MR perfusion

- Techniques
  - Dynamic susceptibility contrast (DSC) MR perfusion
  - dynamic contrast enhanced (DCE) MR perfusion
  - arterial spin labeling (ASL) MR perfusion
- Derived values
  - time to peak (TTP)
  - mean transit time (MTT)
  - cerebral blood volume (CBV)
  - cerebral blood flow (CBF)
  - negative enhancement integral (NEI)
  - k-trans

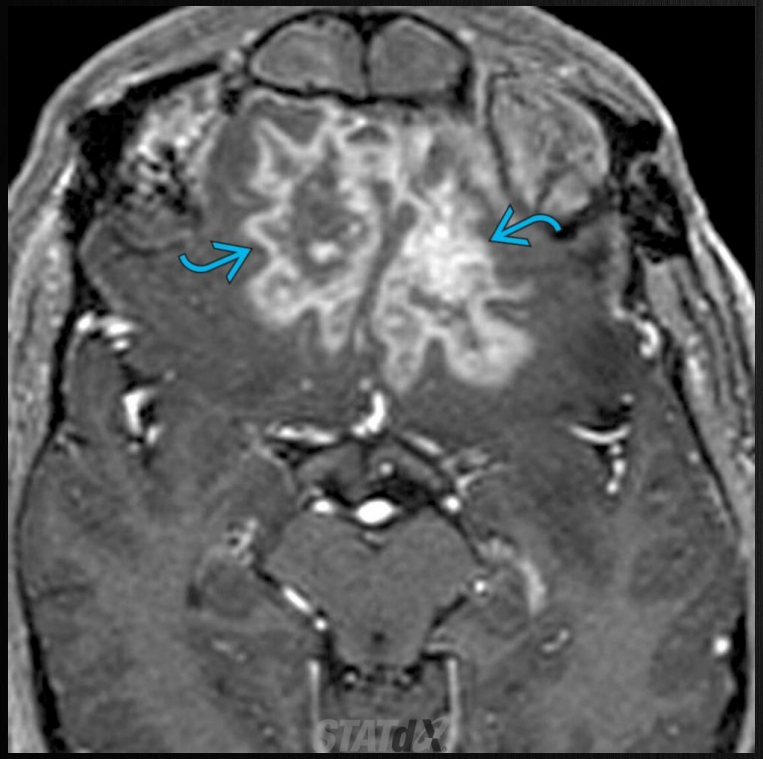
Dynamic Contrast-Enhanced

- Referred to as “permeability” MRI, is based on the acquisition of serial T1-weighted images before, during, and after administration of MR contrast media, such as a gadolinium-based contrast agent.
- The resulting signal intensity–time curve reflects a composite of tissue perfusion, vessel permeability, and extravascular-extracellular space

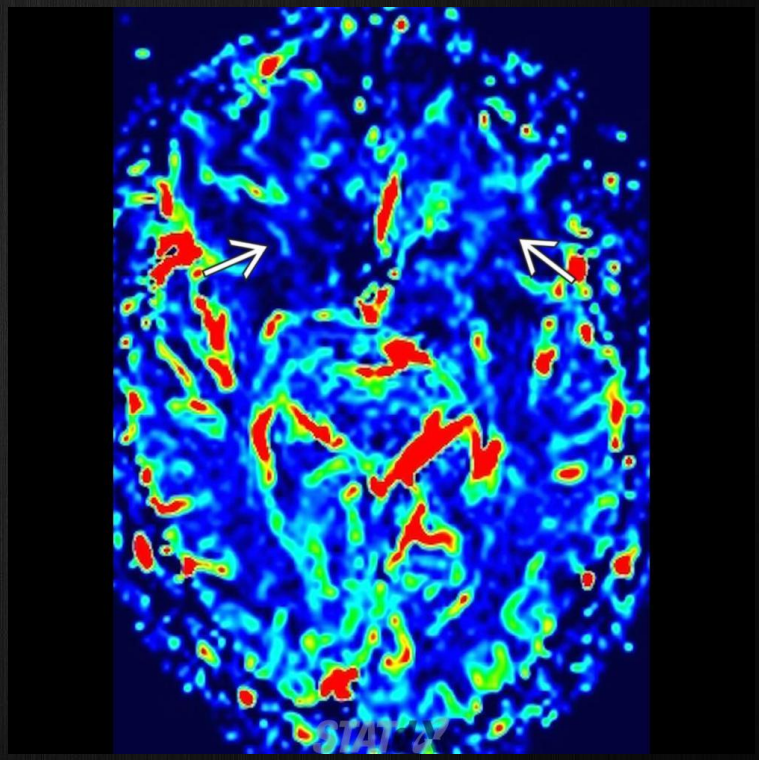
DCE

- DCE MR perfusion
- Imaging depicts the wash-in, plateau, and washout contrast kinetics of the tissue, thereby providing insight into the nature of the bulk tissue properties at the microvascular level.

Radiation Necoris



Axial T1WI C+ MR in a patient with esthesioblastoma 6 months post radiation shows masses (cyan curved arrow) in the inferior frontal lobes with a spreading wavefront enhancement pattern.

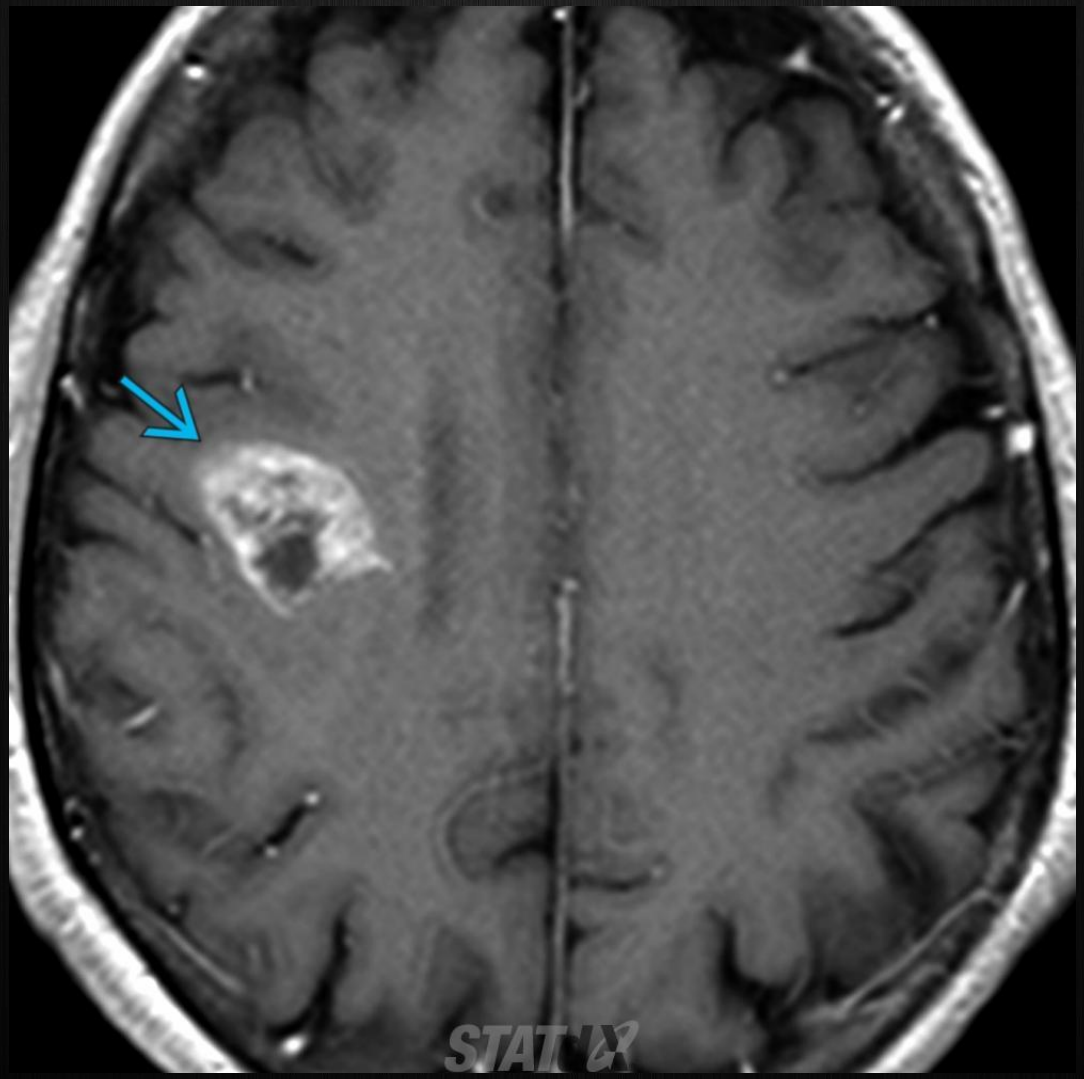


MR perfusion rCBV map in the same patient does not show any significant increase in the relative cerebral volume (white solid arrow) in the regions of enhancement.

These findings are typical of radiation necrosis.

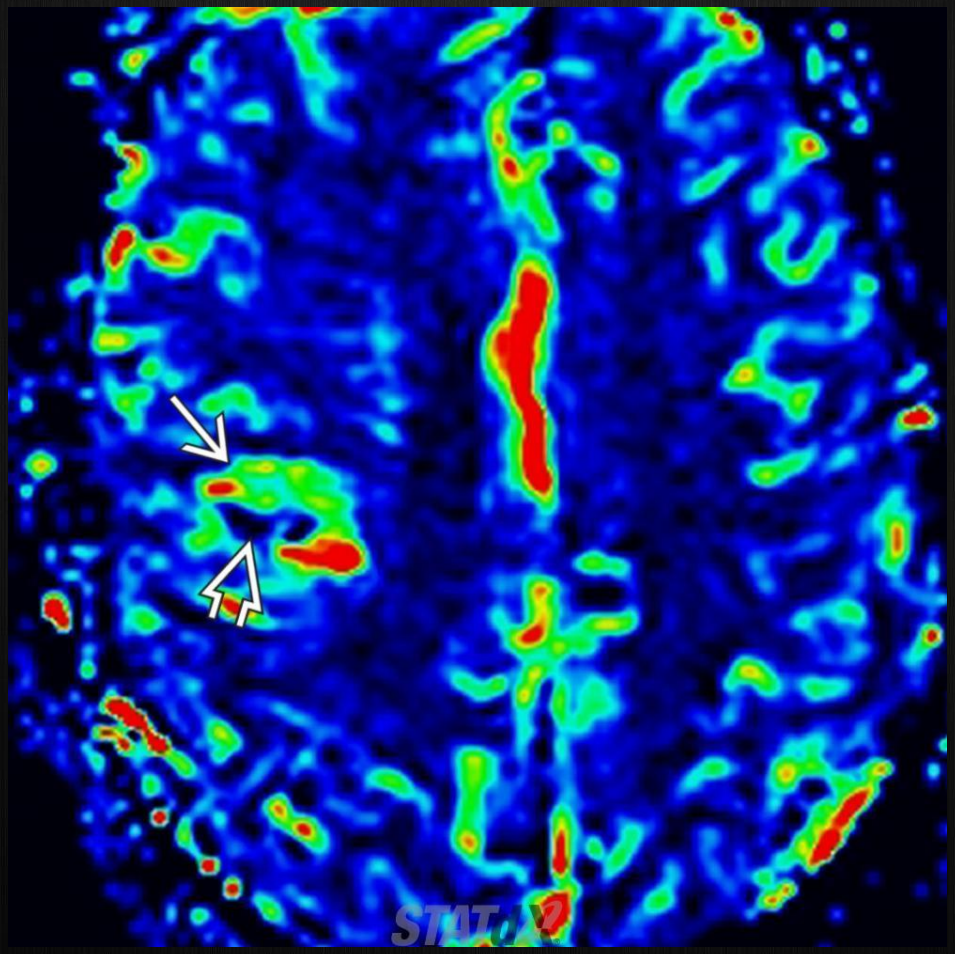
Radiation necrosis can occur months to years after radiation therapy. More than 85% of cases occur within 2 years.

Case 1 (GBM)



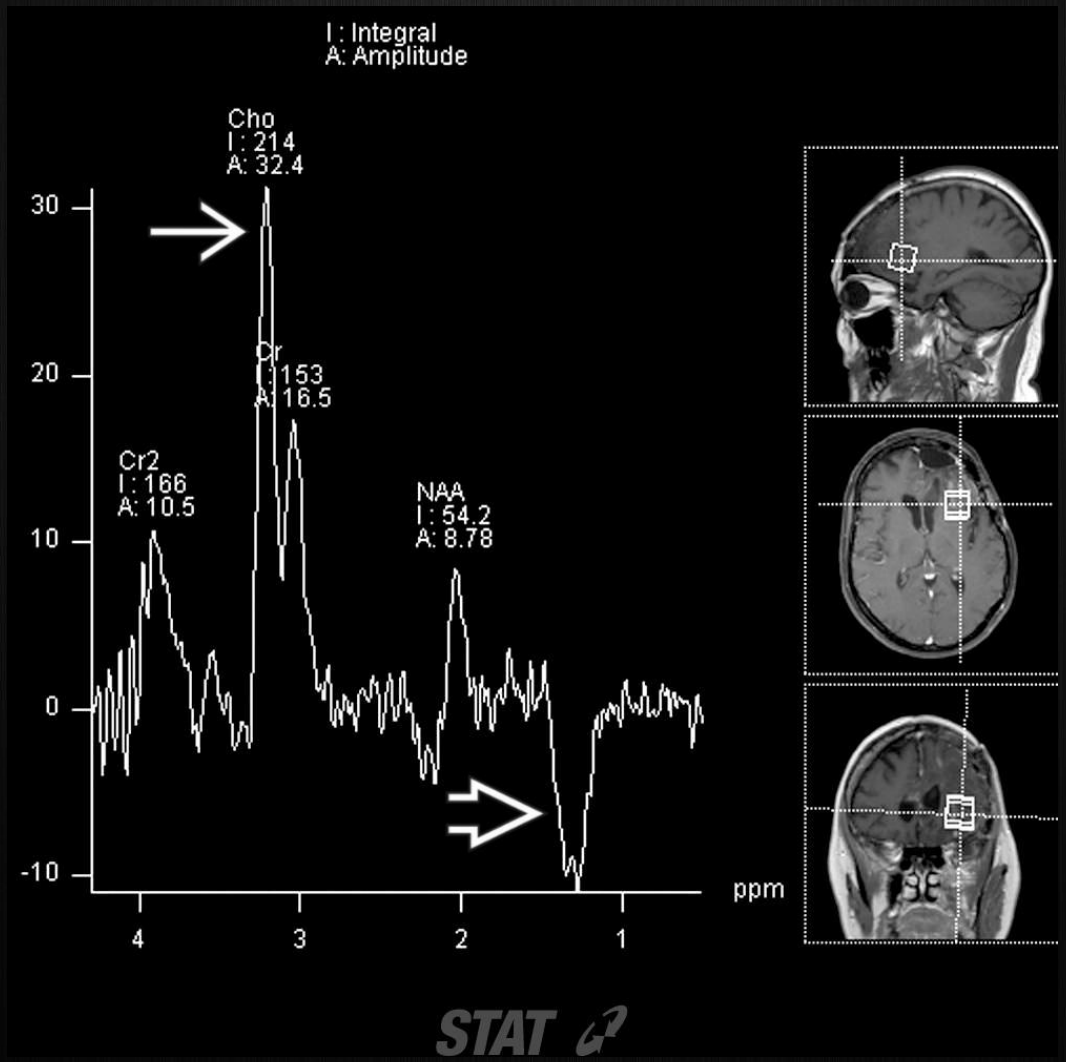
Axial T1 C+ MR in a 42-year-old man with new-onset seizure shows a peripherally enhancing mass (cyan solid arrow) with only mild associated mass effect

Case 1 (GBM)



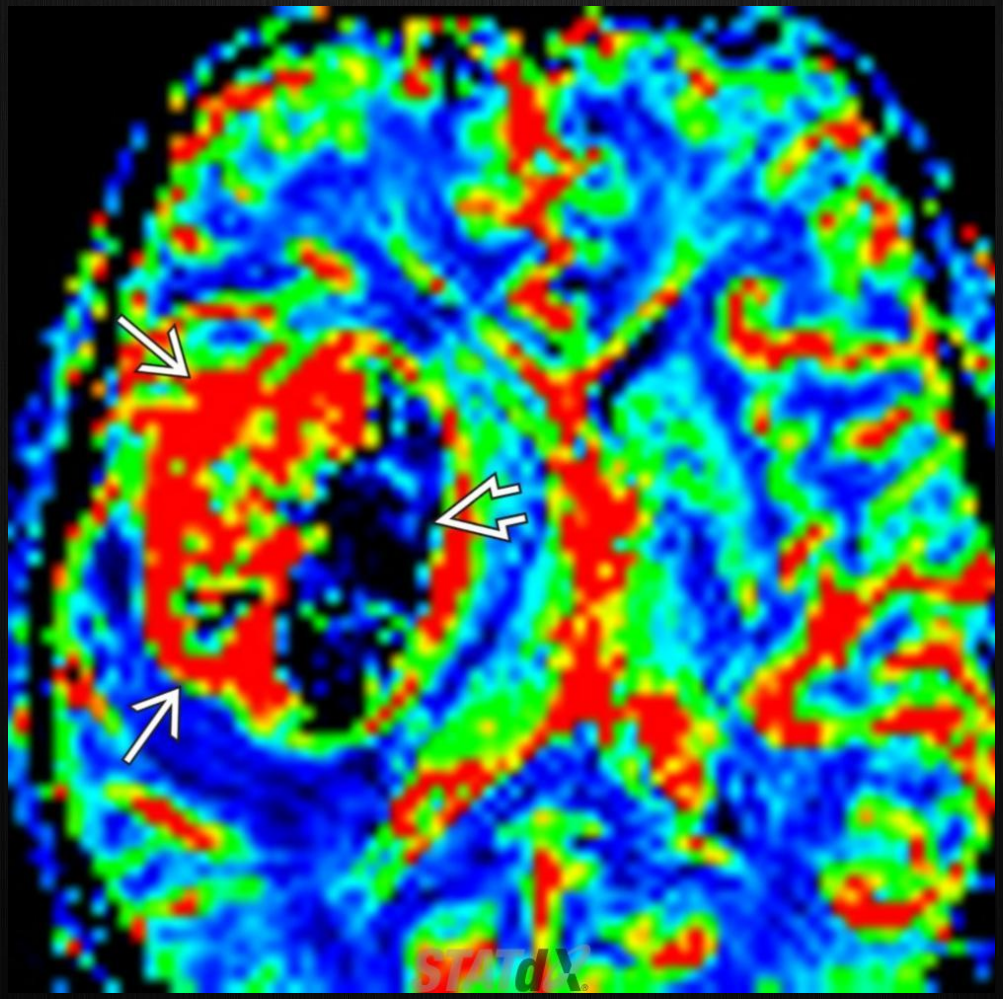
Axial MR perfusion in the same patient shows an ↑ rCBV (white solid arrow) in the solid parts of the tumor and a low rCBV in the necrotic center (white open arrow). Perfusion MR is helpful to provide an accurate preoperative diagnosis. In addition, it is often used to help guide a biopsy if the location of the tumor prevents the patient from undergoing a complete resection.

Case 1 (GBM)



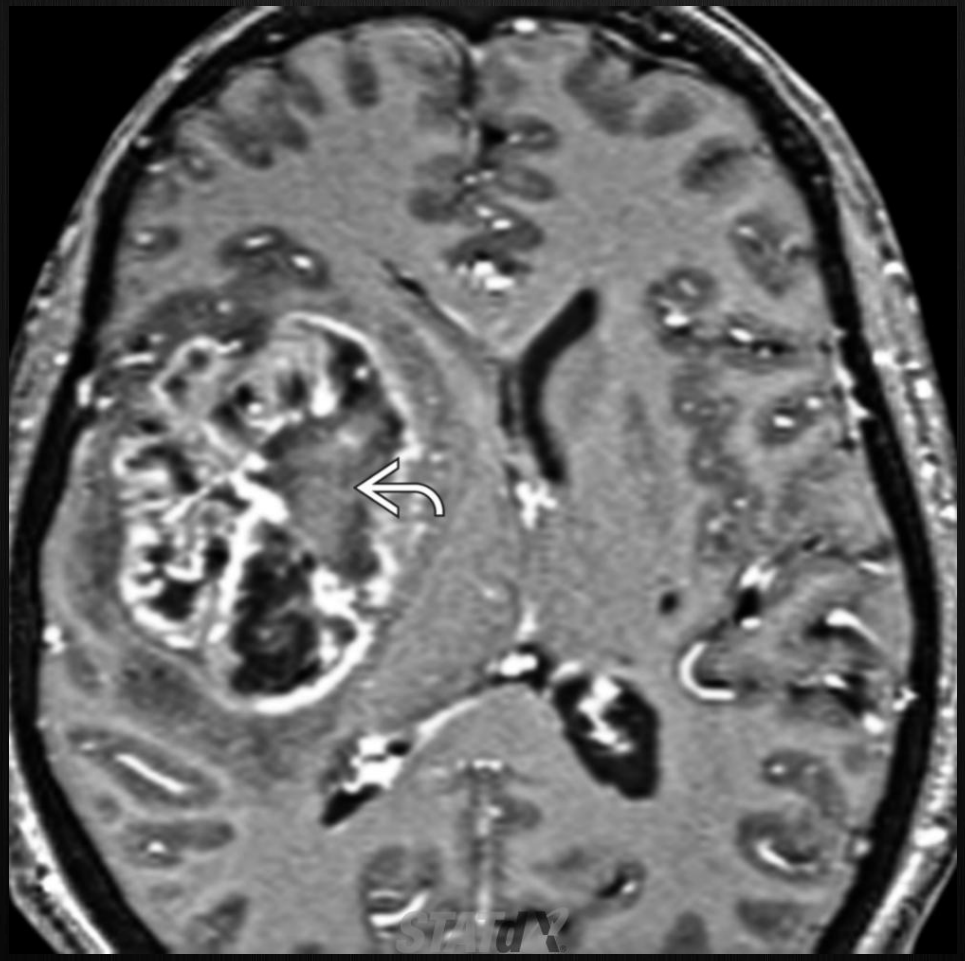
MRS in a patient with recurrent GBM shows a classic malignant tumor spectrum with a markedly elevated Cho (white solid arrow), a low NAA at 2.02 ppm, and an inverted lactate peak (white open arrow) at 1.33 ppm.

Case 2 (GBM)



Axial MR perfusion in the same patient shows an ↑ rCBV (white solid arrow) in the solid parts of the tumor and a low rCBV in the necrotic center (white open arrow). Perfusion MR is helpful to provide an accurate preoperative diagnosis. In addition, it is often used to help guide a biopsy if the location of the tumor prevents the patient from undergoing a complete resection.

Case 2 (GBM)



Axial T1 C+ MR shows a heterogeneously enhancing temporal lobe mass with central necrosis (white curved arrow), which is characteristic of a GBM. These highly malignant gliomas have a poor prognosis with overall survival typically < 1 year.