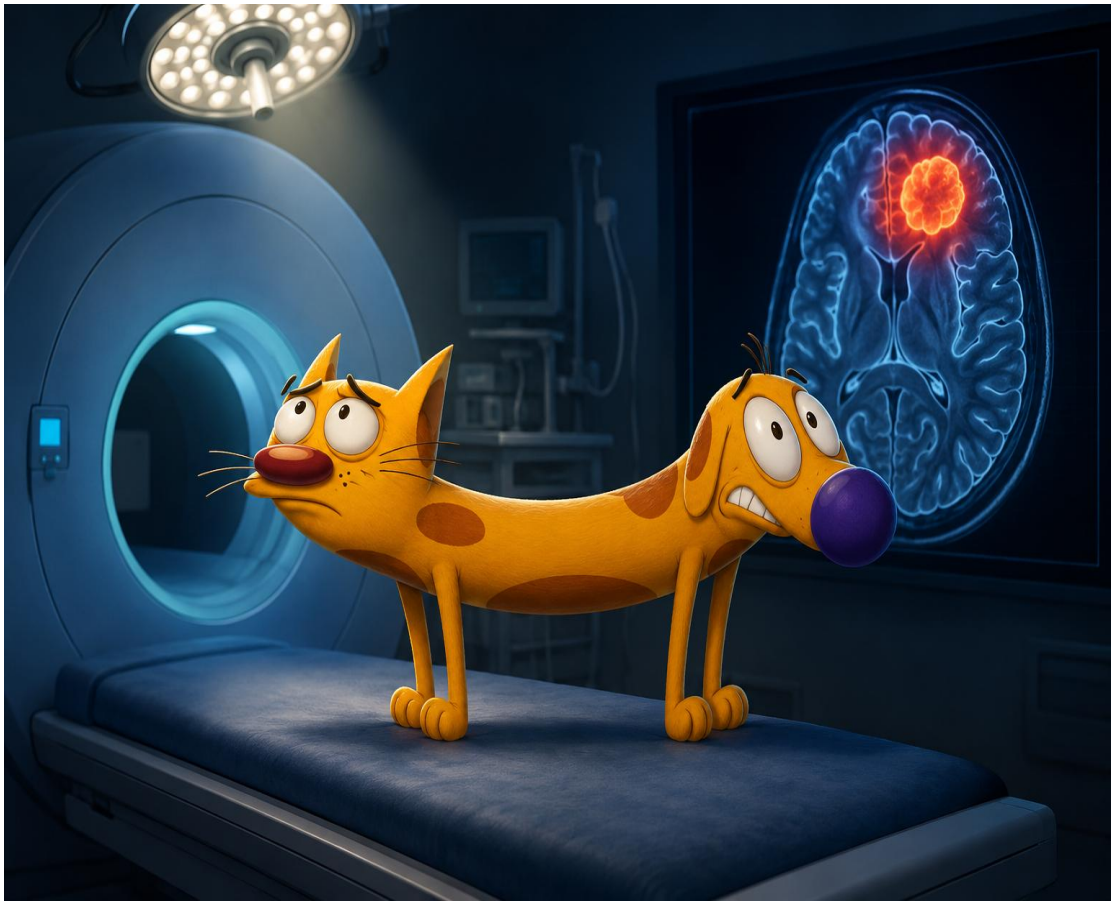


BRAIN TUMORS-1
Summary
Written by Dr. Ali Abu Jamil

 # Ps-Ps Bobby here! Meow-Woof! Brain stuff? This is serious biz! Let's break it down, two heads are better than one, right?!

 # Intracranial Tumors Intro-Dog-tion! We're talking lumps in the skull! Arf! They divide into Primary (starting right there) vs. Metastasis (invaders from afar!). They're also Intra-axial (inside the brain goo - parenchyma) vs. Extra-axial (on the outside, like a tough doggie toy). And don't forget Supratentorial (top part) vs. Infratentorial (bottom part), and who gets 'em: Adults vs. Pediatric! Meow!

 # The Good, The Bad, and The Ugly (Benign vs. Malignant): Benign ones aren't invasive (like a lazy cat sleeping), but WATCH OUT! The skull is a fixed, bony box! Even a "good" tumor can be devastating just by squishing things (mass effect)! Yikes! (Like most Meningiomas, WHO Grade I). Malignant ones are the bad boys: they grow fast, invade like

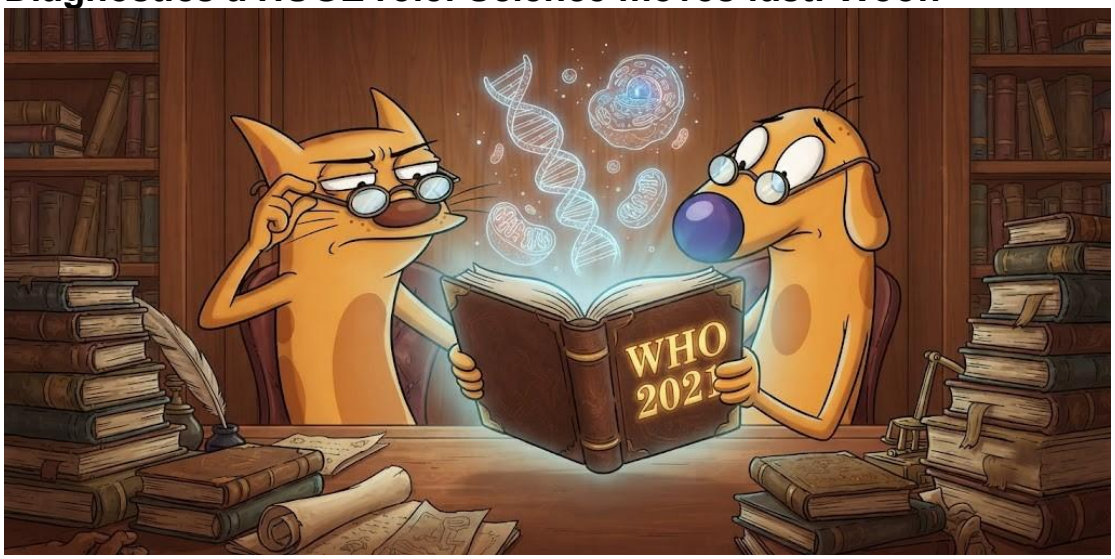
crazy, and rarely might even drop little metastases down to the spinal cord! Grrr!

 # Why Do They Happen? (Etiology): It's all about Induction, Promotion, and Progression! Like a chain reaction! On a tiny molecular level, it's a battle between Oncogenes (the gas pedal for growth - go go go!) and Tumor Suppressor Genes (the brakes - whoa, stop!). When things go wrong... lumps happen! Meow!

 # Risk Factors! Red Alert! Red Alert! Mostly, it's just bad luck, no genetic predisposition! Except for some special inherited syndromes! Here are the big ones to sniff out: NF1: Leads to Optic Nerve Glioma (eye nerve!) and Peripheral Neurofibroma. NF2: Causes Bilateral Acoustic Neuroma (hearing nerve, both sides!) and Multiple Meningiomas. Tuberous Sclerosis: Brings Subependymal Glioma. Li-Fraumeni Disease: Can cause Glioma, Ependymoma, and Medulloblastoma. Von Hippel-Lindau Disease: Leads to Hemangioma and Hemangioblastoma! Arf! So many big words!

 # Other Risks to Watch Out For: Besides genes, keep your nose away from: Radiation to the head, Immunosuppression (when your body's defenses are down), Viral infections, nasty Chemicals (like anthracene and nitrosourea), and even severe Head trauma! Stay safe out there, two-legged friends!

 # The WHO Rulebook! (Classification): The World Health Organization has the ultimate list! In 2007, it was just based on what cells looked like under a microscope (Histology - phenotype). Then in 2016, they got smarter! They combined Histology + Molecular Genetics (genotype) for an "integrated" diagnosis! And the newest 2021 (5th) update gives Molecular Diagnostics a HUGE role! Science moves fast! Woof!



 # The Big Classification Tree (Based on Cell of Origin): Where do these lumps come from?! Let's categorize: Neuroepithelial Tumors (from brain lining/support cells): Glial Cells: Astrocytoma, Oligodendroglioma, Ependymoma. Choroid Plexus Tumors. Neurons: Ganglioglioma, Gangliocytoma, Neuroblastoma. Pineal Tumors, Medulloblastoma. Nerve Sheath Tumors: Schwannoma, Neurofibroma (like in NF!). Meningeal Tumors: Meningioma (the extra-axial squishers!). Microglial Cells: Primary CNS Lymphoma. Pituitary Tumors. Germ Cell Tumors: Germinoma, Teratoma. TUMOR-LIKE MALFORMATIONS: Craniopharyngioma, Dermoid/Epidermoid Tumors, Colloid Cyst. Metastasis & Extension from nearby bad guys! Meow-Woof! That's a whole zoo of lumps!

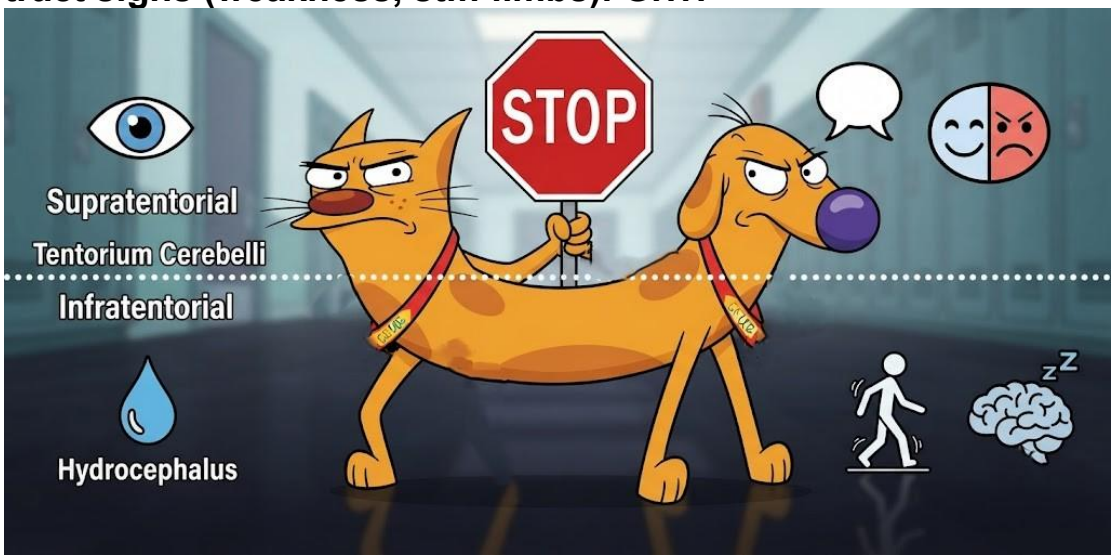
 # How It All Starts (Clinical Presentation): The big bad headache! It can be gradual (sneaky like a cat) or acute (sudden like a loud bark!). Why? Because of: Increased ICP (pressure inside the skull box!), invasion or compression of

pain-sensitive structures (like nerves or blood vessels - ouch!), or it can be secondary to vision difficulties (your eyes are struggling!). Meow!

 # The Warning Signs - Don't Ignore These!:
Other features of increased ICP: This is serious! Think nausea, vomiting (sometimes like a... Lateralizing features: This means the brain is getting squished or shifting! Herniation is the scariest word here - brain parts pushing where they shouldn't! Grrr! Epilepsy (Seizures): BIG RED FLAG! New onset epilepsy in an adult, especially above age 30, should warn the doctor for the possibility of a tumor! Why? Because this happens in 30% of patients with brain tumors! Woof! That's a lot!

 # More Sneaky Symptoms: Subtle changes in personality and behavior: You might act weird, not like yourself! One minute you're a grumpy cat, the next a hyper puppy! (This depends on the tumor's location). Progressive neurological deficit: This means a loss of function that gets worse over time. Depends on the site! If the tumor is in the motor area, you get weak. If in the speech area, you talk funny! Meow!

 # Symptoms by Brain Region (The Map of Trouble!): Symptoms are divided by the Tentorium Cerebelli (the big tent separating top and bottom brain)! Supratentorial (Top Part): Problems here affect: Frontal Lobe: Personality changes, weakness on one side. Parietal Lobe: Numbness, problems with spatial awareness. Temporal Lobe: Speech problems, memory issues, sometimes seizures with weird smells/feelings. Occipital Lobe: Vision problems! (Visual field defects). Hypothalamus & Pituitary: Hormone problems! (Lots of endocrine chaos). Cranial Nerves I, II: Smell (I) and Vision (II) problems. Cavernous Sinus: Affects nerves controlling eye movement and face sensation. Infratentorial (Bottom Part): Problems here are dangerous! They cause: Increased ICP and Hydrocephalus: Fluid buildup! (Because the drainage gets blocked). Cerebellum Signs: Problems with coordination, balance, and fine motor skills (like walking drunk!). Brain Stem Signs: This is bad news! Cranial nerve palsy (III-XII) (double vision, swallowing problems, facial weakness), alternation in consciousness (drowsiness, coma!), and long tract signs (weakness, stiff limbs). Grrr!

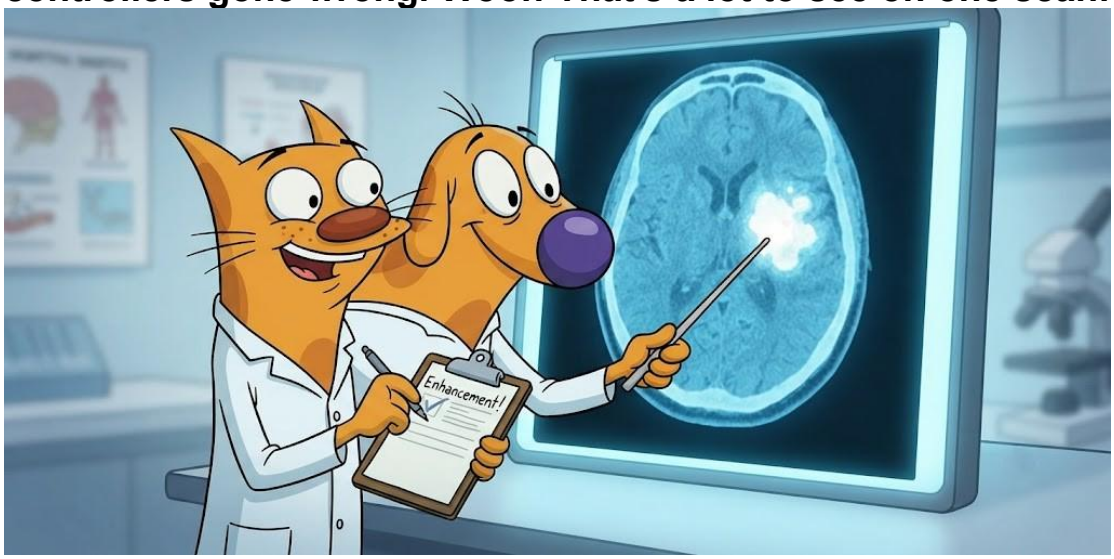


 # Investigation Time! (How Doctors Find the Lumps): The aim is simple: Diagnose the presence of a brain tumor and find the source if you suspect it's a Metastasis (metastasis needs a body search for the primary tumor!). Arf!

 # Skull X-Ray (Old School but Still Useful!): Can show: Calcification: Seen in Oligodendroglioma, Meningioma, Craniopharyngioma, and Ependymoma. (Like tiny rocks in the lump!). Hyperostosis (extra bone growth). Bone destruction: Seen in Mets, Chordoma, Craniopharyngioma. Erosion of Sella Turcica (the little bone seat where the pituitary lives).

Signs of ICP (like separated sutures in kids). Midline shift of pineal gland (if it's calcified, it gets pushed over by the tumor!). Meow!

 # Brain CT Scan (The Workhorse!): This is super important! It shows: Site, mass effect, bone destruction, enhancement, multiplicity (one lump or many?). Enhanced Tumors (they "light up" with contrast dye): High-Grade Gliomas: The nasty, aggressive ones. Meningioma: The extra-axial squishers. Metastasis: The invaders from afar. Acoustic Neuroma: The hearing nerve tumor. Large Pituitary Tumors: The hormone controllers gone wrong. Woof! That's a lot to see on one scan!

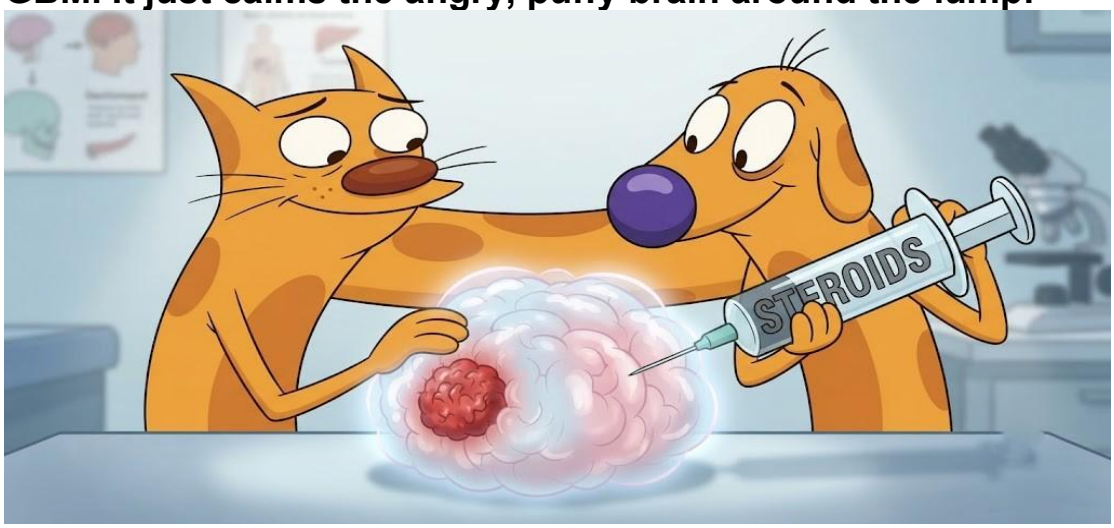


 # The Ultimate Investigation Tools! MRI: The absolute Gold Standard! Shiny, detailed, and perfect! Woof! Angiography or MRA: To look at the blood vessels feeding the lump. PET Scan: To see how hungry those tumor cells are! CSF Cytology: Checking the spinal fluid for floating tumor cells. But MEOW, be careful! Remember the contraindications (don't poke if the

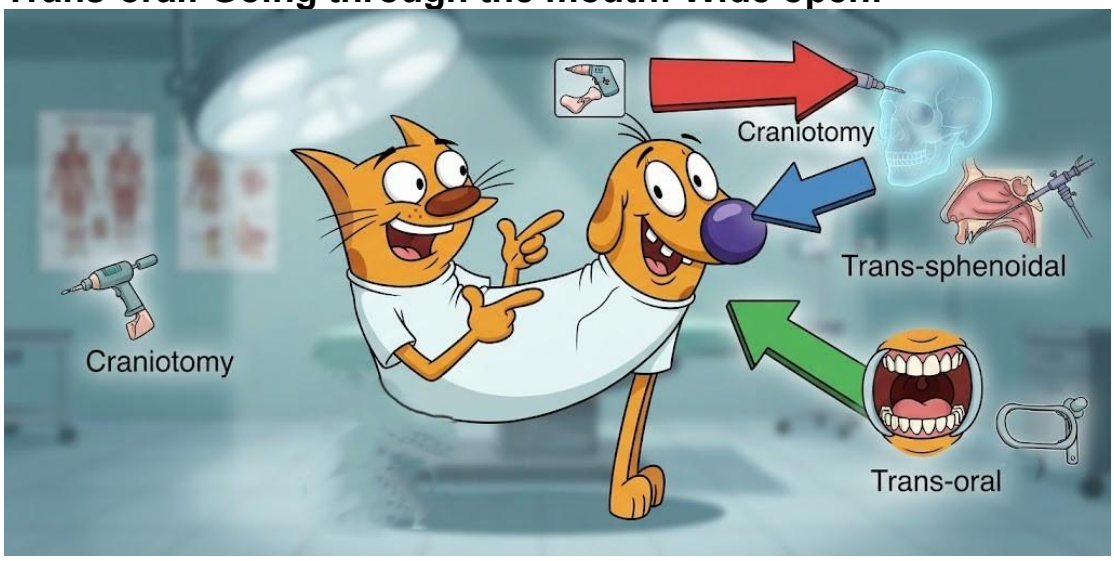
pressure is too high, or the brain might pop out like a kitten from a box!). Biopsy: Taking a tiny piece to know exactly what it is! Can be done with a needle through a burr hole, using stereotactic biopsy (super precise, like a GPS-guided dog nose!), or just grabbing a piece during the actual surgery. Tumor Markers: Chemical clues in the blood!

 # Differential Diagnosis: Copycats! Not every lump is a tumor! Gotta rule out the fakers: Vascular: Hematoma (blood pool), Aneurysm, AVM (tangled blood vessels). Infection: Abscess, Tubercloma, Hydatid cyst (nasty germs making bubbles!). Other Cysts: Arachnoid cyst, Dermoid and Epidermoid cyst (just harmless fluid sacs!). Phew!

 # Medical Therapy (The Illusion!): Listen closely, humans! Medical treatment does NOT affect the tumor itself! Sad meow. It doesn't shrink the bad cells. It is used only to reduce the edema (swelling) surrounding the tumor. Steroids are the main trick here, especially used with Mets, Meningioma, and GBM. It just calms the angry, puffy brain around the lump!



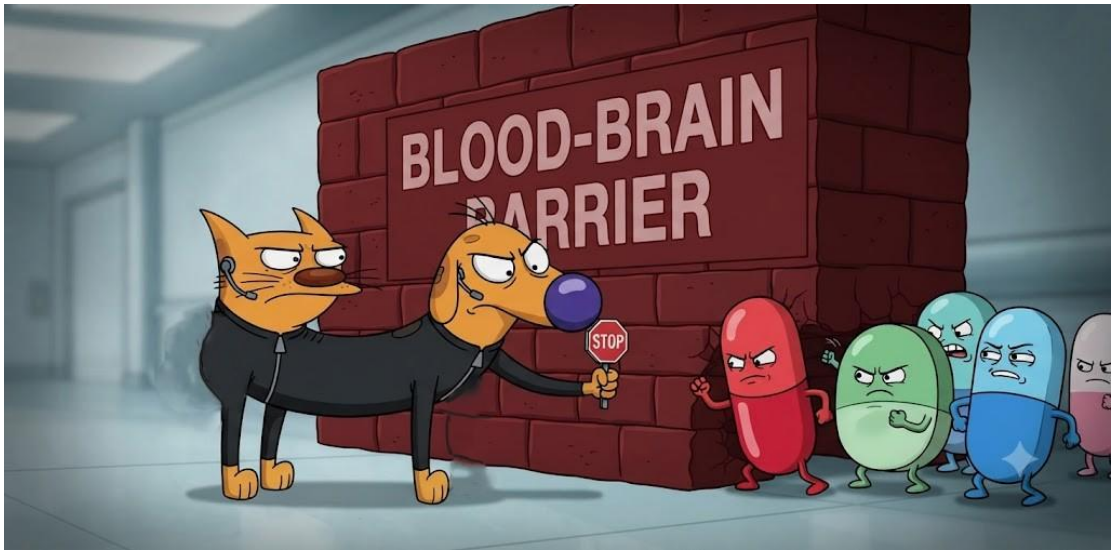
 # Surgical Treatment: Let's Get It Out! Grrr, time for action! Aims of surgery: To take a biopsy, remove the tumor completely or partially (cytoreduction - making it smaller!), or to treat complications like hydrocephalus (putting in a drain tube!). Surgery is recommended for most brain tumors! How do we get in? Craniotomy / Craniectomy: Opening the skull bone. Trans-sphenoidal: Going through the nose! Sniff, sniff! Trans-oral: Going through the mouth! Wide open!



 # Radiotherapy (Zapping the Bad Guys!): Know the difference! Radiation therapy (broad beams over time) vs. Radiosurgery (one super precise, high-dose zap, like Gamma Knife!).Conventional radiotherapy is mostly used as an adjuvant (helper) after surgery. The most radiosensitive (easily zapped) tumors are Germinoma and Medulloblastoma. Zap, boom, gone!

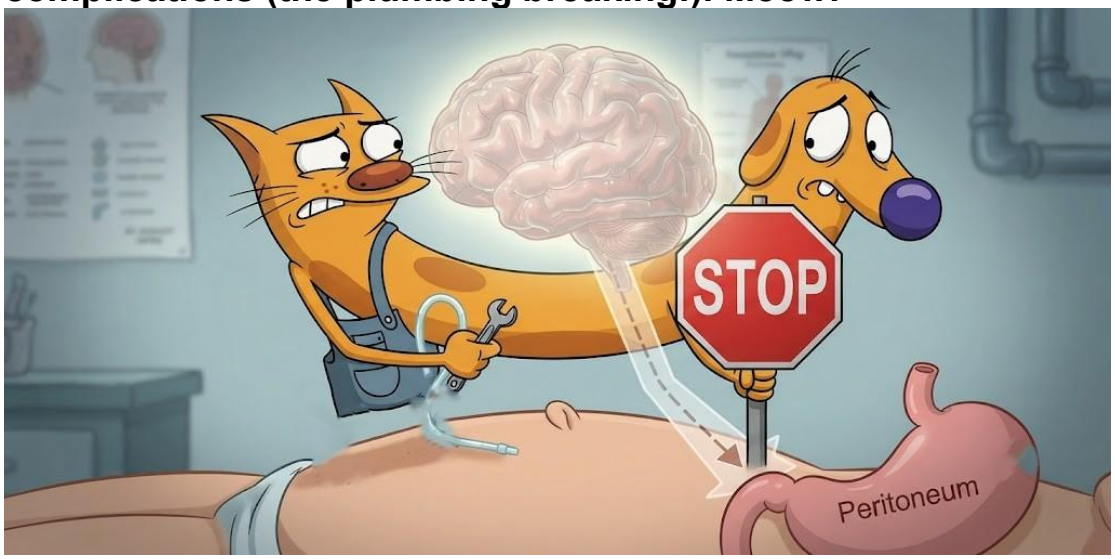
 # Complications: It’s not all fun and games! It can increase edema, cause demyelination (stripping the wires!), radionecrosis (dead tissue), affect cognitive functions (brain fog), and scarily, might induce OTHER tumors later, like Meningioma! Gulp!

 # Chemotherapy (The Bouncer Problem!): Big Problem: The intact Blood-Brain Barrier (BBB)! It blocks the drugs from getting in! Like a tough bouncer at a club! Another issue: only a small proportion of cells are in active growth (chemo only kills fast growers). Examples: Alkylating agents: Like Temozolomide (the famous one for GBM). Combination drugs: PCV (Procarbazine, Lomustine, and Vincristine).



 # New Treatments (The Future is Now!): Excited woof-meow! Science is getting cool! Hyperthermia treatment: Heating the tumor cells up to cook them! Immunotherapy: Like LAK cells (boosting your own body's immune army to attack!). Gene therapy: Fixing the broken DNA codes from the inside out! Mind blown!

 # Posterior Fossa Tumors (The Back-Row Lumps!): Woof! These tricky lumps sit at the bottom of the skull. Sometimes, before we can do the real surgery, we need to put in a shunt or an EVD (a drain tube) to let the trapped fluid out! But beware of the risks! Peritoneal seeding (bad tumor cells escaping down the tube into the tummy - yuck!), prolonged hospitalization (staying in bed too long!), and general shunt complications (the plumbing breaking!). Meow!



 # Glioma (The Big Bosses!): These tumors arise from the neuroectoderm, specifically the glial cells (the brain's support team). They are the most common brain tumors, making up a

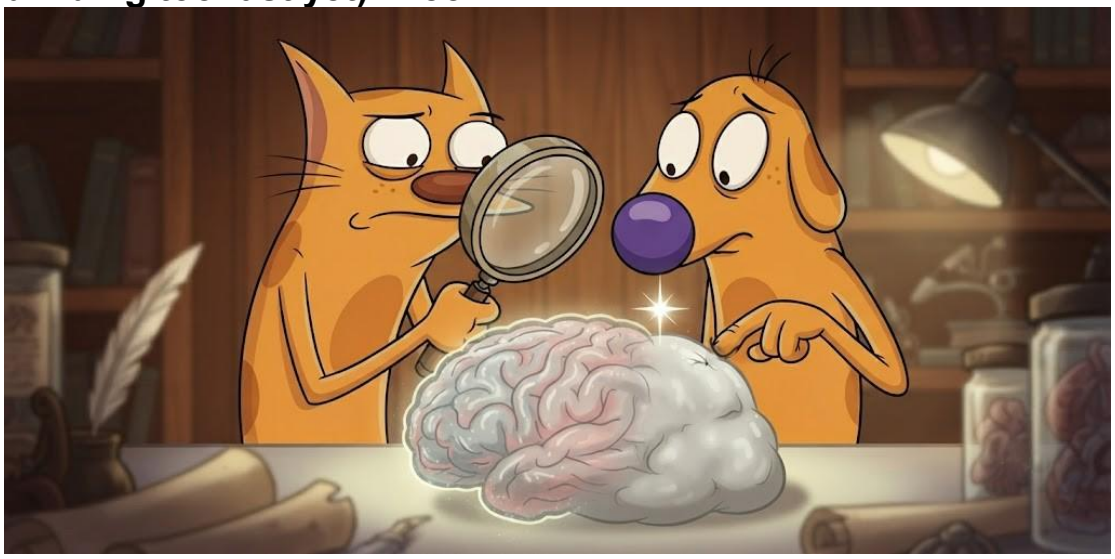
massive 52% of them! There are four different types, and they are a force to be reckoned with! Arf!

 # Astrocytoma (Star-Cell Trouble!): This tumor arises from astrocytes! What do normal astrocytes do? They support neurons, absorb neurotransmitters, release neuroactive molecules, and help form the Blood-Brain Barrier (BBB)! They work so hard, but when they turn bad... hiss! They are the most common primary brain tumors (45%), peaking in ages 40-60 years. They like to hide equally in the frontal, temporal, parietal, and thalamic areas, but are less common in the occipital lobe!

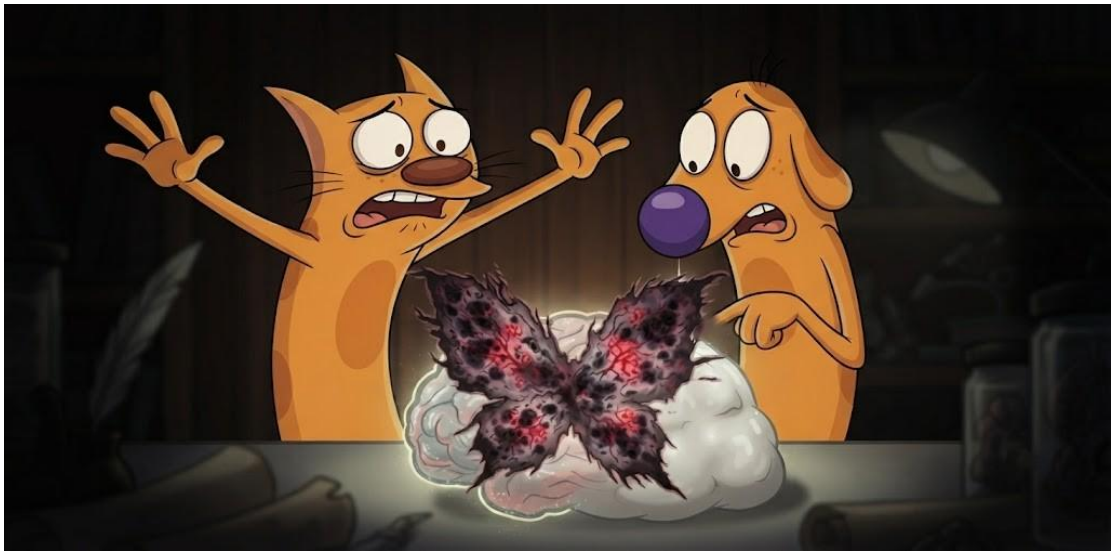
 # The WHO Grading System: How mean is the tumor? The WHO gives them grades from 1 to 4! Grade 1: Pilocytic astrocytoma (the good, calm kid!). Grade 2: Diffuse astrocytoma (starting to spread out...). Grade 3: Anaplastic astrocytoma (getting nasty and aggressive!). Grade 4: Glioblastoma multiforme (GBM) (the ultimate, terrifying bad boy! Grrr!)

 # Low-Grade Astrocytoma (Grades 1 & 2 - The Sneaky Slowpokes): Site: In adults, usually in the cerebral hemispheres. In kids, mostly in the cerebellum! Macroscopic (What the naked eye sees): Not capsulated, no distinct margins (they blend into normal brain like a stealthy cat!), relatively avascular (not many blood vessels), firm fibrous consistency (like a tough dog chew toy!), 15% show fine calcium deposits (little gritty spots!), and occasionally they invade diffusely. Microscopic (Under the lens): Well-differentiated, showing hypercellular glia with nuclear atypia

(weird-looking nuclei!) but rare mitotic activity (they aren't dividing too fast yet). Meow!



 # High-Grade Astrocytoma (Grades 3 & 4 - The Fast & Furious!): Site: Mostly in the cerebral hemispheres. Macroscopic: Highly vascular margins (lots of bloody vessels feeding it!), necrosis (dead, dying tissue in the middle!), and the famous "Butterfly Glioma" (it grows across the midline connecting the two brain halves, looking like a scary butterfly!). Microscopic: Rapidly growing and widely infiltrating the brain like invasive roots of a giant tree! Hiss-Growl!



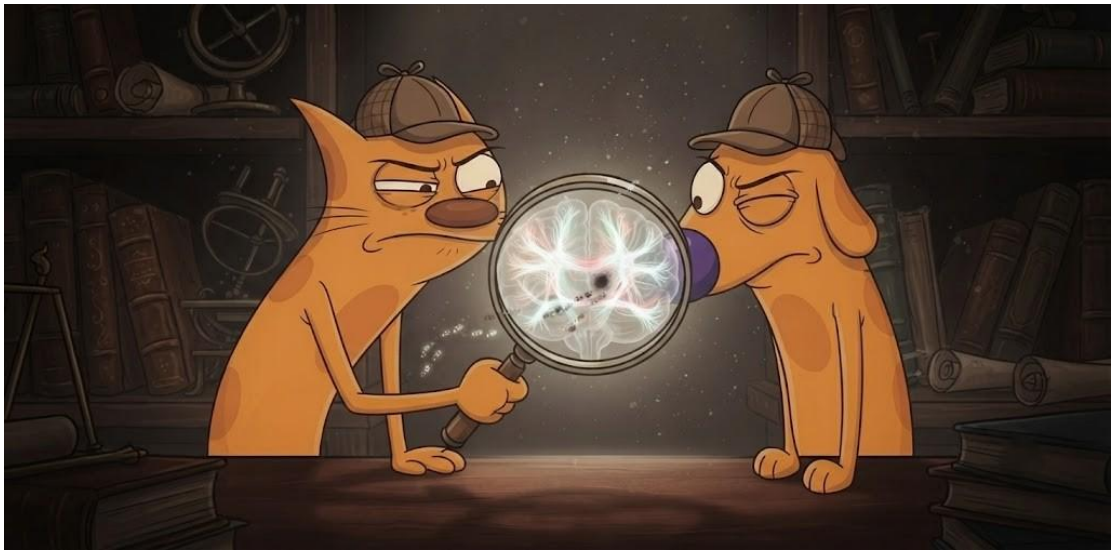
 # Clinical Features of Astrocytoma (The Clues!): How do you know they're there? It all depends on the grade! Low grades are slow, high grades are fast! Arf! Duration and progression: Dictated by how mean the tumor is (Grade 1 vs Grade 4). Epilepsy: Seizures are a huge red flag! Features of increased ICP: Headaches, vomiting, the whole nasty pressure package!

Focal neurological deficit: Weakness, numbness, or speech loss depending exactly on where the lump is sitting!

 # Investigations: The CT Scan Show! Looking at the screen is like looking at two different worlds! Low-Grade (The quiet ones): Small hypodense mass (dark spot), little surrounding edema (not much swelling), no enhancement (doesn't light up with dye), but calcification may be present (little white dots!). High-Grade (The loud, angry ones): Large mass, marked edema (huge swelling!), and they enhance in a non-uniform manner (light up messy and uneven, like a ring!). Grrr!

 # MRI (The Mighty Magnet!): Meow! This is more sensitive than CT, especially for sneaky spots in the posterior fossa, brain stem, skull base, and small tumor masses! Usually, both low and high grades appear as a decrease in T1 signal (dark on T1) and an increase in T2 signal (bright on T2). We also use Angiography and Skull X-Ray to help piece the puzzle together!

 # How Astrocytomas Spread (The Sneaky Escape!): They don't usually like to leave the brain (systemic spread is rare), but they are master escape artists inside the skull! CSF Seeding: High grades can drop little seed cells into the spinal fluid in 10-25% of cases! Yikes! Tracing through white matter: They love to sneak along the brain's wiring like a cat stalking prey through tall grass!



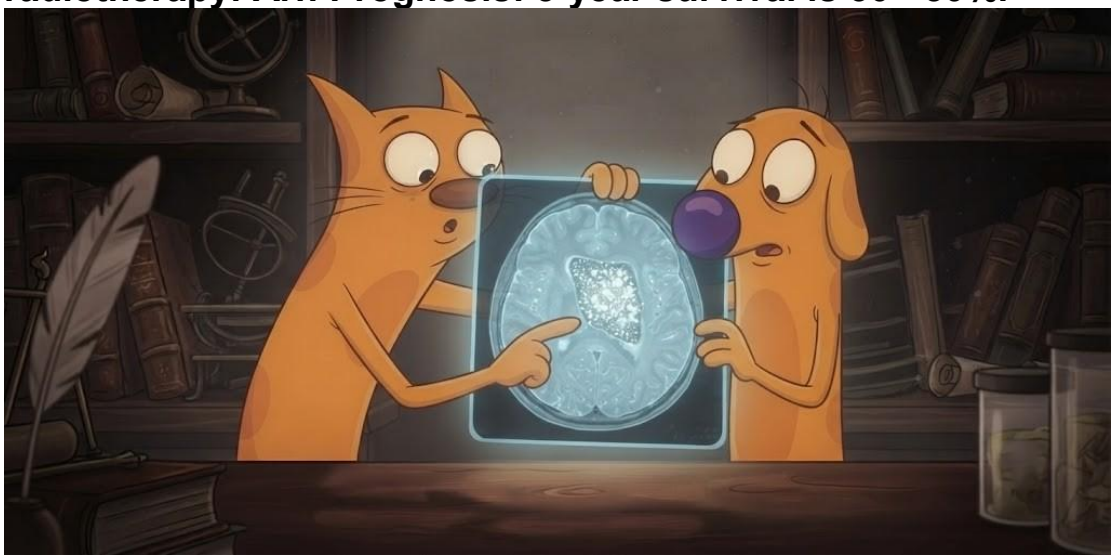
 # Management (Fighting Back!): Woof! Time to get tough! Surgical: We go in! The aim is to take a biopsy, decrease tumor size (debulk it!), and reduce tumor mass prior to adjuvant therapy (make it smaller so radiation works better!). Radiotherapy: Used as an adjuvant (helper) after surgery. Other therapies: Chemotherapy, Immunotherapy, and Hyperthermia join the dog pack to help out!

 # Prognosis (The Honest Truth... It's Sad): Drops ears sadly... At present, there is no satisfactory treatment for Grade 3 and 4. Surgery alone gives about 17 weeks of survival. Adding adjuvant radiotherapy extends it to about 37 weeks. But for Low grades, the prognosis is much better, living approximately 8 years! Meow…

 # Oligodendroglioma (The New Kid on the Block!): Sniff, sniff... what's this? Origin: Arises from oligodendrocytes (the cells that make the fatty insulation for brain wires!). Makes up 5% of all gliomas. Peak age: Maximal incidence in the 5th decade

(40s-50s). Site: Supratentorial (top part of the brain). Behavior: Presents as a range! Most are well-differentiated (good guys!), but 40% are mixed gliomas (hanging out with astrocytoma or ependymoma cells!). Clinical features: Exactly the same as astrocytoma! (Seizures, headaches, focal deficits). Woof!

 # Oligodendroglioma Investigations & Treatment: On scans (CT/MRI), this tumor loves to show off its calcification in 90% of cases! Like crunchy dog treats inside the brain! Enhancement in 50% of cases, and it has beautifully well-demarcated edges (clear borders, unlike the sneaky astrocytomas!). Treatment: We go aggressive! Standard treatment is aggressive resection (cutting it out!) followed by radiotherapy! Arf! Prognosis: 5-year survival is 30 - 50%.



 # Ependymoma (The Ventricular Squatters!): Origin: Makes up 5% of all gliomas. Age: Most are in children and adolescents! Site: It's a tale of two locations! 30% are supratentorial (mainly adults) and 70% are infratentorial (mainly kids!). Meow!

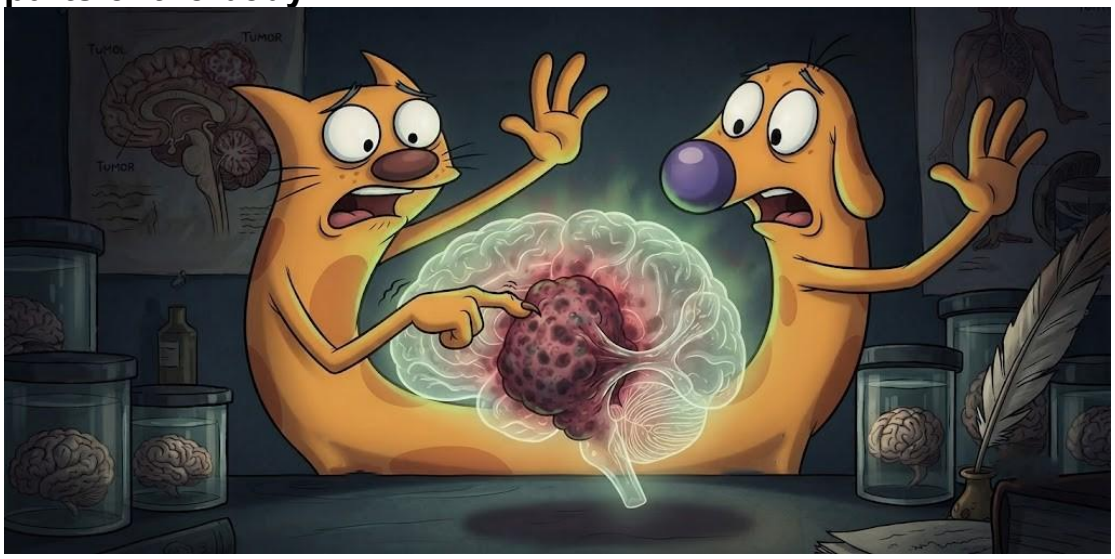
 # Ependymoma Classification (Under the Lens!): Non-anaplastic (The nicer ones): Papillary: Occurs in 2 cool patterns—rosettes and pseudorosettes (they look like tiny flowers under the microscope! Pretty but dangerous!). Myxopapillary: Usually in the spinal cord.
Subependymoma: Heavily calcified, often found by accident during an autopsy or just hanging out without causing a fuss!
Anaplastic: The nasty, aggressive ones! Note: Anaplastic and papillary are the most common ones that actually make the patient sick!

 # Ependymoma Clinical Picture: Supratentorial: Presents with increased ICP (headaches!) and focal neurological deficit. Infratentorial: Causes increased ICP due to hydrocephalus (blocking the fluid drains!) and ataxia (wobbly, uncoordinated walking from cerebellum involvement!). Like a puppy walking on ice!

 # Ependymoma Investigation & Treatment: CT/MRI: The tumor arises in the ventricle and enhances! Calcification in 90% (especially the supratentorial ones). Spread: Loves to drop seeds in the CSF. Systemic spread is rare. Treatment: Surgical resection plus Radiation of the whole neuroaxis (zapping the entire brain and spine just in case seeds escaped!). It's the second most radiosensitive tumor (right after medulloblastoma!). Prognosis: 5-year survival is 20-50%. Adults and supratentorial tumors have a better prognosis!

 # Medulloblastoma (The Ultimate Bad Boy of the Back Brain!): Grrr, hiss! This one is terrifying! Peak age is 5 years (poor little puppies and kittens!). It is the most common midline posterior fossa tumor.
ALL are highly malignant! No low-grade versions here!
Spread: It's an aggressive traveler—spreads by CSF seeding

and even hematogenous spread (through the blood!) to other parts of the body!



 # Medulloblastoma Investigations: CT: Shows an isodense midline lesion squishing the 4th ventricle, with strong enhancement (lights up bright like a beacon of trouble!). MRI: Used for even better detail to see exactly where it's hiding and how far those sneaky seeds have spread! Woof, scary stuff!

 # Medulloblastoma Treatment: First things first, we gotta treat the hydrocephalus (drain that backed-up fluid, woof!). Then comes Surgery to remove the nasty lump, followed by Neuraxis radiation (zapping the entire brain and spinal cord pathway to catch any escaped seeds!). Meow!

 # Prognosis: 5-year survival is 40 - 60%. Better odds than some, but still a tough fight! Arf!

 # Meningioma (The Arachnoid Invader!): Meow! This tumor arises from the arachnoid layer of the meninges (the spider-webby brain cover!). It’s the most common benign brain tumor, making up 15% of all tumors! Occurs at any age, peaks in middle age, and happens more in females! (Girl power gone wrong, arf!).

 # Etiology (Why it happens?): Possible risk factors include head trauma (bonk!), low levels of radiation, NF2 (that genetic troublemaker again!), and sex hormones are important (explains why ladies get it more!).

 # Where Do They Hide? (Site): The most common spot is the parasagittal region (right by the middle brain vein)! Less frequently from the convexity, sphenoidal wing, olfactory groove, or suprasellar area! Woof!

 # Classification: Fun fact! We classify them depending on their position of origin, rather than their histology (what they look like under a microscope)!

 # Histological Types: Under the lens, they can be: Syncytial (meningiotheliomatous), Transitional, Fibroblastic, or Angiomatous. Malignant variants are infrequent (thank goodness, meow!).

 # Clinically - Parasagittal Tumors: Patients present with epilepsy and contralateral lower limb paresis (weakness in the leg on the opposite side - like dragging a paw!). If bilateral, it causes ICP and even urinary incontinence (oops, potty problems!). If it arises from the posterior falx, it causes hemianopia (loss of half the vision)! Arf!

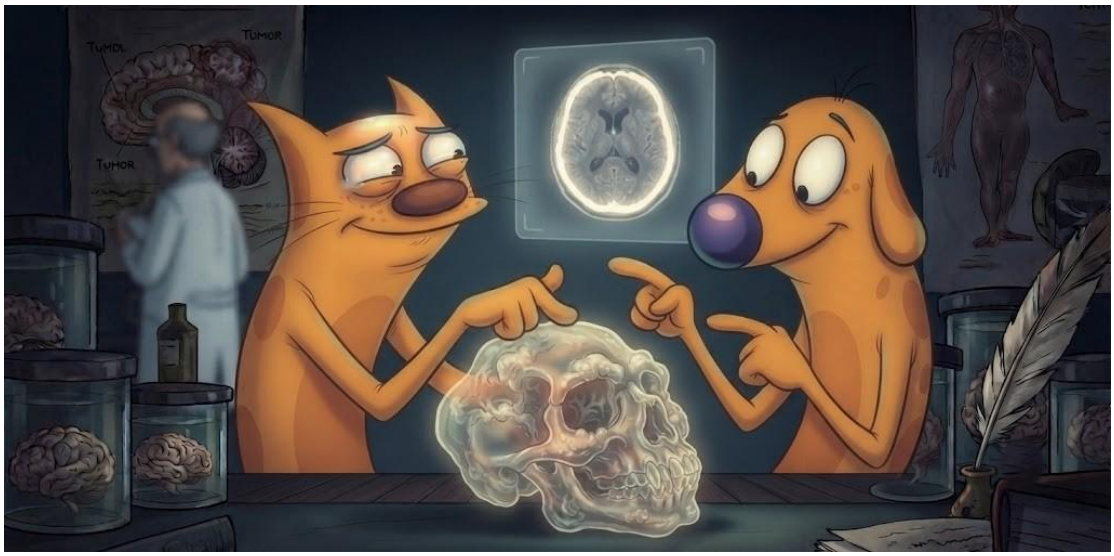
 # Convexity Tumors: Mostly just cause increased ICP! Head pressure!

 # Sphenoid Ridge & Olfactory Groove: May compress the optic nerve (eye trouble!) or cause ICP. They love causing Foster Kennedy Syndrome (swollen optic disc on one side, and a dead/shrunken optic nerve on the other!). Olfactory groove ones start with unilateral anosmia (can't smell on one side - sniff sniff, nothing!).

 # Suprasellar: Causes bitemporal hemianopia (losing side vision in both eyes), but interestingly, WITHOUT endocrine disturbances! (Hormones are safe, meow!).

 # Ventricular Tumors: Just cause Increased ICP (clogging the brain's plumbing!).

 # Investigations (The Scan Clues!): CT: Hyperdense (bright!), enhances uniformly (lights up nice and even!), and causes Hyperostosis of the cranial vault (makes the skull bone grow thick and hard like a tough bone chew toy!). MRI: Isointense on T1! Woof!



 # Treatment: Total surgical excision is the goal! Cut the whole thing out! Radiation may be used to treat any leftover residual tumors! Meow!

 # Risk of Recurrence: They can come back! The most common reason is if the tumor invaded the dural sinus (a big blood vein channel) and the surgeon couldn't safely get it all out! Also a risk with those rare malignant variants! Grrr!

 # Pituitary Adenoma (The Master Gland Troublemaker!): Arises from the anterior pituitary, peaks in 3rd-4th decades, M=F, and hangs out with MEN-1 syndrome! Fun fact: they are found in about 20% of autopsies! We walk among them without knowing, woof!

 # Classification: Microadenoma (<1 cm) vs Macroadenoma (≥1 cm). Also split into Active (functional/secretory) vs Inactive (non-functional). The most common secretory ones? Prolactinomas, ACTH, and GH producers! Meow!

 # Mass Effects (The Bully!): Causes Headaches and Bitemporal hemianopsia (losing side vision because it squishes the optic chiasm—like wearing blinders on both sides!). Can also cause hydrocephalus. If it gets invasive into the cavernous sinus, watch out for CN III, IV, V1, V2, VI palsy, proptosis, and chemosis! Grrr!

 # Endocrine Effects (Hormone Chaos!): Prolactinoma: Infertility, no periods, milk flow (galactorrhea), low libido. ACTH: Cushing's disease, dark skin (hyperpigmentation). GH: Acromegaly (big hands/feet in adults) or Gigantism (huge kids!). Panhypopituitarism: Total gland failure from compression (thyroid, adrenal, gonads all slow down!).

 # Pituitary Apoplexy (The Emergency!): Hiss! Sudden hemorrhage or necrosis in the tumor! Abrupt severe headache, visual loss, ophthalmoplegia, dropped mental status, and sudden panhypopituitarism! Rarely causes CSF leak or SAH signs!

 # Investigations & Treatment: Check those visual fields and CNs! Do endocrine tests (Prolactin, TSH, 8 AM cortisol, IGF-1, etc.) and get an MRI with contrast!

 # How We Fix It: Medical: For apoplexy, give rapid corticosteroids! For prolactinoma, use dopamine agonists (bromocriptine)! For Cushing's, use serotonin antagonists or ketoconazole! For acromegaly, somatostatin analogues! Surgical: Endoscopic trans-sphenoidal (through the nose, sniff sniff!) is the way to go! Meow!

 # Vestibular Schwannoma / Acoustic Neuroma (The Ear Tunnel Invader!): A slow-growing, benign posterior fossa tumor (8-10% of tumors). Arises from the vestibular nerve (CN VIII) in the internal auditory canal, expanding into the CPA! If bilateral, it's NF2 for sure! Woof!

 # The Early Triad (Tumor <2cm): Unilateral progressive hearing loss (98%), tinnitus (ringing!), and disequilibrium (feeling wobbly!). Meow, I hate ear aches!

 # Later Features (Tumor >2cm): Ear pain, facial numbness + weakness, and taste changes (because it's squishing CN V and VII!).

 # Late Features (Tumor >4cm): Ataxia, headaches, vomiting, double vision, and cerebellar signs from brainstem compression and hydrocephalus!

 # Investigations & Treatment: MRI with gadolinium is the absolute best (>98% sensitive!). Audiograms help too! Expectant: Just watch it with serial MRIs if it’s small and you're older! Radiation: Stereotactic Radiosurgery (Gamma Knife!). Surgery: Needed if >3cm, or if there's brainstem compression/hydrocephalus. It's curable if completely removed! Watch out for complications like CSF leaks or nerve damage. And remember to test family members if NF2 is suspected! Arf!

 # ✨ Ps-Ps Bobby signing off! No more questions here, my two-brained medical journey is complete! Meow-Woof! ✨

"The brain rewires itself through what it repeats most. Every thought you choose today is either strengthening the chains of your past or building the pathways to your future."