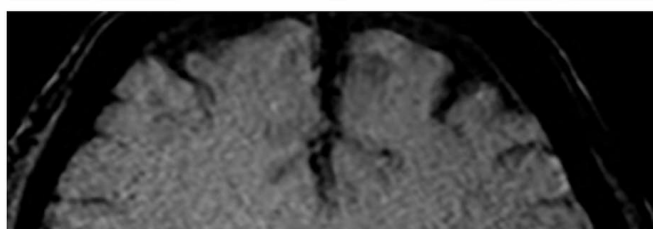
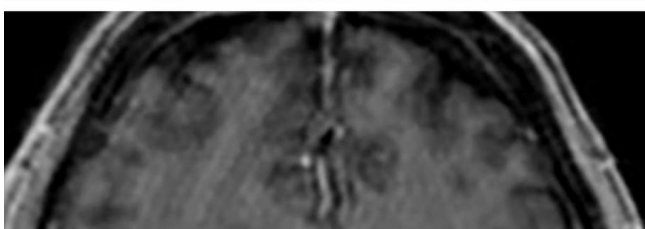
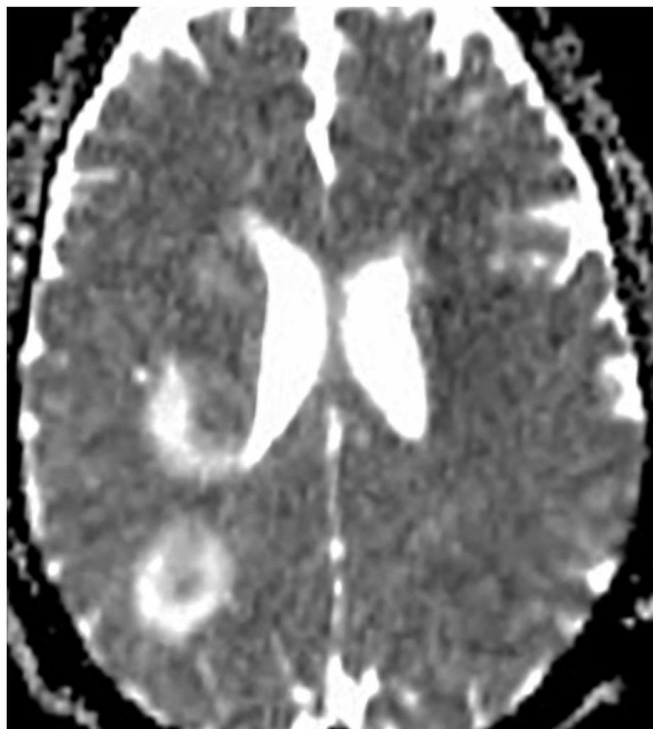
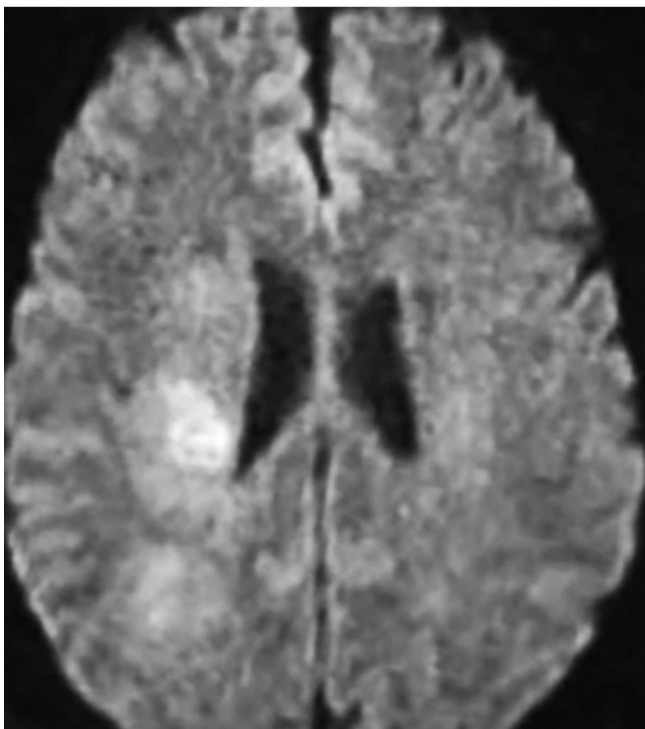
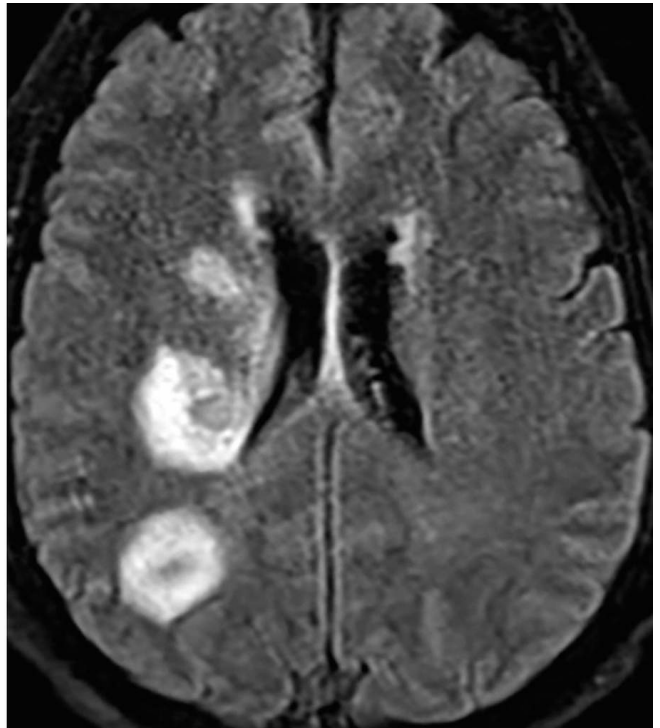
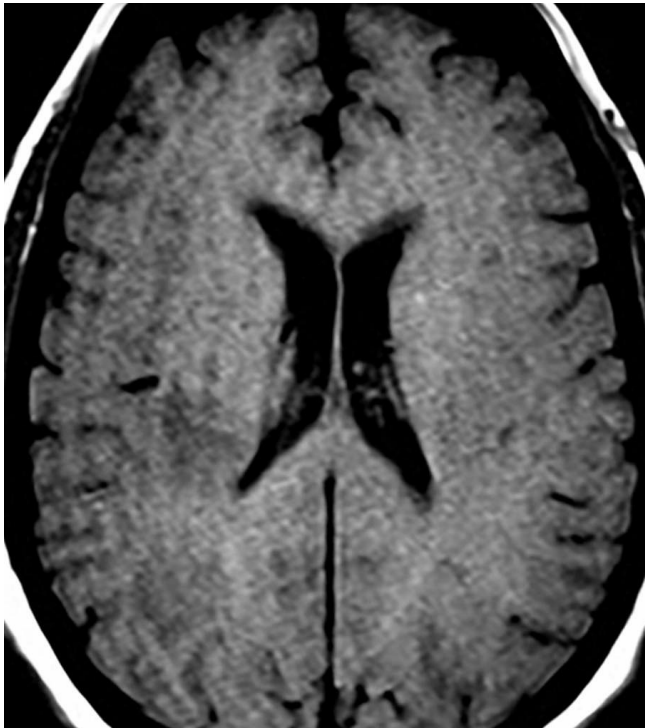
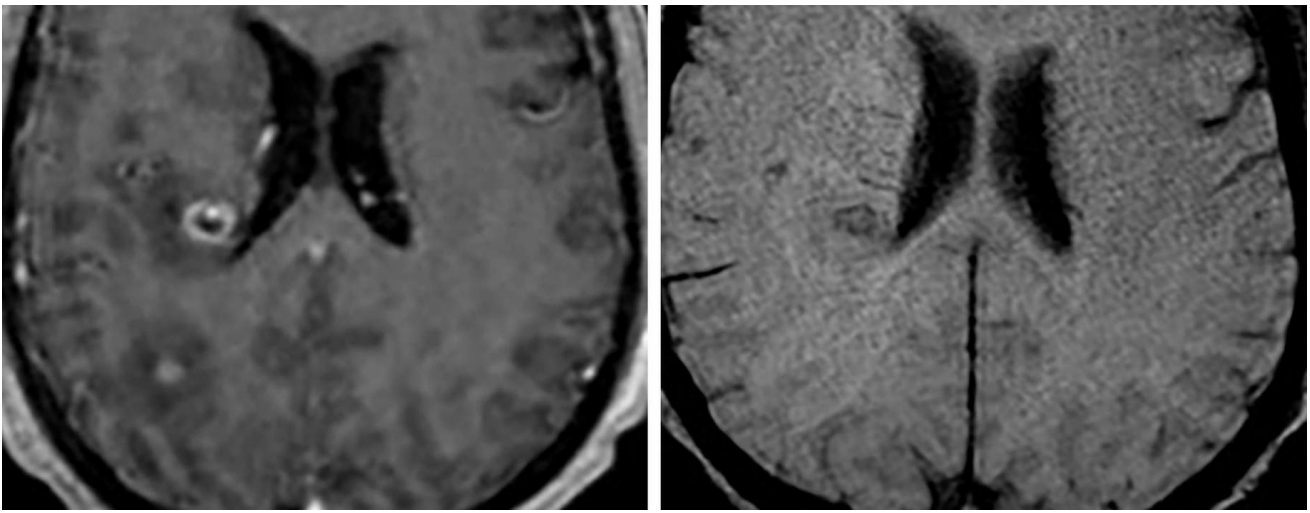




# Toxoplasmosis

*Last Updated: July 13, 2021*





**Figure 1:** Ill-defined regions of masslike signal abnormality in the right corona radiata and parietal subcortical white matter. Notice the T1 isointense to slightly hypointense signal (top left) with corresponding FLAIR hyperintensity (top right). There is faint, DWI-hyperintense, mildly reduced diffusivity (middle left and middle right) associated with the aforementioned lesions corresponding to areas of peripheral mildly nodular enhancement (bottom left). (Bottom Left) The right corona radiata lesion that closely approximates the ependyma of the right lateral ventricle has a characteristic “eccentric target sign,” an eccentric enhancing nodule within the cavity. Although not a specific sign, it can help narrow the differential. (Bottom Right) In addition, there is faint hypointense signal on SWI representing focal hemorrhage, which can be helpful in distinguishing toxoplasmosis from nontreated lymphoma. If further differentiation between toxoplasmosis and lymphoma is needed, a thallium nuclear medicine scan can be helpful.

## Description

- Opportunistic protozoan infection cause by *Toxoplasma gondii*
- Most common CNS opportunistic infection in patients with AIDS

## Pathology

- *Toxoplasma gondii* is an obligate intracellular protozoan that exists in 3 forms
  - Oocysts
  - Tachyzoites

- Bradyzoites
- Results in necrotizing encephalitis

## Clinical Features

- Symptoms
  - Headache, malaise, fever, and possible seizures
- Demographics
  - 20% to 70% of US population is seropositive
  - 3% to 10% of patients with AIDS have CNS toxoplasmosis
    - More common when CD4 cell count is  $<200$  cells/ $\mu$ L

## Imaging

- General
  - Multiple lesions in different stages of evolution typically located at the corticomedullary junction, basal ganglia, and thalami; much less commonly involves the brainstem
- Modality specific
  - CT
    - Multiple areas of hypoattenuation, most frequently in the basal ganglia, thalamus, and corticomedullary junction
    - Peripheral or nodular enhancement
  - MRI
    - T1WI
      - Ill-defined hypointense lesions, rarely hyperintense
    - T2WI
      - Hypointense to isointense with surrounding vasogenic edema
    - DWI
      - Highly variable
    - SWI
      - May see hypointense signal representing hemorrhage, which is helpful when trying to

distinguish toxoplasmosis from nontreated lymphoma

- PWI
  - Very similar to pyogenic abscess
    - Reduced perfusion in the capsule
- Postcontrast
  - Nodular rim enhancement
  - Eccentric target sign (enhancing nodule within enhancing rim, may be similar in appearance to neurocysticercosis)
- MRS
  - Low specificity due to wide range of peaks
- Nuclear medicine
  - Thallium-201 SPECT and  $^{18}\text{F}$ -fluorodeoxyglucose positron emission tomography ( $^{18}\text{F}$ -FDG PET)
    - May be helpful when trying to differentiate from lymphoma
    - Toxoplasmosis will demonstrate low uptake on both modalities
- Imaging recommendations
  - MRI with contrast; consider SWI, PWI, and MRS
  - Thallium-201 SPECT and  $^{18}\text{F}$ -FDG PET may be helpful
- Mimic
  - Often difficult to distinguish from lymphoma, but perfusion imaging can help differentiate between toxoplasmosis with normal or decreased perfusion and lymphoma with increased perfusion; thallium-201 SPECT can also be used to help differentiate between them

For more information, please see the corresponding chapter in [Radiopaedia](#) and the [Toxoplasmosis](#) chapter within the [Cerebral Infectious Diseases](#) subvolume in *The Neurosurgical Atlas*.

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