

# 2025 Magnetic Resonance Angiography/Venography (MRA/ MRV) Brain

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## *Diagnostic Imaging*

MRA-Brain-HH  
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# Magnetic Resonance Angiography/Magnetic Resonance Venography (MRA/MRV) Brain/Head

## MRA Brain/Head Related National Coverage Determination (NCD)/Local Coverage Determination (LCD)

Please refer to <https://www.cms.gov/medicare-coverage-database/search.aspx> if applicable to the individual's health plan membership.

Type/ID Number	Title
NCD 220.2	Magnetic Resonance Imaging
LCD 33633	Magnetic Resonance Angiography
LCD 34372	Magnetic Resonance Angiography
LCD 34424	Magnetic Resonance Angiography
LCD 34865	Magnetic Resonance Angiography

### Clinical Judgment

These medical policies are designed to provide clinical guidance and do not supplant a provider's independent professional judgment. Physicians retain full and independent authority to determine appropriate care based on each patient's individual clinical circumstances. Although services may be subject to documentation requirements, medical necessity review, or coverage limitations, nothing in this policy is intended to restrict or interfere with a physician's independent medical judgment.

### MRA Contraindications

An MRA is contraindicated for **ANY** of the following:

- Safety, related to clinical status (eg, body mass index exceeds MR capability, intravascular stents within recent 6 weeks)
- Safety, related to contrast material (eg, allergy, renal impairment)
- Safety, related to implanted devices (aneurysm clip, cochlear implant, insulin pump, spinal cord stimulator)



#### IMPORTANT

Some implanted devices that were once absolute contraindications to a MRI, may now be accepted. Considerations include if the MRI is able to accommodate the device, or the device is deemed safe for MRI.

**References:** [3] [22] [13] [8] [1]

## Preamble: Pediatric Diagnostic Imaging

HealthHelp's clinical guidelines for the Diagnostic Imaging program, are intended to apply to both adults and pediatrics (21 years of age or younger), unless otherwise specified within the criteria.

### MRA/MRV Brain/Head Guideline

Magnetic resonance angiography/magnetic resonance venography (MRA/MRV) of the brain/head is considered medically appropriate when the documentation demonstrates **ANY** of the following:

1. Intracranial vascular disease is known and **ANY** of the following:
  - a. Aneurysm or vascular malformation is known, based on prior imaging.
  - b. Carotid or vertebral artery dissection is known, based on prior imaging, for follow-up within 3 to 6 months for evaluation of recanalization and/or to guide anticoagulation treatment.
  - c. Moyamoya disease, reversible cerebral vasoconstriction syndrome (RCVS) or vasculitis is known, based on clinical exam or prior imaging.
  - d. Vertebrobasilar insufficiency is known **AND** symptoms (eg, dizziness, numbness, pain) are new or worsening.

**References:** [12] [6] [17]

2. Intracranial vascular disease is suspected for **ANY** of the following:
  - a. Aneurysm screening and **ANY** of the following:
    - i. Aortic diseases are known (aneurysm, coarctation, dissection).
    - ii. Bicuspid aortic valve
    - iii. Ehlers-Danlos, vascular syndrome; at diagnosis and every 18 months thereafter (more frequently if abnormalities are found)
    - iv. Fabry disease; follow-up every 2 to 3 years beginning at age 18 years old
    - v. Fibromuscular dysplasia (FMD) evaluation [11]
    - vi. First-degree relatives (child, parent, sibling) with a history of intracranial aneurysm and **EITHER** of the following: (**\*NOTE:** *repeat screening is recommended every 5 years.*)
      - A. Asymptomatic, at least **TWO** first-degree relatives with histories of an intracranial aneurysm.

- B. Symptomatic (eg, headache, nausea, vomiting), at least **ONE** first-degree relative with a history of intracranial aneurysm.
- vii. Loeys-Dietz syndrome, at diagnosis and every 2 years thereafter
- viii. Spontaneous coronary artery dissection (SCAD); one time vascular study from brain to pelvis
- ix. Takayasu's arteritis
- b. Benign intracranial hypertension (pseudotumor cerebri) differentiation from dural sinus thrombosis
- c. Cerebral intraparenchymal hemorrhage is known, based on prior imaging **AND** underlying vascular abnormality (eg, arteriovenous malformation, dural venous fistula, venous varices) is suspected.
- d. Horner's syndrome evaluation (anhidrosis, miosis, ptosis)
- e. Moyamoya disease is suspected or known (eg, cognitive decline, recurrent headache, seizures).
- f. Reversible cerebral vasoconstriction syndrome (RCVS) is suspected or known (eg, demonstrated on prior imaging, recurrent thunder clap headache ["worst headache of my life]).
- g. Sickle cell disease (hemorrhagic or ischemic) and **ANY** of the following:
  - i. Neurological signs (eg, dizziness, numbness, pain)
  - ii. Transcranial doppler velocity is more than 200 cm/second (increased stroke risk) and age is 2 years to 16 years.
- h. Stroke, ischemic, or transient ischemic attack (TIA) occurred recently (within 6 months).
- i. Subarachnoid hemorrhage (SAH) is known (eg, nausea, stiff neck, thunder clap headache ["worst headache of my life], vomiting) and CTA is **contraindicated or unavailable**.
- j. Vascular abnormalities are suspected or known with **ANY** of the following:
  - i. Aneurysm is suspected with isolated 3rd nerve palsy (oculomotor) **AND** pupil involvement.
  - ii. Headache and **ANY** of the following:
    - A. Associated with exercise, exertion, sexual activity or forced breathing through closed airways (Valsalva).

- B. Thunderclap headache is known, underlying vascular abnormality (eg, arteriovenous malformation, dural venous fistula, venous varices) is suspected **AND** initial brain imaging is negative.
- iii. Pulsatile tinnitus is known and vascular etiology (eg, atherosclerotic disease, dural arteriovenous fistulas, dural vein thrombosis) is suspected.
- iv. Vascular malformation (arteriovenous malformation [AVM] or dural arteriovenous fistula) is suspected **AND** prior imaging is non-diagnostic or indeterminate.
- k. Vasculitis and **EITHER** of the following:
  - i. Large vessel vasculitis (giant cell arteritis, Takayasu arteritis) and intracranial involvement is suspected.
  - ii. Primary or secondary, is suspected or known, with initial laboratory work up (eg, c-reactive protein [CRP], erythrocyte sedimentation rate [ESR] or serology) **AND** neurological signs (eg, dizziness, numbness, pain).
- l. Venous thrombosis, central (dural sinus thrombosis), is suspected (eg, cranial nerve palsy, headache, seizures).
- m. Vertebrobasilar insufficiency (VBI) is suspected or known **AND** there are new or worsening symptoms (eg, dizziness, headaches, vertigo).

**References:** [12] [16] [2] [5] [19] [20] [9] [17] [4] [15] [7] [21] [10] [14] [18]

- 3. Pre-procedural evaluation, to guide treatment planning or post-surgical assessments (within 90 days of procedure) for evaluation of complications or disease recurrence

## MRA/MRV Brain/Head Procedure Codes

**Table 1. MRA Brain/Head Associated Procedure Codes**

CODE	DESCRIPTION
70544	Magnetic resonance angiography, head; without contrast material(s)
70545	Magnetic resonance angiography, head; with contrast material(s)
70546	Magnetic resonance angiography, head; without contrast material(s), followed by contrast material(s) and further sequences

## MRA/MRV Brain/Head Summary of Changes

MRA/MRV Brain/Head guideline had the following version changes from 2024 to 2025:

**Table 1. 2025 MRA Brain Summary of Changes**

Date	Type of Change	Summary
05/16/2025	Annual	<ul style="list-style-type: none"> <li>• Added the following to keep in line with current evidence:               <ul style="list-style-type: none"> <li>▪ "Carotid or vertebral artery dissection is known" under "Intracranial vascular disease" per the evidence</li> <li>▪ "Horner's syndrome" per the evidence</li> <li>▪ Under "Aneurysm screening" per the evidence                   <ul style="list-style-type: none"> <li>◦ "Ehlers-Danlos, vascular syndrome"</li> <li>◦ "Fabry disease"</li> <li>◦ "Takayasu's arteritis"</li> </ul> </li> </ul> </li> <li>• Reworded "Vasculitis" indication for clarity</li> <li>• Removed the following:               <ul style="list-style-type: none"> <li>▪ Combination studies as they are redundant</li> <li>▪ NCD 220.1 as it does not have clinical indications</li> <li>▪ Under "Aneurysm screening" under "Intracranial vascular disease"                   <ul style="list-style-type: none"> <li>◦ "Adult with polycystic kidney disease" per the evidence</li> <li>◦ Age parameter from "aortic coarctation" per the evidence</li> </ul> </li> </ul> </li> </ul>
09/09/2025	MId-cycle	<ul style="list-style-type: none"> <li>• Added examples throughout for clarity</li> <li>• Added parameters (underlined below) for clarity to the following:               <ul style="list-style-type: none"> <li>▪ "Carotid or vertebral artery dissection is known, <u>based on prior imaging</u>"</li> <li>▪ "Cerebral intraparenchymal hemorrhage is <u>known, based on prior imaging</u>" under "Intracranial vascular disease is suspected"</li> <li>▪ "Moyamoya disease, reversible cerebral vasoconstriction syndrome (RCVS) or vasculitis is known (<u>eg, cognitive decline, recurrent headache, seizures</u>)"</li> </ul> </li> </ul>

## MRA/MRV Brain/Head Definitions

**Aneurysm** refers to weakness in an artery wall, allowing it to abnormally balloon out or widen.

**Anhidrosis** is defined as the absence or significant reduction of sweating, which can result from various central or peripheral autonomic disorders, drug side effects, or other conditions affecting sweat gland function.

**Aortic Coarctation** is a congenital narrowing of the aorta, typically located near the ligamentum arteriosum just distal to the origin of the left subclavian artery.

**Arteriovenous malformation (AVM)** are congenital high-flow vascular malformations characterized by abnormal shunting of blood from high-flow feeding arteries to low-resistance

veins via a cluster of aberrant blood vessels termed a central nidus, bypassing the normal capillary bed.

**Bicuspid aortic valve (BAV)** is a heart defect that occurs when the aortic valve has two leaflets instead of three. BAV is the most common type of congenital heart disease. It's present from birth and can go unnoticed until later in life.

**Carotid artery dissection**, also known as cervical artery dissection, is a tear in the inner layer of the wall of one of the carotid arteries, the major blood vessels in the neck that supply blood to the brain, leading to potential blood flow disruption and stroke.

**Computed tomography angiography (CTA)** is a medical test that combines a computed tomography (CT) scan with an injection of a special dye to produce pictures of blood vessels and tissues in a part of the body.

**C-reactive protein (CRP)** is a pentameric protein synthesized by the liver, whose level rises in response to inflammation.

**Dissection** refers to the separation of the layers within the wall of an artery, most commonly the aorta, due to a tear in the intimal layer, leading to the formation of a false lumen.

**Dural arteriovenous fistula (dAVF)** is an abnormal connection that forms between an artery and a vein in the tough covering over the brain or spinal cord.

**Dural venous sinuses** are valveless channels formed by the separation of the periosteal and meningeal layers of the dura mater, responsible for draining venous blood from the brain and cerebrospinal fluid (CSF) into the internal jugular veins.

**Ehlers-Danlos syndrome** is a group of hereditary connective tissue disorders that manifests clinically with skin hyperelasticity, hypermobility of joints, atrophic scarring and fragility of blood vessels.

**Erythrocyte sedimentation rate (ESR)** is a blood test that measures the rate at which red blood cells settle at the bottom of a test tube over one hour, indicating the presence of inflammation in the body.

**Fabry disease** is an X-linked lysosomal storage disorder caused by a deficiency of the enzyme  $\alpha$ -galactosidase A, leading to the accumulation of glycosphingolipids in various tissues and organs, resulting in systemic vascular complications.

**Fibromuscular dysplasia** is a rare blood vessel disorder that causes arteries to narrow and grow larger. FMD occurs when the strong, flexible cells in arteries are replaced with less strong, less flexible cells. This makes the arteries stiffer and more likely to be damaged.

**Giant cell arteritis** is a systemic inflammatory vascular disease that predominantly affects adults over 50 years old, characterized by granulomatous inflammation of the blood vessel walls, particularly the branches of the carotid and vertebral arteries, and is associated with symptoms such as headache, jaw claudication, visual disturbances, and tender/thickened temporal arteries.

**Hemorrhage** is a copious or heavy discharge of blood from the blood vessels.

**Horner's syndrome** is a syndrome marked by sinking in of the eyeball, constriction of the pupil (miosis), drooping of the upper eyelid (ptosis), face vasodilation and anhidrosis (abnormal

deficiency or absence of sweating) caused by paralysis of the cervical sympathetic nerve fibers on the affected side.

**Indeterminate** findings are inconclusive or insufficient for treatment planning.

**Ischemia** is a deficient supply of blood to a body part (such as the heart or brain) due to obstruction of the inflow of arterial blood.

**Ischemic stroke** occurs when the blood supply to part of the brain is interrupted or reduced, preventing brain tissue from getting oxygen and nutrients. Brain cells begin to die in minutes.

**Loeys-Dietz syndrome** is a rare autosomal dominant connective tissue disorder characterized by aggressive aortic aneurysms, arterial tortuosity, and distinctive craniofacial and skeletal features.

**Magnetic resonance angiogram (MRA)** is a test that uses a magnetic field and pulses of radio wave energy to provide images of blood vessels inside the body, allowing for evaluation of blood flow and blood vessel wall condition. MRA is used to look for aneurysms, clots, tears in the aorta, arteriovenous malformations and stenosis caused by plaque in the carotid arteries (neck) or blood vessels leading to the lungs, kidneys or legs.

**Magnetic resonance venogram (MRV)** is a diagnostic procedure that uses a combination of a large magnet, radiofrequencies, and a computer to produce detailed images of organs and structures within the body. An MRV uses magnetic resonance technology and intravenous (IV) contrast dye to visualize the veins. Contrast dye causes the blood vessels to appear opaque on the X-ray image, allowing the visualization the blood vessels being evaluated. MRV is useful in some cases because it can help detect causes of leg pain other than vein problems.

**Miosis** is the excessive constriction of the pupil of the eye.

**Moyamoya disease** is a rare, chronic, and progressive condition that causes the blood vessels that supply blood to the brain to narrow. The internal carotid arteries in the skull become blocked or narrowed.

**Non-diagnostic** is a result that does not lead to a confirmed diagnosis.

**Parenchymal** the essential and distinctive tissue of an organ or an abnormal growth as distinguished from its supportive framework.

**Pediatric approximate ages** are defined by the US Department of Health (USDH), the Food and Drug Administration (FDA), and the American Academy of Pediatrics (AAP) as the following:

1. Infancy, between birth and 2 years of age
2. Childhood, from 2 to 12 years of age
3. Adolescence, from 12 to 21 years of age, further defined by the AAP into:
  - a. Early (ages 11–14 years)
  - b. Middle (ages 15–17 years),
  - c. Late (ages 18–21 years)
  - d. Older ages may be appropriate for children with special healthcare needs.

**Periprocedural** is a medical term that means occurring before, during, or after a medical procedure. "Perioperative" is another term that refers to the time around surgery.

**Polycystic kidney disease (PKD)** is a genetic disorder that causes fluid-filled cysts to grow in the kidneys. The cysts can grow very large and cause the kidneys to enlarge and lose function. PKD cysts can reduce kidney function and lead to kidney failure.

**Pseudotumor cerebri** is a disorder of elevated spinal fluid pressure in the brain that can lead to progressive loss of vision over time.

**Ptosis** is the drooping of the upper eyelid.

**Pulsatile tinnitus** is a rhythmic pulsing noise in one or both ears that occurs in the absence of external sound and tends to be synced with the heartbeat.

**Recanalization** refers to the process of restoring flow to a blocked or narrowed vessel, often in the context of blood vessels or fallopian tubes. It essentially means reopening a previously blocked or interrupted passageway.

**Reversible cerebral vasoconstriction syndrome (RCVS)** is a group of disorders characterized by severe headaches and a narrowing of the blood vessels in the brain. RCVS is reversible and patients often recover within three months.

**Screening** is the systematic application of a test or inquiry to identify individuals at sufficient risk of a specific disorder to warrant further investigation or direct preventive action, among persons who have not sought medical attention for symptoms of that disorder.

**Serology** is the medical science dealing with blood serum especially in regard to its immunological reactions and properties.

**Sickle cell disease** is a chronic anemia that occurs in individuals who are homozygous for the gene controlling hemoglobin S (eg, African or Mediterranean descent). It is characterized by destruction of red blood cells and by episodic blocking of blood vessels by the adherence of sickle cells to the vascular endothelium. This causes the serious complications of the disease (such as organ failure).

**Spontaneous coronary artery dissection (SCAD)** is a tear in the wall of a coronary artery. It's an emergency condition that can slow or block blood flow to the heart. This can lead to a heart attack, heart rhythm problems or sudden death.

**Stroke**, sometimes called a brain attack, occurs when something blocks blood supply to part of the brain or when a blood vessel in the brain bursts. In either case, parts of the brain becomes damaged or dies. A stroke can cause lasting brain damage, long-term disability or even death.

**Subarachnoid hemorrhage (SAH)** is defined as bleeding into the subarachnoid space surrounding the brain, most commonly caused by the rupture of cerebral aneurysms.

**Takayasu's arteritis** is a chronic inflammatory disease especially of the aorta and its major branches (the brachiocephalic artery and left common carotid artery) that result in progressive stenosis, occlusion and aneurysm formation marked by diminution or loss of the pulse (as in the arm) and ischemic symptoms.

**Third nerve palsy** can impair eye movements, the response of pupils to light, or both. These palsies can occur when pressure is put on the nerve or the nerve does not get enough blood.

**Thrombosis** is the formation of a blood clot (partial or complete blockage) within blood vessels, whether venous or arterial, limiting the natural flow of blood and resulting in clinical sequela.

**Thunderclap headache** is headache characterized by sudden, severe head pain, often described as "the worst headache of my life." It is sometimes called a sentinel headache. The pain usually peaks within five minutes, persists for at least one hour and may be accompanied by nausea or vomiting. is an uncommon type of headache that strikes suddenly, the pain peaks within 60 seconds and can warn of potentially life-threatening conditions (usually having to do with bleeding in and around the brain).

**Transient ischemic attack (TIA)** is a brief interruption of the blood supply to the brain that causes a temporary impairment of vision, speech or movement. The episode usually lasts for just a few moments but may be a warning sign of a full scale stroke.

**Valsalva maneuver** is the action of attempting to exhale with the nostrils and mouth or the glottis, while closed. This increases pressure in the middle ear and the chest, as when bracing to lift heavy objects and is used as a means of equalizing pressure in the ears. It can be used to diagnose or treat certain cardiovascular conditions.

**Vascular malformations** are abnormalities in the development of blood vessels, lymph vessels or both, which can be present at birth or become apparent later in life. These malformations can involve arteries, veins, capillaries or lymphatic vessels, and can lead to various symptoms depending on the location and type of malformation.

**Vasculitis** involves inflammation of the blood vessels. The inflammation can cause the walls of the blood vessels to thicken, which reduces the width of the passageway through the vessel. If blood flow is restricted, it can result in organ and tissue damage.

**Venous thrombosis or compression** is the formation of a blood clot in a blood vessel.

**Vertebral artery dissection (VAD)** is a medical condition where a tear occurs in the inner lining of a vertebral artery, a blood vessel in the neck that supplies blood to the brain, potentially leading to blood clots and stroke.

**Vertebrobasilar insufficiency (VBI)** is defined by inadequate blood flow through the posterior circulation of the brain, supplied by the 2 vertebral arteries that merge to form the basilar artery. VBI affects the parts of the brain that control movement and balance.

## MRA/MRV Brain/Head References

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## Disclaimer section

### Purpose

The purpose of the HealthHelp's clinical guidelines is to assist healthcare professionals in selecting the medical service that may be appropriate and supported by evidence to safely improve outcomes. Medical information is constantly evolving, and HealthHelp reserves the right to review and update these clinical guidelines periodically. HealthHelp reserves the right to include in these guidelines the clinical indications as appropriate for the organization's program objectives. Therefore the guidelines are not a list of all the clinical indications for a stated procedure, and associated Procedure Code Tables may not represent all codes available for that state procedure or that are managed by a specific client-organization.

### Clinician Review

These clinical guidelines neither preempt clinical judgment of trained professionals nor advise anyone on how to practice medicine. Healthcare professionals using these clinical guidelines are responsible for all clinical decisions based on their assessment. All Clinical Reviewers are instructed to apply clinical indications based on individual patient assessment and documentation, within the scope of their clinical license.

### Payment

The use of these clinical guidelines does not provide authorization, certification, explanation of benefits, or guarantee of payment; nor do the guidelines substitute for, or constitute, medical advice. Federal and State law, as well as member benefit contract language (including definitions and specific contract provisions/exclusions) take precedence over clinical guidelines and must be

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## National and Local Coverage Determination (NCD and LCD)



### NOTICE

To ensure appropriate review occurs to the most current NCD and/or LCD, always defer to <https://www.cms.gov/medicare-coverage-database/search.aspx>.

## Background

National Coverage Determinations (NCD) and Local Coverage Determinations (LCD) are payment policy documents outlined by the Centers for Medicare and Medicaid Services (CMS) and the government's delegated Medicare Audit Contractors (MACs) that operate regionally in jurisdictions.

CMS introduced variation between different jurisdictions/Medicare Audit Contractors (MACs) and their associated covered code lists with the transition to ICD 10. The variation resulted in jurisdictions independently defining how codes are applied for exclusions, limitations, groupings, ranges, etc. for the medical necessity indications outlined in the NCD and LCD. Due to this variation, there is an inconsistent use/application of codes and coverage determinations across the United States between the different MACs.

In addition, **WITHOUT** notice, CMS can change the codes that indicate medical necessity and the format of the coverage determinations/associated documents (eg, Articles). This is an additional challenge for organizations to keep up with ongoing, unplanned changes in covered codes and medical necessity indications.

## Medical Necessity Codes

Due to the variation in code application between jurisdictions/MACs and that updates can happen without notification, HealthHelp is not able to guarantee full accuracy of the codes listed for any



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Coverage Determination, and advises that prior to use, the associated Coverage Determination Articles are reviewed to ensure applicability to HealthHelp's programs and any associated NCDs and LCDs.

**For Internal Use Only:**

11248 11249 11253 11282 11325 11328 11333 11349 11350 11351 11352 11354 11355 11356  
11358 11359 11360 11361 11362 11365 11366 11367 11368 11369 11370 11374 11375 11394  
11395 11396 11565