

Evolut Clinical Guideline 2009 for Brain Computed Tomography Angiography (CTA)

Guideline Number: Evolut_CG_2009	<u>Applicable Codes</u>	
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Original Date: September 1997	Last Revised Date: November 2025	Implementation Date: January 2026

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STATEMENT

General Information

- *It is an expectation that all patients receive care/services from a licensed clinician. All appropriate supporting documentation, including recent pertinent office visit notes, laboratory data, and results of any special testing must be provided. If applicable: All prior relevant imaging results and the reason that alternative imaging cannot be performed must be included in the documentation submitted.*
- *Where a specific clinical indication is not directly addressed in this guideline, medical necessity determination will be made based on widely accepted standard of care criteria. These criteria are supported by evidence-based or peer-reviewed sources such as medical literature, societal guidelines and state/national recommendations.*
- *The guideline criteria in the following sections were developed utilizing evidence-based and peer-reviewed resources from medical publications and societal organization guidelines as well as from widely accepted standard of care, best practice recommendations.*

Purpose

Computed tomography angiography (CTA) generates images of vessels that can be evaluated for evidence of stenosis, occlusion, or aneurysms. CTA uses ionizing radiation and requires the administration of iodinated contrast agent, which is a potential hazard in patients with impaired renal function. MRA and CTA are generally comparable noninvasive imaging alternatives, each with their own advantages and disadvantages. These studies examine blood vessels in the brain.

Note: Authorizations for CT Angiography cover both arterial and venous imaging. The term *angiography* refers to both arteriography and venography.

INDICATIONS FOR BRAIN CT ANGIOGRAPHY

Evaluation of Suspected Intracranial Vascular Disease ^(1,2)

Aneurysm Screening

- Screening for intracranial aneurysm if two or more first-degree family members (parent, brother, sister, or child) of intracranial aneurysm ^(1,3)
 - **Note:** Repeat study is recommended every 5-7 years ⁽³⁾
- For one first degree relative with aneurysm, asymptomatic screening is not indicated and would require a neurological sign or symptom supporting clinical concern for aneurysm ⁽⁴⁾
- Screening for aneurysm in high-risk populations ⁽¹⁾:
 - Known genetic syndromes (see **Genetic Syndromes and Rare Diseases**)

- Bicuspid aortic valve
- Known aortic diseases (aneurysm, coarctation, dissection)

Suspected Vascular Abnormalities

- Suspected high flow vascular malformation (arteriovenous malformation (AVM) or dural arteriovenous fistula) in patient with previous or indeterminate imaging study ^(1,2)
 - **Note:** MRI is the study of choice for detecting low-flow vascular malformations such as cavernomas, developmental venous anomalies and capillary telangiectasia ⁽²⁾
- Thunderclap headache with continued concern for underlying vascular abnormality (i.e., aneurysm or reversible cerebral vasoconstriction syndrome) after initial negative brain imaging. ^(5–8)
 - **Note:** Negative brain CT < 6 hours after headache onset excludes subarachnoid hemorrhage in neurologically intact patients. ⁽⁸⁾ MRI lacks sensitivity in excluding subarachnoid hemorrhage less than 24 hours after headache onset. ^(5,9)
- Headache associated with exercise, exertion, or sexual activity ^(5,10)
- Isolated third nerve palsy (oculomotor) with pupil involvement to evaluate for aneurysm ^(11,12)
- Non-Central Horner's Syndrome (secondary/preganglionic or tertiary/post-ganglionic) to evaluate for a vascular source (Such as dissection, aneurysm, arteritis)
 - **Note:** CTA/MRA of the chest and neck may also be indicated
- Pulsatile tinnitus to identify a suspected arterial vascular etiology ^(13–15)

Cerebrovascular Disease

Ischemic

- Recent ischemic stroke or transient ischemic attack (see **background** section) ^(16,17)
 - **Note:** For remote strokes with no prior vascular imaging, imaging can be considered based on location/type of stroke and documented potential to change management
- Known or suspected vertebrobasilar insufficiency (VBI) in patients with symptoms such as dizziness, vertigo, headaches, diplopia, blindness, vomiting, ataxia, weakness in both sides of the body, or abnormal speech. ^(18–20)
- Suspected carotid or vertebral artery dissection (secondary to trauma or spontaneous) ^(17,21,22)
- Suspected cerebral vasospasm ⁽¹⁾

Hemorrhagic

- Known subarachnoid hemorrhage (SAH) ^(1,2)
- Known cerebral intraparenchymal hemorrhage with concern for underlying vascular abnormality ^(2,17)

Venous ^(7,17)

Any of the following when MRA is contraindicated or cannot be performed:

- Suspected central venous thrombosis and **ONE** of the following:
 - Patient has a hypercoagulable state such as pregnancy, post-partum, prothrombotic conditions (acquired or genetic), malignancy, oral contraceptive use, recent infection, recent trauma or covid-19
 - Documentation of concern for central venous thrombosis is specified
 - Papilledema or signs of increased intracranial pressure
- Distinguishing benign intracranial hypertension (pseudotumor cerebri) from dural sinus thrombosis

Vasculitis and Other Intracranial Vascular Disease

- Known vasculitis or autoimmune disease with concern for secondary CNS vasculitis based on neurological signs or symptoms
- Suspected primary CNS vasculitis based on neurological signs and symptoms with completed infectious/inflammatory lab work-up ^(1,23)
- Large vessel vasculitis
 - Giant cell arteritis with suspected intracranial involvement ⁽²⁴⁾
 - Takayasu's Arteritis ⁽²⁵⁾
 - At initial diagnosis
 - Every 6 months for the first 2 years while on therapy
 - Annually after the first 2 years
- Suspected Moyamoya disease ^(2,26)
- Suspected reversible cerebral vasoconstriction syndrome ^(7,27)
- For patients with fibromuscular dysplasia (FMD) ^(28,29):
 - One-time vascular study from brain to pelvis
- Spontaneous coronary arteries dissection (SCAD) ⁽⁶⁾:
 - One-time vascular study from the brain to pelvis

Evaluation of Known Intracranial Vascular Disease ^(1,2)

- Known intracranial aneurysm, treated aneurysm, or known vascular malformation (i.e., AVM or dural arteriovenous fistula)
- Known vertebrobasilar insufficiency with new or worsening signs or symptoms (VBI) ^(19,20)
- Follow-up of known carotid or vertebral artery dissection with any ONE of the following ^(17,30,31):

- At 3-6 months post dissection (for evaluation of recanalization or to guide anticoagulation treatment)
- When documentation is provided that the results will be used to guide anticoagulation treatment
- When there is recurrent pain, headache or new neurologic deficits that suggest progression
- Known vasculitis, reversible cerebral vasoconstriction syndrome or Moyamoya disease ^(2,26,27,32)

PREOPERATIVE OR POSTOPERATIVE ASSESSMENT

When not otherwise specified in the guideline:

Preoperative Evaluation ⁽¹⁶⁾:

- Refractory trigeminal neuralgia or hemifacial spasm when done for surgical evaluation ⁽³³⁾
- Imaging of the area requested is needed to develop a surgical plan

Postoperative Evaluation:

- Known or suspected complications
- A clinical reason is provided how imaging may change management

Note: This section applies only within the first few months following surgery

FURTHER EVALUATION OF INDETERMINATE FINDINGS

Unless follow up is otherwise specified within the guideline:

- For initial evaluation of an inconclusive finding on a prior imaging report (i.e., x-ray, ultrasound or CT) that requires further clarification
- One follow-up exam of a prior indeterminate MR/CT finding to ensure no suspicious interval change has occurred. (No further surveillance unless specified as highly suspicious or change was found on last follow-up exam.)

IMAGING IN KNOWN GENETIC CONDITIONS

- ADPKD (Autosomal Dominant Polycystic Kidney Disease) when MRA is contraindicated or cannot be performed ⁽³⁴⁾:
 - Every 10 years (including at diagnosis)

- Loeys-Dietz ⁽³⁵⁾:
 - Every two years (including at diagnosis) **OR**
 - More frequently if abnormalities are found
- Vascular Ehlers-Danlos syndrome (vEDS) ⁽³⁶⁾:
 - Every 18 months (including at diagnosis) **OR**
 - As clinically indicated to follow known vascular abnormalities

Combination Studies for Known Genetic Conditions

NOTE: When medical necessity is met for an individual study **AND** conscious sedation is required (such as for young pediatric patients or patients with significant developmental delay), the entire combination is indicated)

Brain CT and CTA

- Sickle Cell Disease ^(37,38):
 - When needed to screen for silent stroke
 - Abnormal Transcranial Doppler Velocity > 200 cm/s
 - New neurologic or cognitive concerns (including TIA, no formal testing required)
 - When cessation or changing frequency of transfusions is under consideration

Brain/Neck/Chest/Abdomen/Pelvis CTA

- Loeys-Dietz ⁽³⁵⁾:
 - Every two years (including at diagnosis) **OR**
 - More frequently if abnormalities are found
- Vascular Ehlers-Danlos syndrome (vEDS) ⁽³⁶⁾:
 - Every 18 months (including at diagnosis) **OR**
 - As clinically indicated to follow known vascular abnormalities

OTHER COMBINATION STUDIES WITH BRAIN CTA

NOTE: When medical necessity is met for an individual study **AND** conscious sedation is required (such as for young pediatric patients or patients with significant developmental delay), the entire combination is indicated)

Brain CT and Brain CTA

- Recent ischemic stroke
- Recent transient ischemic attack (TIA) when MRI is contraindicated or cannot be

performed ^(16,17)

- History of stroke and **ONE** of the following:
 - No prior workup when MRI is contraindicated or can't be performed
 - New neurologic signs or symptoms
- Acute, sudden onset of headache with personal history of a vascular abnormality or first-degree family history of aneurysm ^(1,7)
- Thunderclap headache >6 hours after onset in an acute setting with high suspicion of SAH ⁽⁷⁾
- Headache associated with exercise, exertion, or sexual activity when MRI is contraindicated or cannot be performed ⁽⁵⁾
- Suspected central venous thrombosis and MRI is contraindicated or cannot be performed and **ONE** of the following ⁽¹⁷⁾:
 - Patient has a hypercoagulable state such as pregnancy, post-partum, prothrombotic conditions (acquired or genetic), malignancy, oral contraceptive use, recent infection, recent trauma or Covid-19
 - Documentation of concern for central venous thrombosis is specified
 - Papilledema or signs/symptoms of increased intracranial pressure
- Known Moyamoya disease ^(2,26) or reversible cerebral vasoconstriction with any new or changing neurological signs or symptoms ^(7,27)
- Suspected secondary CNS vasculitis based on neurological signs or symptoms in the setting of an underlying systemic disease with abnormal inflammatory markers or autoimmune antibodies when MRI is contraindicated or cannot be performed ⁽¹⁾
- Suspected primary CNS vasculitis based on neurological signs and symptoms with completed infectious/inflammatory lab work-up when MRI is contraindicated or cannot be performed ^(1,23,39)

Brain and Neck CTA (with or without Brain CT or Chest CTA)

When medical necessity has been met for both Brain CTA and Neck CTA the indicated study is Brain and Neck CTA (CPT code: 70471) see Evolent Clinical Guideline 2068 for Brain and Neck CTA.

Brain/Neck/Chest/Abdomen/Pelvis CTA

- For patients with fibromuscular dysplasia (FMD), a one-time vascular study from brain to pelvis is indicated ^(28,29)
- For assessment in patients with spontaneous coronary artery dissection (SCAD), SCAD is a common initial diagnostic event for underlying fibromuscular dysplasia (FMD) ⁽⁴⁰⁾
 - **Note:** Body vascular imaging for SCAD can be done at time of coronary angiography
- Takayasu's Arteritis ⁽²⁵⁾:

- At initial diagnosis
- Every 6 months for the first 2 years while on therapy
- Annually after the first 2 years

CODING AND STANDARDS

Codes

70496, +70472

Applicable Lines of Business

☒	CHIP (Children’s Health Insurance Program)
☒	Commercial
☒	Exchange/Marketplace
☒	Medicaid
☒	Medicare Advantage

BACKGROUND

Pulsatile tinnitus

Pulsatile tinnitus has many etiologies, and the choice of study should be based on accompanying signs and symptoms. For general screening MRI brain with IAC/MRA brain and neck is approvable. If IIH is suspected (typically with headache and vision changes in a younger woman with a high BMI), MRI/MRV brain is indicated. If there is concern for vascular etiology, CTA or MRA brain/neck is indicated. If there is associated hearing loss and neurological signs/symptoms, MRI brain with IAC is indicated. If the temporal bone is suspected to be involved and/or retrotympenic lesion seen on otoscopy, CT temporal bone/IAC is indicated. If there is concurrent concern for boney and a vascular issue, CTA of the head and neck can be used to evaluate both.

*CTV and Central Venous Thrombosis***

CT Venogram is indicated for the evaluation of a central venous thrombosis/dural sinus thrombosis. The most frequent presentations are isolated headache, intracranial hypertension syndrome, seizures, focal neurological deficits, and encephalopathy. Risk factors are hypercoagulable states inducing genetic prothrombotic conditions, antiphospholipid syndrome and other acquired prothrombotic diseases, such as cancer, oral contraceptives, pregnancy,

puerperium (6 weeks postpartum), infections, and trauma. Since venous thrombosis can cause SAH, infarctions, and hemorrhage, parenchymal imaging with MRI/CT is also appropriate. ^(41–44)

CTA and Dissection

Craniocervical dissections can be spontaneous or traumatic. Spontaneous dissection presents with headache, neck pain with neurological signs or symptoms. There is often minor trauma or precipitating factor (i.e., exercise, neck manipulation). Dissection of the extracranial vessels can extend intracranially and/or lead to thrombus which can migrate into the intracranial circulation causing ischemia. Therefore, vascular imaging of the head and neck is warranted. ^(22,45)

Contraindications and Preferred Studies

- Contraindications and reasons why a CT/CTA cannot be performed may include: impaired renal function, significant allergy to IV contrast, pregnancy (depending on trimester).
- Contraindications and reasons why an MRI/MRA cannot be performed may include: impaired renal function, claustrophobia, non-MRI compatible devices (such as non-compatible defibrillator or pacemaker), metallic fragments in a high-risk location, patient exceeds weight limit/dimensions of MRI machine.

SUMMARY OF EVIDENCE

ACR Appropriateness Criteria® Cerebrovascular Diseases-Aneurysm, Vascular Malformation, and Subarachnoid Hemorrhage ⁽¹⁾

Study Design: The study design involves a detailed literature review and expert panel recommendations to establish imaging guidelines for various cerebrovascular conditions. The criteria are based on the latest evidence and expert consensus to ensure appropriate imaging procedures are selected for different clinical scenarios.

Target Population: The target population includes patients with cerebrovascular diseases such as aneurysms, vascular malformations, and SAH. Specific variants address different clinical presentations, including known acute SAH, suspected cerebral vasospasm, untreated cerebral aneurysms, previously treated cerebral aneurysms, high-risk cerebral aneurysm screening, known high-flow vascular malformations, and suspected CNS vasculitis.

Key Factors:

Imaging Recommendations: The document outlines the appropriateness of various imaging modalities, including arteriography, CTA, MRA, MRI, and ultrasound, for different clinical scenarios. Each variant provides specific recommendations based on the clinical presentation and the relative radiation level associated with each imaging procedure.

Clinical Presentations: The criteria cover a wide range of clinical presentations, from acute SAH to surveillance monitoring of untreated and treated aneurysms, as well as screening for high-risk populations and evaluation of suspected CNS vasculitis.

Expert Panel: The recommendations are developed by an expert panel on neurological imaging, including specialists from various institutions and organizations. The panel's collaboration ensures a comprehensive and well-rounded approach to imaging guidelines.

Headache Classification Committee of the International Headache Society (IHS) The International Classification of Headache Disorders, 3rd edition ⁽⁵⁾

Study Design: The ICHD-3 is a systematic classification of headache disorders based on extensive research and clinical studies. The classification is hierarchical, allowing for detailed diagnosis from the first-digit level to the fifth. The criteria for each headache type are based on clinical features, diagnostic criteria, and evidence from field-testing studies.

Target Population: The target population includes individuals experiencing various types of headaches, ranging from primary headaches like migraines and tension-type headaches to secondary headaches attributed to other disorders. The classification is intended for use by healthcare professionals, including neurologists, general practitioners, and researchers, to diagnose and manage headache disorders.

Key Factors:

Primary Headaches: The document classifies primary headaches into categories such as migraines, tension-type headaches, and trigeminal autonomic cephalalgias. Each category includes specific diagnostic criteria, clinical features, and comments on pathophysiology and treatment.

Secondary Headaches: These are headaches attributed to other disorders, such as trauma, vascular disorders, infections, and psychiatric disorders. The classification provides criteria for diagnosing secondary headaches based on the temporal relationship between the headache and the underlying disorder.

Diagnostic Criteria: The criteria for each headache type include the number of attacks, duration, pain characteristics, associated symptoms, and exclusion of other diagnoses. For example, migraine without aura requires at least five attacks lasting 4-72 hours with specific pain characteristics and associated symptoms like nausea and photophobia.

Field Testing: The classification includes results from field-testing studies that validate the diagnostic criteria. These studies involve large populations and use advanced diagnostic methods like neuroimaging and genetic testing.

Clinical and Research Applications: The ICHD-3 is designed for both clinical practice and research. It helps clinicians diagnose and manage headache disorders and provides a standardized framework for researchers to study headache epidemiology, pathophysiology, and treatment.

ACR Appropriateness Criteria® Cerebrovascular Diseases-Stroke and Stroke-Related Conditions ⁽¹⁷⁾

Study Design: The document is a guideline developed by the American College of Radiology (ACR) Appropriateness Criteria Expert Panel on Neurological Imaging. It is based on a systematic analysis of medical literature from peer-reviewed journals and follows established

methodology principles such as the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) and the RAND/UCLA Appropriateness Method.

Target Population: The guidelines are intended for use by radiologists, radiation oncologists, and referring physicians in making decisions regarding radiologic imaging and treatment for patients with cerebrovascular diseases, including stroke and stroke-related conditions.

Key Factors:

Conditions Covered: The guidelines encompass a wide range of cerebrovascular diseases, including carotid stenosis, carotid dissection, intracranial large vessel occlusion, and cerebral venous sinus thrombosis. They also address complications such as intraparenchymal hemorrhage and completed ischemic strokes.

Imaging Recommendations: The document provides evidence-based guidelines for appropriate imaging examinations for diagnosis and treatment of specified medical conditions. It includes recommendations for various imaging modalities such as CT, MRI, MRA, and ultrasound.

Clinical Scenarios: The guidelines cover different clinical scenarios, including transient ischemic attack (TIA), acute ischemic stroke, recent ischemic infarct, and known intraparenchymal hemorrhage, among others.

Methodology: The guideline development and revision process involves a multidisciplinary expert panel and supports the systematic analysis of medical literature. In instances where peer-reviewed literature is lacking or equivocal, expert opinions are used to formulate recommendations.

ANALYSIS OF EVIDENCE

Shared Conclusions ^(1,5,17):

1. **Diagnostic Imaging:** All three articles emphasize the importance of diagnostic imaging in identifying and managing cerebrovascular conditions. They discuss various imaging modalities such as CT, MRI, MRA, and CTA, highlighting their roles in diagnosing conditions like stroke, aneurysms, and vascular malformations.
2. **Clinical Guidelines:** The articles provide clinical guidelines for the management of cerebrovascular diseases. They stress the need for evidence-based approaches and the use of standardized criteria to ensure accurate diagnosis and effective treatment.
3. **Risk Factors:** Each article discusses the risk factors associated with cerebrovascular diseases, including hypertension, smoking, and genetic predispositions. They highlight the importance of identifying these risk factors to prevent and manage conditions effectively.

POLICY HISTORY

Date	Summary
November 2025	<ul style="list-style-type: none"> ● Removed content that included the combination study of Brain and Neck CTA to align with the new CPT code (70471) for the New Brain and Neck CTA guideline
July 2025	<ul style="list-style-type: none"> ● Fixed a sentence-spacing error in the Background ● Edited the policy history for June 2025 to better reflect the changes that were presented at committee. No clinical changes
June 2025	<ul style="list-style-type: none"> ● Guideline name changed from Brain CTA to Brain Computed Tomography Angiography (CTA) ● Guideline number changed from 004-1 to 2009 ● Added new bullet-point to the General Statement section ● Added a Summary of Evidence and Analysis of Evidence ● Updated references ● Updated background section ● Updated combination section ● Updated and rearranged the genetic section ● Removed headache with valsalva ● Clarified low and high flow vascular malformation ● Clarified central Horner's ● Clarified CVT ● Clarified secondary CNS vasculitis ● Clarified follow-up of known carotid or vertebral artery dissection ● Added intervals for imaging of Takayasu arteritis
June 2024	<ul style="list-style-type: none"> ● Updated references ● Updated background section ● Updated combination section ● Clarified <ul style="list-style-type: none"> ○ Frequency of screening in genetic syndromes ● Added

Date	Summary
	<ul style="list-style-type: none"> ○ Screening for aneurysm in high-risk populations ○ Bicuspid aortic valve ○ Known aortic diseases (aneurysm, coarctation, dissection) ○ Suspected cerebral vasospasm ○ Suspected carotid or vertebral artery dissection; secondary to trauma or spontaneous due to weakness of vessel wall (already in combo) ○ Follow-up of known carotid or vertebral artery dissection within 3-6 months for evaluation of recanalization and/or to guide anticoagulation treatment (already in combo) ○ Horner's syndrome, non-central (miosis, ptosis, and anhidrosis) - also in combo section ○ Genetic syndromes and rare disease section. ○ Refractory trigeminal neuralgia or hemifacial spasm when done for surgical evaluation ○ Note: For remote strokes with no prior vascular imaging, imaging can be considered based on location/type of stroke and documented potential to change management ○ To combo CT/CTA section Thunderclap headache >6 hours after onset in an acute setting with high suspicion of SAH ○ Large vessel vasculitis (Giant cell or Takayasu arteritis) with suspected intracranial and extracranial involvement (Brain/Neck CTA combo) ○ Known Moyamoya disease or reversible cerebral vasoconstriction with any new or changing neurological signs or symptoms (Brain CTA/Brain CT combo) ○ Suspected secondary CNS vasculitis based on neurological signs or symptoms in the setting of an underlying systemic disease with abnormal inflammatory markers or autoimmune antibodies (Brain CTA /CT combo) when MRI is contraindicated or cannot be performed ○ Suspected primary CNS vasculitis based on neurological signs and symptoms with completed infectious/inflammatory lab work-up ((Brain CTA /CT combo) when MRI is contraindicated or cannot be performed ● Deleted <ul style="list-style-type: none"> ○ Pulsatile tinnitus combo section



LEGAL AND COMPLIANCE

Guideline Approval

Committee

Reviewed / Approved by Evolent Specialty Services Clinical Guideline Review Committee

Disclaimer

Evolent Clinical Guidelines do not constitute medical advice. Treating health care professionals are solely responsible for diagnosis, treatment, and medical advice. Evolent uses Clinical Guidelines in accordance with its contractual obligations to provide utilization management. Coverage for services varies for individual members according to the terms of their health care coverage or government program. Individual members' health care coverage may not utilize some Evolent Clinical Guidelines. Evolent clinical guidelines contain guidance that requires prior authorization and service limitations. A list of procedure codes, services or drugs may not be all inclusive and does not imply that a service or drug is a covered or non-covered service or drug. Evolent reserves the right to review and update this Clinical Guideline in its sole discretion. Notice of any changes shall be provided as required by applicable provider agreements and laws or regulations. Members should contact their Plan customer service representative for specific coverage information.

Evolent Clinical Guidelines are comprehensive and inclusive of various procedural applications for each service type. Our guidelines may be used to supplement Medicare criteria when such criteria is not fully established. When Medicare criteria is determined to not be fully established, we only reference the relevant portion of the corresponding Evolent Clinical Guideline that is applicable to the specific service or item requested in order to determine medical necessity.

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