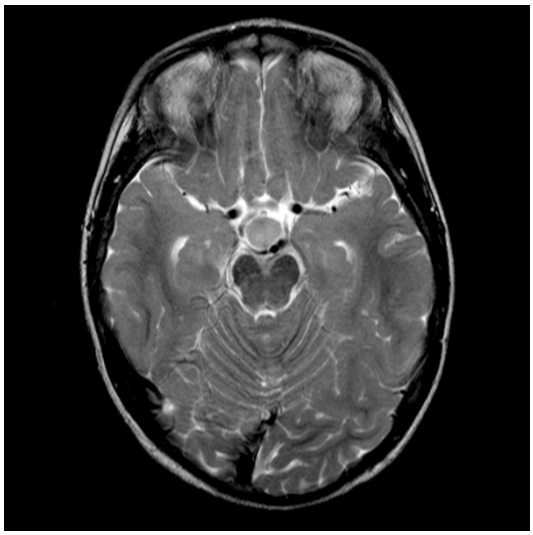


Picture from Medscape website

Hypothalamic hamartoma

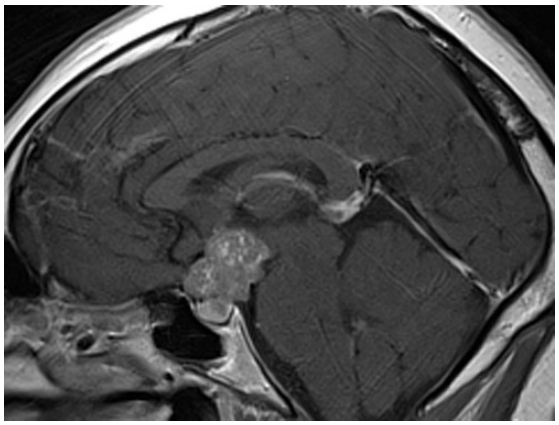
- In children, causes gelastic seizures and precocious puberty
- MRI: non-enhancing, isointense
- Pathology: hypocellular mass of mature glia and neurons

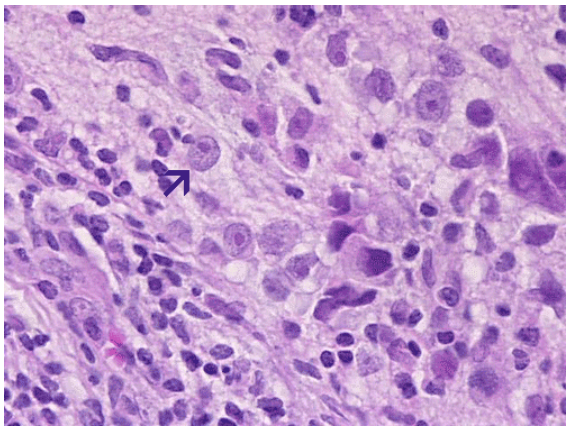




Germinoma:

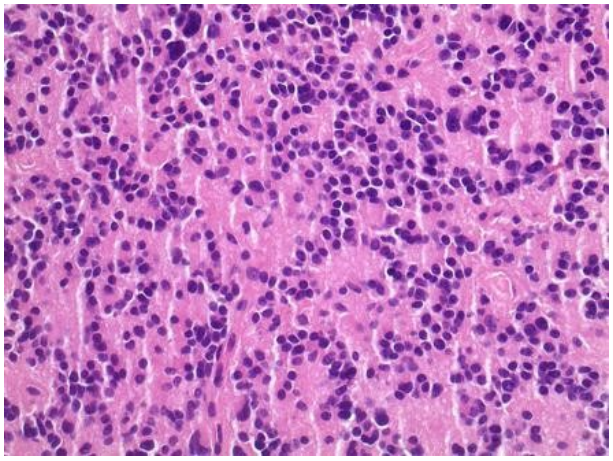
- Suprasellar or pineal (most common pineal tumor)
- Pathology: small reactive lymphocytes and large neoplastic germ cells.





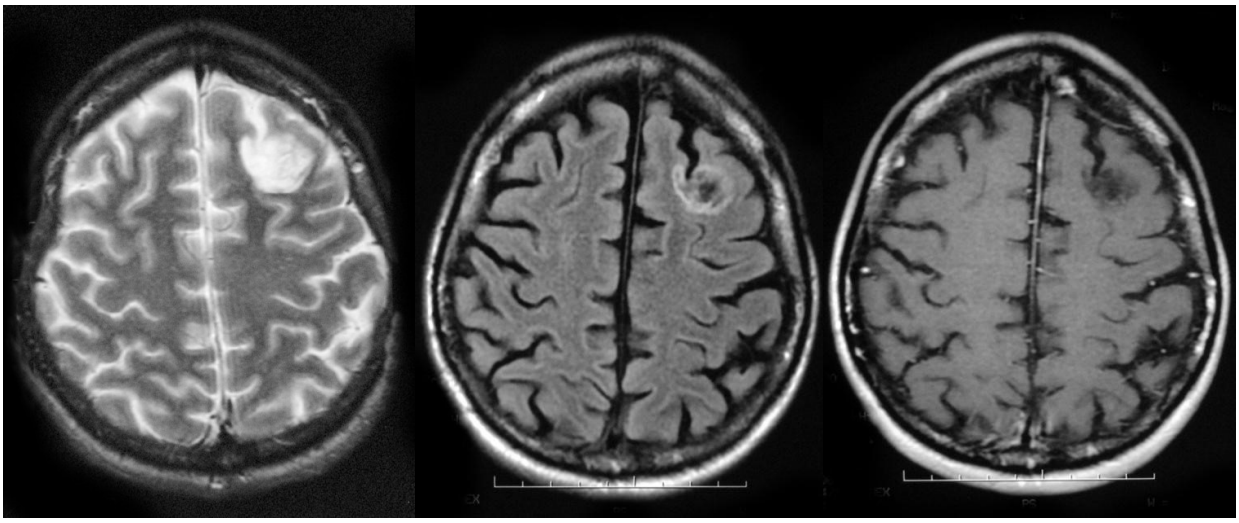
Pineocytoma:

- In Adults, low grade tumor, contrast enhancing
- Pathology: characterized by large anuclear areas called pineocytomous rosettes



DNET:

- Children or young adults
- MRI: Cortical, soap bubble appearance in MRI, no enhancement

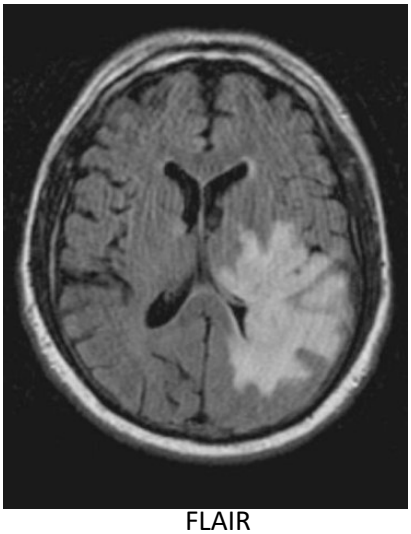


Pictures from Radiopedia

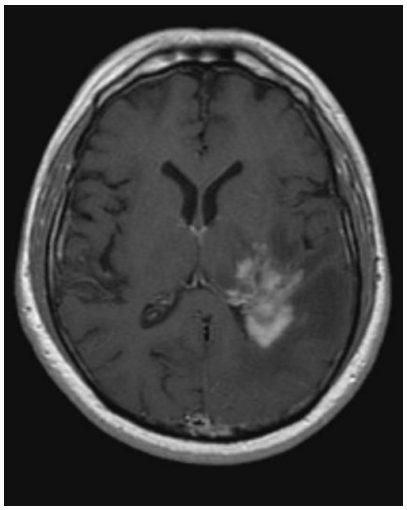
Non-enhancing

CNS lymphoma:

- MRI: homogenous enhancement, vasogenic edema in T2, diffusion restriction in DWI
- Usually arise at the edge of the ventricle



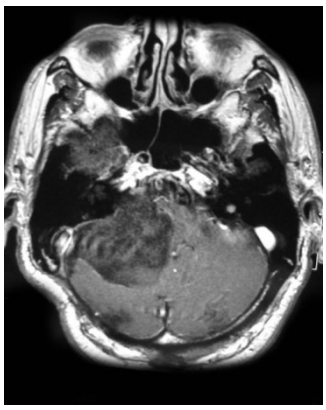
FLAIR



T1+C

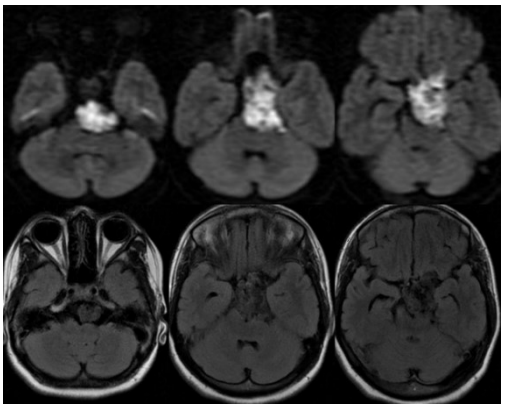
Epidermoid cyst:

- Caused by entrapment of ectodermal tissue in neural tube during development
- MRI: CSF signal in T1/T2, heterogenous in FLAIR, restricted diffusion (unlike arachnoid)
- Pathology: cyst lined by squamous epithelium, filled with keratin and cholesterol.



T1 + contrast

T2



DWI