MEDICAL POLICY

MEDICAL POLICY DETAILS	
Medical Policy Title	**CT (Computed Tomography) Perfusion Imaging of the Brain**
Policy Number	**6.01.37**
Category	**Technology Assessment**
Original Effective Date	**12/18/08**
Committee Approval Date	**12/17/09, 03/17/11, 05/19/11, 05/24/12, 05/23/13, 05/22/14, 06/18/15, 02/18/16, 02/16/17, 02/15/18, 02/21/19, 02/20/20, 01/21/21, 01/20/22, 01/19/23, 01/18/24**
Current Effective Date	**04/15/24**
Archived Date	**N/A**
Archive Review Date	**N/A**
Product Disclaimer	• *Services are contract dependent; if a product excludes coverage for a service, it is not covered, and medical policy criteria do not apply.* • *If a commercial product (including an Essential Plan or Child Health Plus product), medical policy criteria apply to the benefit.* • *If a Medicaid product covers a specific service, and there are no New York State Medicaid guidelines (eMedNY) criteria, medical policy criteria apply to the benefit.* • *If a Medicare product (including Medicare HMO-Dual Special Needs Program (DSNP) product) covers a specific service, and there is no national or local Medicare coverage decision for the service, medical policy criteria apply to the benefit.* • *If a Medicare HMO-Dual Special Needs Program (DSNP) product DOES NOT cover a specific service, please refer to the Medicaid Product coverage line.*

POLICY STATEMENT

I. Based upon our criteria and assessment of the peer-reviewed literature, cerebral perfusion analysis using computed tomography (CT) is considered medically appropriate for **ANY** of the following criteria:
   A. For the evaluation of acute stroke (<24 hours) to help identify individuals with stroke-like symptoms and to help identify those most likely to benefit from thrombolysis or thrombectomy; **OR**
   B. For follow up for acute cerebral ischemic or infarction and/or reperfusion in the subacute or chronic phase of recovery; **OR**
   C. To assist in planning and evaluating the effectiveness of therapy for cervical or intracranial arterial occlusive disease (as an isolated test or in combination with cerebrovascular reserve challenge) and/or chronic cerebral ischemia; **OR**
   D. To identify cerebral hypoperfusion syndrome following revascularization; **OR**
   E. To evaluate the vascular status of solid tumors where MRI is degraded due to susceptibility artifact from air-containing spaces, surgical clips, or dental work; **OR**
   F. To follow up on tumor response to therapy; **OR**
   G. Acute ischemic stroke (within the first 24hrs); **OR**
   H. Transient ischemic attacks (TIA); **OR**
   I. Hemorrhagic stroke; **OR**
   J. Subdural hemorrhage.

II. Based upon our criteria and assessment of the peer-reviewed literature, CT perfusion imaging has not been medically proven to be effective and, therefore, is considered **investigational** for all other indications.

Refer to Corporate Medical Policy #11.01.03 Experimental or Investigational Services

DESCRIPTION

Perfusion imaging using CT is proposed to provide detailed study of cerebral blood flow (CBF), which may assist in identification of ischemic regions of the brain, especially within the first few hours of an acute stroke. The technique requires either a diffusible inert gas indicator such as xenon (Xe) or a non-diffusible indicator such as an iodinated contrast agent. The CT scanner is then used to capture images as the agent accumulates in cerebral tissues. The technique tracks transient attenuation changes in the blood vessels and brain parenchyma during the first pass of an intravenously injected contrast medium. Results of CT perfusion studies allow calculation of regional cerebral blood volume (CBV), mean transit time (MTT), and CBF. Proposed advantages of CT perfusion imaging are that it is less invasive than angiography and more widely available than magnetic resonance imaging (MRI).

Three CT perfusion imaging approaches use different data acquisition and analysis methods. Whole brain CT perfused blood volume is assessed by a helical scan through the whole brain with and without contrast. First pass perfusion CT (bolus tracking CT perfusion study) acquires repeated images at the same location through a volume of interest during bolus injection and passage of contrast through the region of interest. Dynamic perfusion CT acquires a temporal set of images through an extended volume of interest (imaging of tissue beyond the absolute width of the detector array) during a bolus injection of contrast.

RATIONALE

Several post-processing software packages have received Section 510(k) marketing clearance from the U.S. Food and Drug Administration (FDA) for use with a CT system, to perform perfusion imaging, e.g., the GE Medical Systems CT Perfusion 4 (March 2006), the Philips Medical Systems Brain Perfusion Option (Feb. 2004) and the Siemens Medical Solutions syngo Perfusion-CT (Dec. 2003).

The American College of Radiology (ACR) and American Society of Neuroradiology (ASNR) published an ACR/ASNR practice guideline (October 2012) for performance of CT perfusion in neuroradiologic imaging. The guidelines state that brain primary indications for perfusion CT in neuroradiology include, but are not limited to: differentiating salvageable ischemic penumbra from unsalvageable ischemic core, distinguishing benign oligemia from true “at-risk” ischemic penumbra, helping identify patients most likely to benefit from thrombolysis or thrombectomy, predicting hemorrhagic transformation in acute ischemic stroke, and identifying patients with malignant profiles, suspected vasospasm-related cerebral ischemia and infarction and/or delayed cerebral ischemia (DCI) following aneurysmal subarachnoid hemorrhage, and cerebral hemorrhage with secondary local ischemia. Brain secondary indications are: (1) follow-up of acute cerebral ischemia or infarction and/or reperfusion in the subacute or chronic phase of recovery, to assist in planning and evaluating the effectiveness of therapy for cervical or intracranial arterial occlusive disease (as an isolated test or in combination with a cerebrovascular reserve challenge) and/or chronic cerebral ischemia; (2) identifying cerebral hyperperfusion syndrome following revascularization; (3) detection of crossed cerebellar diaschisis in acute ischemic stroke; and (3) contrast delay as a predictor of new incident infarct. CT perfusion scanning may also be helpful in the setting of acute traumatic brain injury, the setting of acute seizures, the assessment of neoplastic disease, and in patients with contraindication to MRI-based perfusion imaging or with devices or material in or close to the field of view that would result in nondiagnostic MRI scans. Head and neck primary indications include evaluation of the vascular status of solid tumors where MRI is degraded due to susceptibility artifact from air-containing spaces or from surgical clips or dental work. Head and neck secondary indications include follow-up of tumor response to therapy.

In 2019, American Heart Association (AHA) and American Stroke Association (ASA) revised their 2018 guideline statement on the use of CTP for the Early Management of Adults with Ischemic Stroke as follows:

RECOMMENDATION	**SOR**	**LOB**	**LOE**
In patients eligible for IV alteplase, because benefit of therapy is time dependent, treatment should be initiated as quickly as possible and not delayed for additional multimodal neuroimaging, such as CT and MRI perfusion imaging.	I	Strong benefit	B-NR (nonrandomized)

When selecting patients with acute ischemic stroke within 6 to 24 hours of last known normal who have large vessel occlusion in the anterior circulation, obtaining CTP or DW-MRI, with or without MRI perfusion, is recommended to aid in patient selection for mechanical thrombectomy, but only when patients meet other eligibility criteria from one of the RCTs that showed benefit from mechanical thrombectomy in this extended time window.	I	Strong benefit	A (high-quality evidence from multiple RCTs)
In selected patients with acute ischemic stroke (>16 to 24 hours of last normal) and large vessel occlusion, DAWN criteria (which may include imaging findings from CTP) may be used for clinical decision making regarding mechanical thrombectomy.	IIa	Moderate benefit	B-R (nonrandomized)

CT: computed tomography; CTP: computed tomography perfusion; DW-MRI: diffusion-weighted magnetic resonance imaging; IV: intravenous; LOB: level of benefit; LOE: level of evidence; MRI: magnetic resonance imaging; RCT; randomized controlled trial; SOR: strength of recommendation.

Perfusion CT in Brain Tumors

The standard for tumor grading is a histopathologic assessment of tissue. Limitations of histologic assessment include sampling error due to regional heterogeneity and interobserver variation. These limitations can result in inaccurate classification and grading of gliomas. Because malignant brain tumors are characterized by neovascularity and increased angiogenic activity, perfusion imaging has been proposed as a method to assess tumor grade and prognosis. Dynamic contrast-enhanced MRI (DCE-MRI) is the preferred technique, because there is no radiation exposure and a good signal-to-noise ratio. Perfusion CT may be an alternative choice for glioblastoma patients with DCE-MRI examination contraindications. Potential advantages, compared with MR perfusion, include the wider availability, faster scanning times, and lower cost. CTP imaging may also be used to distinguish recurrent tumor from radiation necrosis.

CODES

- *Eligibility for reimbursement is based upon the benefits set forth in the member's subscriber contract.*
- *CODES MAY NOT BE COVERED UNDER ALL CIRCUMSTANCES. PLEASE READ THE POLICY AND GUIDELINES STATEMENTS CAREFULLY.*
- *Codes may not be all inclusive as the AMA and CMS code updates may occur more frequently than policy updates.*
- *Code Key: Experimental/Investigational = (E/I), Not medically necessary/ appropriate = (NMN).*

CPT Codes

Code	Description
0042T	Cerebral perfusion analysis using computed tomography with contrast administration, including post-processing of parametric maps with determination of cerebral flood flow, cerebral blood volume, and mean transit time.

HCPCS Codes

Code	Description
No code	

ICD10 Codes

Code	Description
I63.00-I63.9	Cerebral infarction (code range)

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*Key Article

KEY WORDS

Dynamic Perfusion CT, Multimodal CT, PCT, Perfusion CT, Xenon-enhanced CT, XeCT.

CMS COVERAGE FOR MEDICARE PRODUCT MEMBERS

There is currently a Local Coverage Determination (LCD) for Computed Tomography Cerebral Perfusion Analysis (CTP) (L38667). Please refer to the following LCD website for Medicare members: [https://www.cms.gov/medicare-coverage-database/view/lcd.aspx?LCDId=38667&ver=3] accessed 10/03/23.