Brain Tumors

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**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)
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)

Colloid cyst:
- Usually arise in the 3rd ventricle close to the foramen of Monroe
- MRI: isointense on T1, hyperintense 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)

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

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

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**Rathke’s cleft cyst:**
- Supra-sellar cystic tumor, isointense, non-enhancing
- Pathology: cyst lined with ciliated columnar epithelium with goblet cells.
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

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.