1. **Clinical Indications**

Brain MRI may be indicated for **1 or more** of the following:

* 1. Neurologic abnormality or deficit, unexplained, as indicated by **1 or more** of the following:
     1. Focal sensory deficit (e.g., anosmia, numbness, paresthesias) of the face, limb, or whole side of the body
     2. Focal weakness of face, limb, or whole side of the body
     3. Change in speech or language (e.g., dysarthria, aphasia)
     4. Ataxia or gait disturbance
     5. Papilledema
     6. Visual disturbance (e.g., diplopia, visual field defect, nystagmus, visual loss)
     7. Horner syndrome (unilateral miosis, ptosis, facial anhydrosis)
     8. Other cranial nerve palsy
     9. Altered mental status
  2. Headache, with symptoms or signs suggesting structural cause.
  3. Hearing loss, as indicated by 1 or more of the following:
     1. Unexplained unilateral sensorineural hearing loss documented by audiometry
     2. Congenital sensorineural hearing loss
     3. Hearing loss associated with neurologic symptoms or focal findings
  4. Dizziness or vertigo, as indicated by 1 or more of the following:
     1. Focal neurologic findings (e.g., weakness, numbness, paresthesias or one side of body)
     2. Cerebellar findings (e.g., incoordination of voluntary movements, intention tremor, disorder of equilibrium or gait, diminished muscle tone)
     3. New-onset headache or neck pain
     4. Unresponsive to symptomatic treatment
     5. Unresponsive to antibiotic treatment for sinus or ear infection
  5. Preoperative imaging for cochlear implant
  6. Monitoring of acoustic neuroma being followed without surgery; intervals include 1 or more of the following:
     1. Six and twelve months after initial diagnosis
     2. Annually for next year
     3. Every 1 to 2 years thereafter
  7. Monitoring after radiosurgical removal of acoustic neuroma: 6 and 12 months, then annually for 5 years, then every 2 years thereafter.
  8. Dementia
  9. Delirium or change in level of consciousness
  10. Syncope
  11. Head trauma
  12. Primary or metastatic brain tumor, melanoma
  13. Non-small cell lung cancer, small cell lung cancer
  14. Epilepsy or seizure disorder
  15. Hydrocephalus
  16. Cerebral infection
  17. Clinical isolated syndrome, multiple sclerosis, or other central nervous system demyelinating disease (e.g., Sjogren’s syndrome, systemic lupus erythematosus)
  18. Parkinson disease or other neurodegenerative disorders
  19. Suspected pituitary tumor
  20. Follow-up after treatment of pituitary tumor
  21. Precocious puberty
  22. Suspected transient ischemic attack or ischemic stroke

1. **Discussion**

MRI of the brain is indicated for evaluation of patients with unexplained focal neurologic deficits.

For suspected acoustic neuroma (vestibular schwannoma), a health technology assessment determined that MRI is appropriate as a first-line test for the detection of acoustic neuroma in appropriately selected patients, such as those with unilateral sensorineural hearing loss.

For patients with suspected Alzheimer disease based on assessment of cognitive function and comorbidities, an expert consensus panel recommends brain imaging once in every patient to exclude other structural etiologies of dementia and confirm specific imaging findings consistent with Alzheimer disease.

Brain MRI is indicated for evaluation of suspected primary or metastatic brain neoplasms.

For new-onset unprovoked seizures in adults, a consensus guideline recommends neuroimaging with either brain CT or MRI. Epilepsy is defined as 2 or more unprovoked afebrile seizures. For children with epilepsy, an expert consensus guideline recommends neuroimaging with brain MRI for the following: status epilepticus; failure to control seizures, worsening seizures, or changes in seizure manifestations; seizures in children younger than 2 years of age, excluding those with febrile seizures; abnormal neurologic examination; a history of significant development delay, arrest, or regression; or a new-onset focal seizure.

For evaluation of hydrocephalus or its complications, brain MRI is a standard imaging modality.

For clinical suspicion of a demyelinating disease such as multiple sclerosis in patients presenting with a clinically isolated syndrome, most commonly manifested as unilateral optic neuritis, brainstem syndrome, or partial myelitis, diagnostic criteria for multiple sclerosis have been developed based on the demonstration of central nervous system lesions disseminated in space and disseminated in time on MRI imaging of the brain and, if appropriate, on spinal cord imaging. Requirements for radiographic dissemination in time criteria for multiple sclerosis include either the simultaneous presence of both gadolinium-enhancing (new) and nonenhancing (older) lesions on the same MRI or new T2 weighted lesions on a repeat MRI performed at least 30 days from the initial onset of symptoms.

For Parkinson disease and other neurodegenerative conditions, MRI is helpful in differentiating Parkinson disease from atypical Parkinson disease, and can provide additional evidence for the presence of other conditions such as progressive supranuclear palsy.

For suspected or known neuroendocrine disease of the pituitary or hypothalamus, an expert consensus guideline recommends MRI as first-line imaging.

For precocious puberty, brain MRI is indicated to rule out hypothalamic lesions such as hamartoma.

For clinical suspicion of a transient ischemic attack, an expert consensus guideline recommends urgent brain MRI with diffusion-weighting imaging, preferably with 24 hours of symptom onset. For acute ischemic stroke, an expert consensus guideline recommends urgent brain imaging, such as MRI if emergently available and not contraindicated, or CT, prior to initiating any specific therapy, including thrombolytic medication. An evidence-based national specialty society guideline recommends brain MRI with diffusion-weighted imaging for the diagnosis of ischemic stroke within 12 hours of symptom onset. A prospective study of 356 consecutive patients presenting with clinically suspected stroke concluded that although both brain MRI and CT had comparable accuracy for detection of intracranial hemorrhage, brain MRI had greater sensitivity than CT for the detection of acute ischemic stroke.

**Resource:**

MCG, Ambulatory Care, 23rd edition, 2/26/2019