Tumor		Notes		Imaging	Management
Gliomas 50%	**Astrocytoma** **-** Commonest - Intra-axial	- Radiation, petrochemicals, phone usage - Mostly in males (50-70), low-grade in children. - Histology = not capsulated, Ca deposition, low grade: avascular - **<u>Low grade</u>:** Hypodense (black), Edema, Calcification, Intact BBB, subcortical - **<u>High grade</u>**: Larger, Marked edema, Enhancement, Usually Supra-tentorial.	- **Grade I: Pilocytic =** benign, children, cerebellum/BS - **Grade II: Diffuse fibrillary** = cerebellum, optic nerve, hypothalamus, pleomorphism - **Grade III: Anaplastic** = vascular, necrosis, mitosis - **Grade IV: Glioblastoma** = enhancement on CT, palisaded necrosis, <1 Y	**<u>CT:</u>** - **Low grade**: small hypodense non-enhancing with no edema - **High grade**: non-homo, large, non-uniform, edema **<u>MRI</u>** - Hypointense on T1, hyperintense on T2 - **Higher grade**: non-homo on T1 with contrast	- Steroids (edema), anti-epileptic (seizures)
	Oligodendrogliomas		- Younger, sup. areas. - Most common to present with seizure - The most **common calcifying** primary tumor, well differentiated.	**<u>CT / MRI:</u>** - Demarcated boundaries, 80% calcification, variable enhancement.	- Removal followed by radio/chemotherapy - Anti-epileptic (seizures) - They live for 5 years
	Ependymomas		- Children (4th ventricle) and young adults (lateral), infratentorial (cerebellar / BS manifestation), hydrocephalus	- Enhances well, found within ventricles, calcification	- Resected, seeding is an issue → radiotherapy used post. Op. - They live for 5 years - Similar to medulloblastoma
Medulloblastoma		- Midline post. fossa, in vermis > obstruct CSF flow of 4th // CMV // M - Hydrocephalus, truncal ataxia, CNS deficit - Seeds tumors to spinal theca - Check for papilledema, bulging fontanelle, sunset eyes (upward gaze palsy due to pressure on sup. colliculus) - **<u>Note</u>**: ICP is affected more with supratentorial (no CSF problems)		**<u>MRI</u>** - Isointense, enhances well, fills ventricles producing a non-communicating hydrocephalus	- Resection, CSF diversion, Radiotherapy - 5-year survival
Meningiomas - Extra-axial		- Arise from pia arachnoid, **most common benign tumor**, enlarge during pregnancy // shows in olfactory groove, parasagittal, sphenoid, supra sellar // slowly growing may show with seizures // calcifications - In sphenoidal ridge → **Foster Kennedy syndrome** (optic atrophy and contralateral papilledema) - **RF**: radiation, trauma, NF2, hormonal disturbances - These with **acoustic schwannoma** and **pituitary adenoma** have a female predominance.		- Vasogenic edema (Tx: GCS) **<u>CT:</u>** - Hyperdense, enhances uniformly with contrast. **<u>MRI</u>** - Isointense on T1, enhances well	- Completely excised with a safety margin - Steroids and anti-epileptic - Radiation only for inaccessible
Metastases		- Lung > breast > GU, colon, kidney - >45 Y, supratentorial > cerebellar - Headache, seizures, profound vasogenic edema		- Remove - Steroid + anti-epileptics - Multiple tumors/recurrences = stereotactic radiosurgery - Chemo = from SCC, breast cancer, lymphoma - Intra-CSF chemo = meningeal carcinomatosis - Immunotherapy = melanoma, non-SCC	

Pituitary Tumors	- Adenomas, from the ant. part of the pituitary gland - 30-40 Y, compress // secrete // hrrg and necrosis - **Secreting**: ACTH (Cushing) // Prolactin; most common (amenorrhea, galactorrhea, impotence, infertility) // GH (acromegaly - **Non-functional**: larger, bitemporal hemianopia, hypopituitarism, hydrocephalus, DI // GH/LH/FSH are the first to be affected but PRL is most resistance	**X-ray:** - Double floor or enlarged Sella **CT:** - **Micro**: might not show, iso/hypodense with delayed enhancement. - **Macro**: isodense, moderate enhancement, calcifications **MRI** - Hypo/iso on T1, iso/hyper on T2	- Medication > surgery, unless: severe visual problems, pituitary apoplexy, Tx failure. - **Surgery** is the Tx of choice for **Acromegaly** and **Cushing** disease. - **Bromocriptine** is the Tx of chose for **prolactinoma**, without visual dysfunction - Transsphenoidal in macro, when larger = trans-cranial - Complication: CSF leak

- Calcifications: meningiomas, craniopharyngiomas, oligodendrogliomas
- Brain tumors risk factors:
  - **a- Genetic**: Von Hippel-Lindau disease (hemangioblastoma) // Li-Fraumeni (gliomas) // TB sclerosis (subependymal astrocytoma) // NF1 (optic nerve glioma) // Nf2 (multiple meningioma)
  - **b- Radiation**
  - **c- Viruses**: lymphoma (EBV), medulloblastoma (CMV)
  - **d- Trauma**: meningiomas

- Imaging
  - **a- X-Rays:** widened sutures, calcifications, osteolytic lesions
  - **b- CT:** bone destruction, calcifications, detect hemorrhage, when MRI is contraindicated
  - **c- MRI**: MRS determines chemical composition, fMRI to locate prior to surgery
  - **d- PET-CT:** following chemo, recurrences, detects metabolic demand

	Children	Adult
Astrocytes	PCA (m.c benign tumor in children)	GBM (m.c adult cancer)
Oligodendrocytes	-	ODG
Ependymal cells	Ependymoma	-
Neurons	Medulloblastoma	-
Meninges	-	Meningioma

- Commonest in adults: gliomas, meningioma, metastases // children: medulloblastoma, cerebellar astrocytomas.
- In adults, 80% are supratentorial // In children, 60% are infratentorial

- Enhancing' or 'non-enhancing' lesion refer to the uptake of Gadolinium-based contrast agent in the lesion. MRI T1 with contrast → Enhancing lesion indicate malignancy (highly vascular)
- Contrast is taken up when there is no BBB; tumors' blood vessels do not have a BBB

- Drop metastasis (seeding) = a. ependymoma b. medulloblastoma c. glioblastoma

- MC brain tumors = mets // Primary brain tumors = astrocytoma (PCA vs GBM) // Benign brain tumor in adults = meningioma // Pediatric primary brain tumor = PCA // Benign brain tumor in children = medulloblastoma // Calcifying brain tumors = oligodendroglioma // 4th ventricle- involving tumor = ependymoma // Exclusively common in female = meningioma

- Pituitary apoplexy = hemorrhage +/- necrosis in a tumor and pituitary