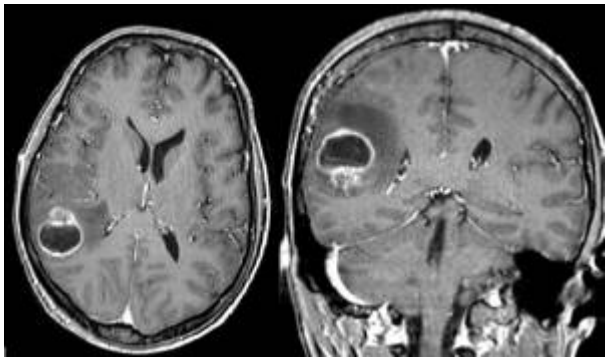
Magnetic resonance imaging for intracranial metastases

Although magnetic resonance imaging (MRI) is more sensitive than computed tomography (CT) for detection of brain metastases, CT remains a vital tool for initial work-up and perioperative management. Advanced MRI techniques such as magnetic resonance spectroscopy (MRS), magnetic resonance perfusion imaging (MRP), diffusion weighted imaging (DWI), and diffusion tensor imaging (DTI) may also be utilized to help distinguish brain metastases from other pathologies, and also to monitor treatment response. Nuclear medicine studies including 18 fluorodeoxyglucose positron emission tomography (FDG-PET) and other molecular imaging may play a larger role in the future.

They usually appear as multiple lesions with nodular or annular enhancement and are surrounded by edema. They are hypervascularized and have no restriction of their diffusion coefficient in their necrotic area and contain lipids on Proton magnetic resonance spectroscopic imaging. Metastases can be distinguished from primary tumors by the lack of malignant cell infiltration around the tumor [1].

Magnetic resonance imaging



Interpretable and easy to obtain MRI features may not be sufficient to predict directly the primary tumour entity of brain metastases (BMs) but seem to have the potential to aid differentiating high- and low-proliferative BMs, such as SCLC and NSCLC [2].

Sequences

The two most commonly used MRI sequences for assessing brain metastases are contrast-enhanced T1-weighted (CET1W) and T2-weighted FLAIR, which provide information about size, morphology and macroscopic structures. Newer MRI sequences have been developed to increase the conspicuity of enhancing metastases. More recently, advanced MRI techniques that have moved beyond anatomical imaging are available to characterize microstructures, cellularity, physiology, perfusion, and metabolism. Changes in these attributes may supersede perceivable macroscopic anatomic changes and can serve as potential biomarkers for monitoring treatment effect, recurrence, and disease progression [3].

In some clinical protocols, diffusion weighted MRI—usually with three diffusion b-values of 0, 500, and 1,000 [s/mm2]—is also acquired in order to provide information about tumor cellularity through

measurement of the apparent diffusion coefficient (ADC) [4) 5)].

Magnetic resonance imaging with contrast enhancement for intracranial metastases

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Magnetic resonance imaging for intracranial metastases Multicenter Studies

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