2025

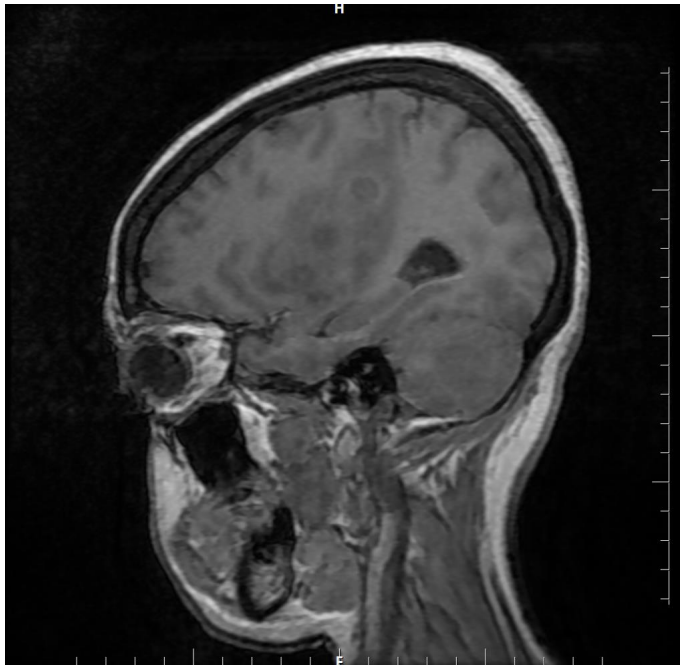
KARNATAKA RADIOLOGY EDUCATION PROGRAM

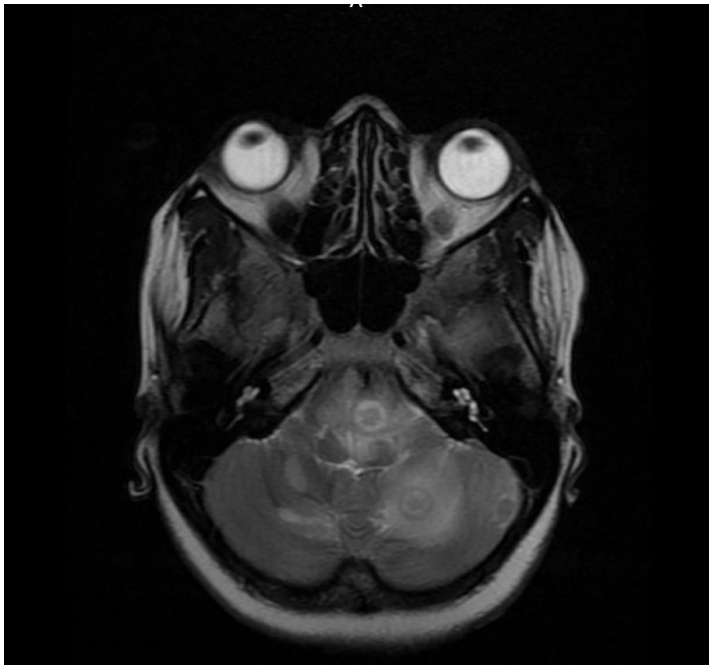
Case presentation

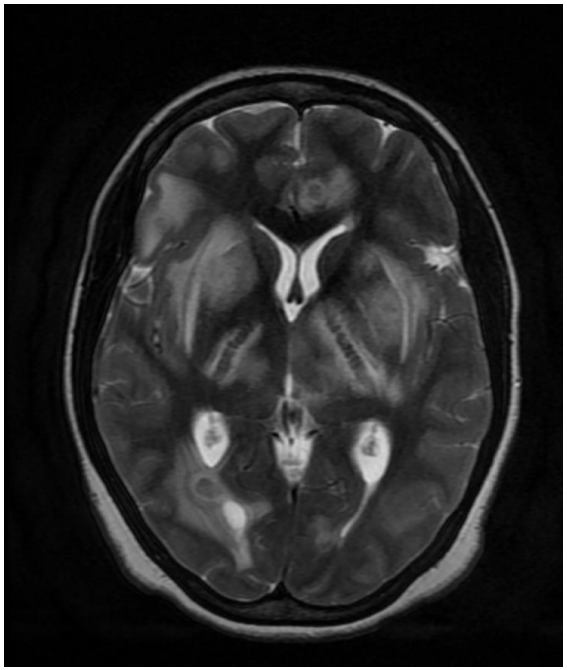
Dr. Vishesh Agrawal

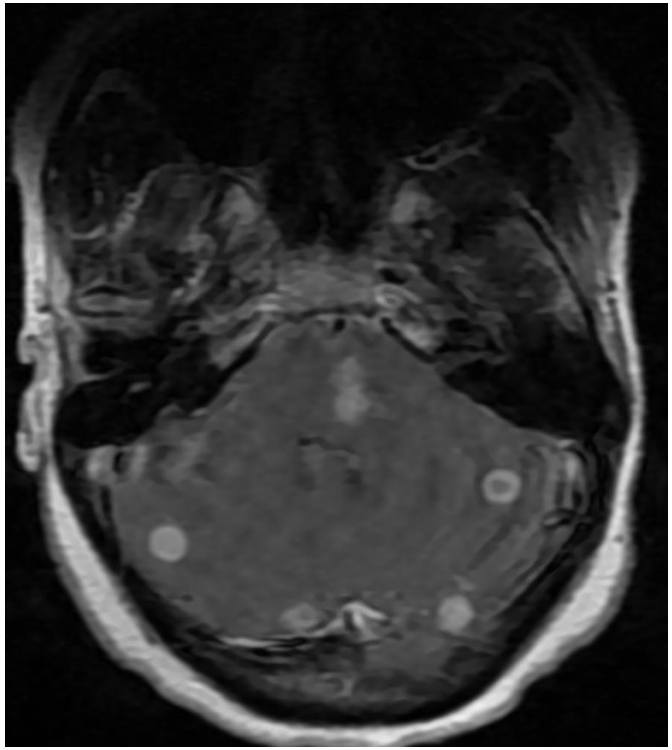
Case 1: (MRN 100200001617146)

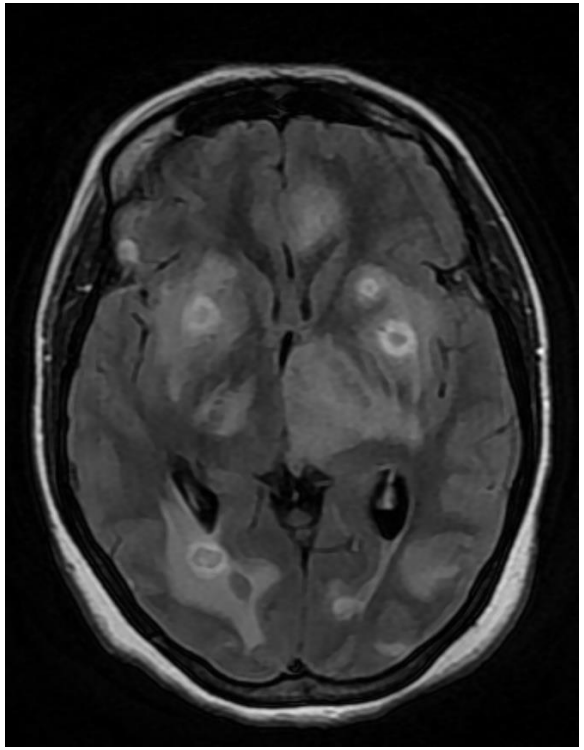
- A 25 year old seropositive female came with symptoms of headache, fever, acute urinary retention, imbalance while walking and weakness of right lower limb.
- No h/o upper limb weakness, speech difficulty, visual symptoms.
- No h/o trauma.
- Vitals were normal
- MRI Brain was advised












SL
C3
T1
T12

Differential diagnoses

Infective / granulomatous etiologies

- Tuberculosis
- Toxoplasmosis
- Cryptococcosis, Aspergilloma
- NCC
- Bacterial / pyogenic abscess

Neoplastic etiology – Lymphoma, metastasis

Toxoplasmosis

- **Neurotoxoplasmosis**, aka **cerebral toxoplasmosis**, is an opportunistic infection in HIV/ AIDS caused by the intracellular protozoan *Toxoplasma gondii*. It is the most common cause of cerebral abscess in these patients.
- In most cases, the infection is asymptomatic followed by a latent phase (persistence of the organisms primarily in the brain, skeletal muscle, and heart.) However, in immunocompromised patients (especially those with HIV/AIDS), infection can become reactivated.
- It is transmitted to humans primarily by ingestion of cysts in undercooked pork or lamb or contaminated vegetables or through direct contact with cat feces

Clinical Presentation

- In immunocompetent patients, acute encephalitis is rare.
- In immunodeficient, the most common presenting symptom in patients with cerebral toxoplasmosis is headache which is often accompanied by altered mental status and fever.
- There may be varied presentations like seizures, cranial nerve abnormalities, visual field defects, and sensory disturbances.
- Focal neurologic signs like motor weakness and speech disturbances are common.

Pathology

- Definitive host- Cat.
- Excretion of oocytes in feces with contaminated uncooked consumption by humans can lead to human infection.

Three distinct zones

- a central avascular zone of coagulative necrosis
- an intermediate vascular zone containing numerous organisms
- an outermost zone of encysted organisms; Toxoplasma lesions do not have a capsule

CT findings

- Multiple hypodense or isodense regions
- Surrounding mass effect / vasogenic edema.
- Location: predominantly in the basal ganglia, periventricular areas corticomedullary junction. May be seen in the posterior fossa. Solitary lesions may occur.
- Size is variable, from less than 1 cm to more than 3 cm, and there may be associated mass effect.
- enhancement: following administration of contrast there is either no enhancement, nodular or ring enhancement which is typically thin and smooth.
- double-dose delayed scan: may show a central filling on delayed scans.
- calcification: uncommon seen in treated cases; may be dot-like or thick and 'chunky‘. Calcification is common in congenital toxoplasmosis.

Numerous enhancing lesions in the right frontal lobe are present with a larger area of central necrosis/hypoattenuation. Prominent vasogenic edema.

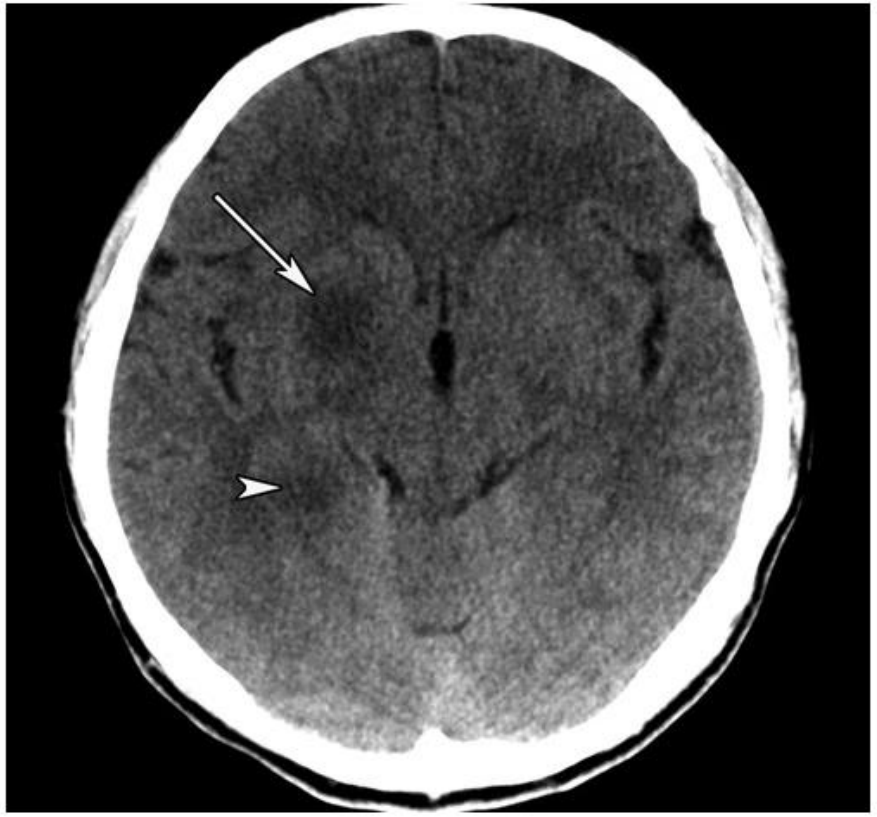
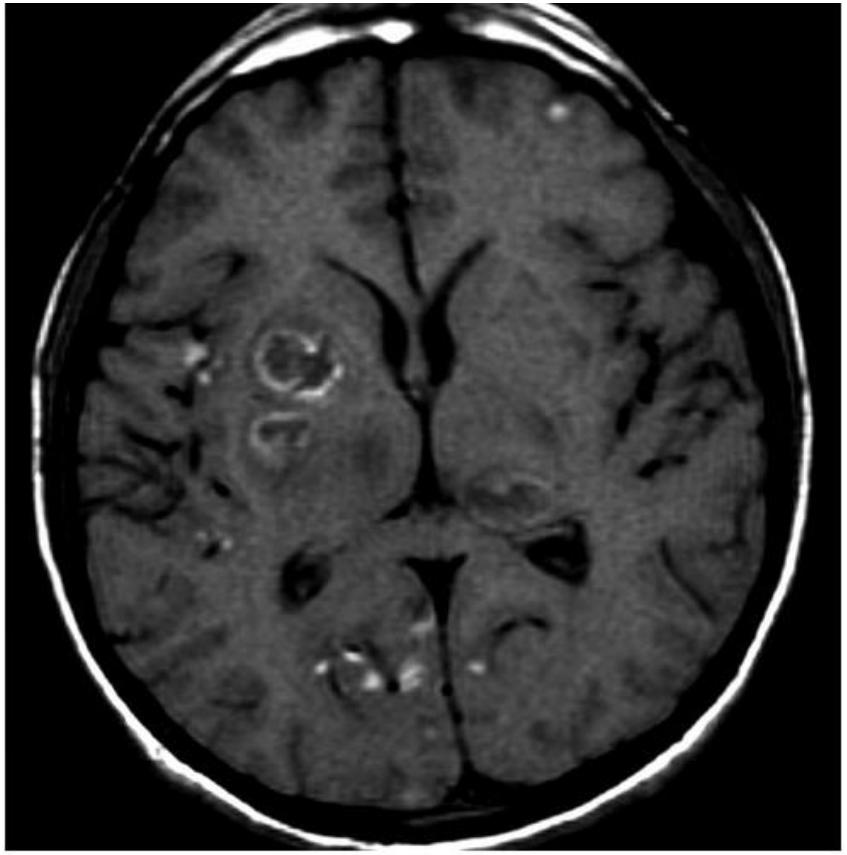


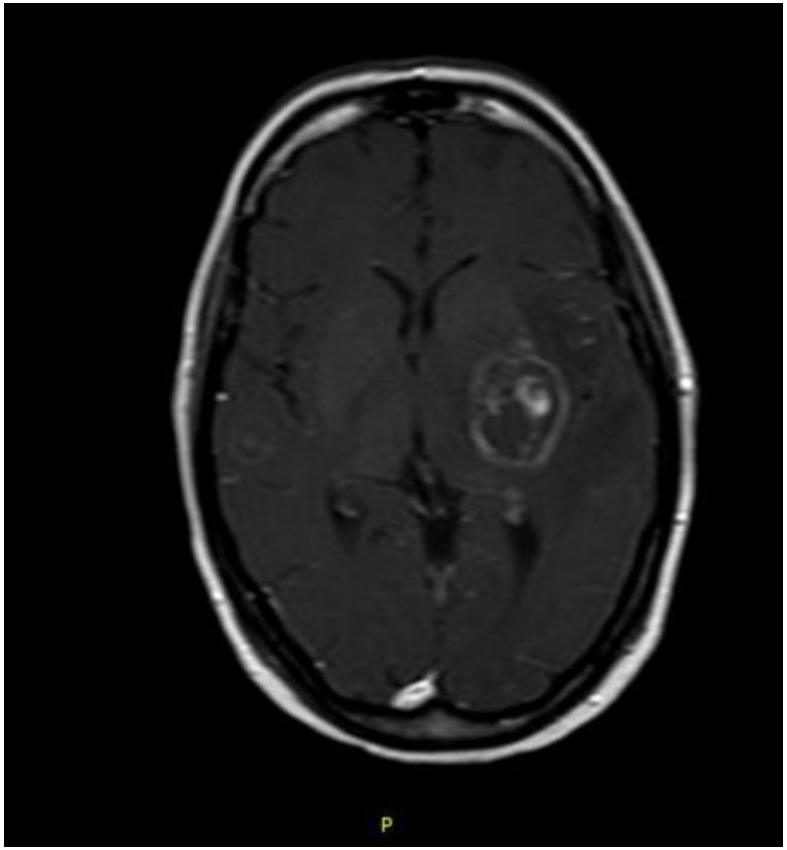
Figure 1. Unenhanced CT scan of the brain shows discrete low-attenuation lesions in the basal ganglia (arrow) and hippocampus (arrowhead).

MRI

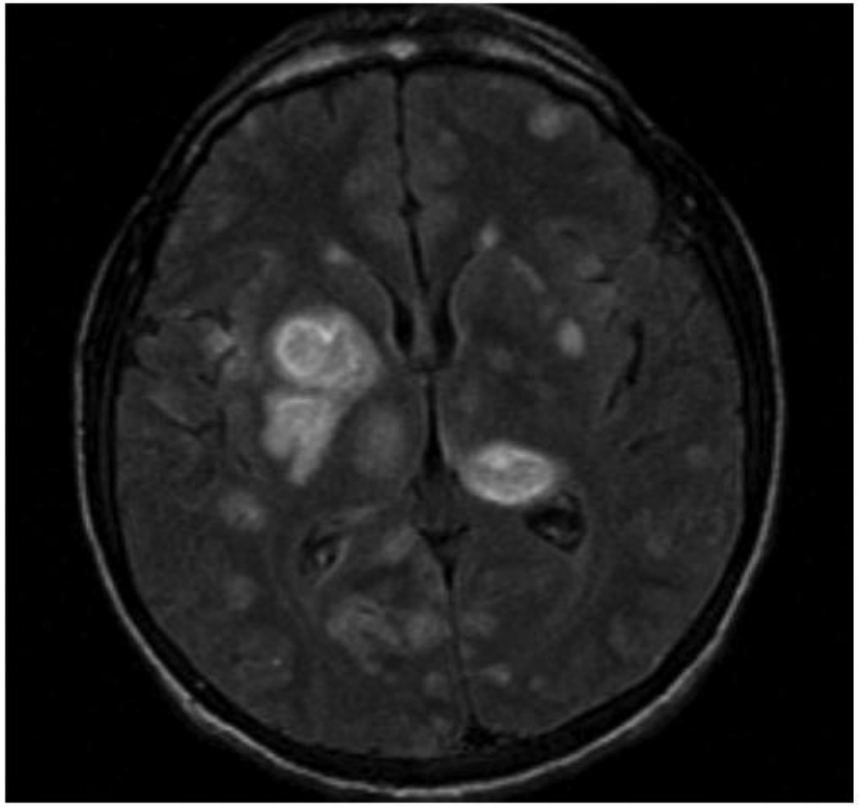
- T1- typically isointense or hypointense. May show peripheral hyperintensity.
- T1 C+ (Gd): ring or nodular enhancement. Eccentric target sign.
- T2 / FLAIR- Variable intensity (hyperintense: thought to represent necrotizing encephalitis, isointense: thought to represent organizing abscess). CONCENTRIC TARGET SIGN may be seen. + Perilesional edema.
- DWI- may show peripheral hyperintensity in the presence of hemorrhage within their walls; however, restricted diffusion within the central portion of the lesion is uncommon
- MR spectroscopy: Increased lipid lactate. Reduced Cho, Cr and NAA



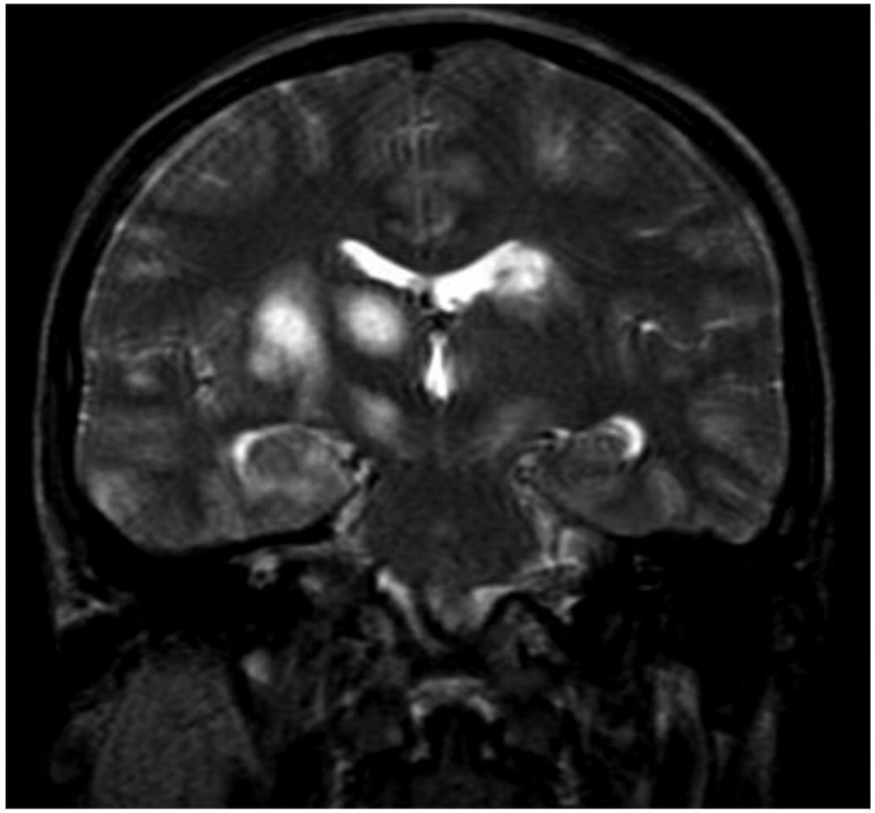
T1



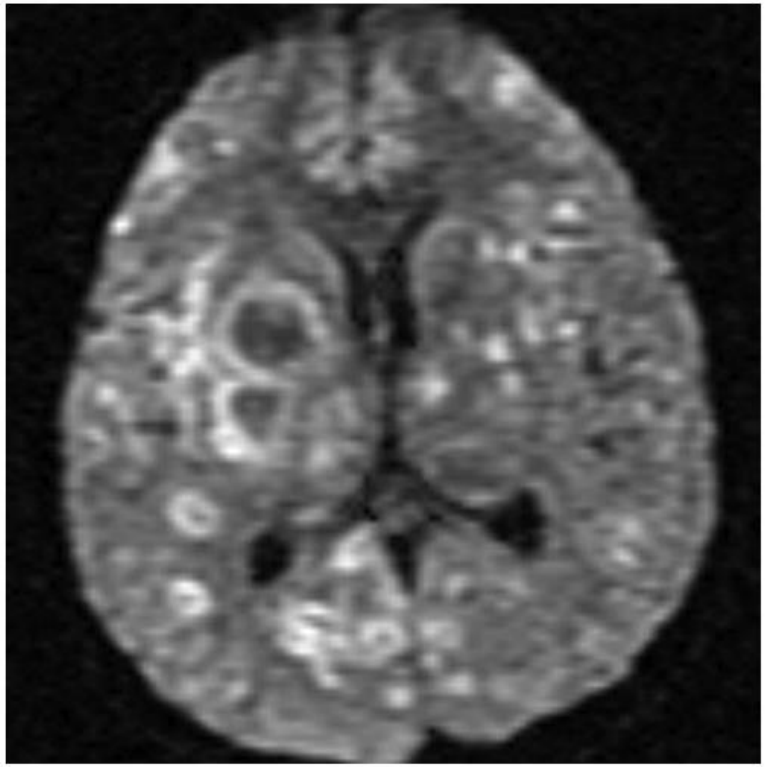
T1 post contrast



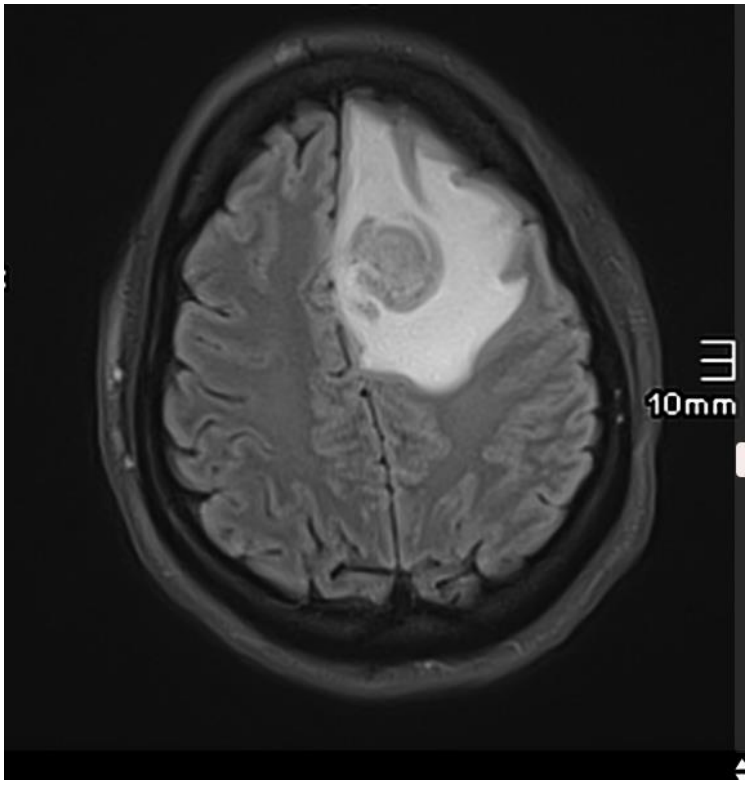
T2



FLAIR



DWI



CONCENTRIC TARGET SIGN FLAIR

Treatment and Prognosis

- Pyrimethamine and sulfadiazine are considered the drugs of choice. Clindamycin may be substituted. All pyrimethamine regimens should include folinic acid (leucovorin) to prevent drug-induced hematologic toxicity.
- The duration of therapy is typically 6 weeks.
- Dexamethasone, a corticosteroid, has been used in patients with radiologic evidence of mid-line shift or other signs of elevated intracranial pressure.
- Anticonvulsants may be administered to patients with a history of seizures

Treatment and Prognosis

- Clinical improvement usually precedes radiologic improvement.
- Therefore, radiologic reassessment should be withheld for approximately 2–3 weeks unless the patient's clinical status does not improve or declines.
- If there is no improvement within 10–14 days after initiation of therapy, alternative diagnoses should be considered.

Differential diagnosis – Primary CNS lymphoma

- Enhancement - Both entities enhance following administration of contrast. In the setting of HIV/AIDS, primary CNS lymphoma may also demonstrate peripheral enhancement similar to toxoplasmosis. Thus, the pattern of enhancement may not be helpful.
- Lesions in lymphoma tend to be more locally infiltrative; thus, a butterfly-like pattern of spread and enhancement is more suggestive of lymphoma than toxoplasmosis
- Diffusion : Toxoplasmosis tends to have more facilitated diffusion while lymphoma tends to have more restricted diffusion in the core of the lesion. (ADC >1.6 times that of contralateral normal white matter favors toxoplasmosis, ADC <0.8-1.0 times contralateral white matter favors lymphoma)

Differential diagnosis – Primary CNS lymphoma

- MR spectroscopy: both entities demonstrate increased lactate and lipids, although this tends to be less marked in lymphoma. Lymphoma typically demonstrates marked increase in choline, whereas it is reduced in toxoplasmosis.
- MR perfusion : rCBV >1.3-1.5 times that of contralateral normal white matter favors lymphoma or other neoplasms (such as glioma or metastasis). rCBV <1.3-1.5 times contralateral white matter favors toxoplasmosis or other infection (such as fungal or bacterial abscess).
- Nuclear medicine: increased uptake in lymphoma

Differential diagnosis – Tuberculosis

- On T2-weighted MR images, mature tuberculomas have a hypointense center surrounded by an isointense capsule that may mimic toxoplasmic lesions.
- Cisternal enhancement, basal ganglia infarction, and communicating hydrocephalus, all of which are seen in tuberculosis, are not usually seen in toxoplasmosis.
- Tuberculosis may manifest as a multiloculated mass, whereas toxoplasmosis does not.
- MRN 10020000527094

Differential diagnosis – Fungal infections

Cryptococcosis and aspergillosis

- may resemble the abscesses in toxoplasmosis
- Hydrocephalus, dilated VR spaces. Leptomeningeal enhancement. Chorid plexitis often seen in cryptococcosis.
- Aspergillosis uncommon in AIDS.
- MRN 10020001299621

Differential diagnosis – NCC

- Various stages- **vesicular, colloidal vesicular, granular nodular**, **nodular calcified**
- Location: subarachnoid space over the cerebral hemispheres, parenchyma: most common location, frequently seen near the grey matter-white matter junction, ventricles. 4th ventricle: most frequent location
- Scolex
- MRN : 10010000773647

Differential diagnosis – Pyogenic abscess

- Restricted diffusion within the central portion of the lesions, a finding in pyogenic abscesses.
- Ring enhancement almost always present.
- Rim of blooming

CD4 Count	Organisms to Consider	Clinical Clues
>500	Community acquired organisms	More likely to acquire bacterial pneumonia, more likely to have HSV and zoster reactivation
200 – 500	Tuberculosis	Hemoptysis, night sweats, weight loss
<200	Pneumocystis jiroveci	Hypoxia induced by activity, interstitial infiltrates, ↑ LDH
	Cryptosporidium	Profuse watery diarrhea
	Candida	Oral thrush, oral lesions
	Fungal pneumonia	Cavitary lesions or diffuse infiltrates on X-ray
<100	Toxoplasmosis	Ring enhancing lesions on CT brain
	Candidal, HSV or CMV esophagitis	Odynophagia, dysphagia
<50	Cytomegalovirus	Visual changes, esophagitis, enteritis, encephalitis
	Cryptococcus	Headache, altered mentation, +India ink
	Mycobacterium avium complex	Night sweats, weight loss, diarrhea, malaise
	Primary CNS lymphoma (EBV assoc.)	Focal neuro deficits, seizures, weight loss, confusion