6.01.49 Computed Tomography (CT) Perfusion Imaging of the Brain

<table>
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<th>Section</th>
<th>Effective Date</th>
<th>Original Policy Date</th>
<th>Next Review Date</th>
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<tr>
<td>6.0 Radiology</td>
<td>October 31, 2014</td>
<td>June 28, 2007</td>
<td>October 2015</td>
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**Description**

Perfusion imaging using computed tomography (CT) provides an assessment of cerebral blood flow that may assist in the identification of ischemic regions of the brain. This technology is proposed as a method to aid treatment decisions in patients being evaluated for acute ischemic stroke, subarachnoid hemorrhage, cerebral vasospasm, brain tumors, and head trauma.

**Related Policies**

- N/A

**Policy**

CT-based perfusion imaging of the brain is considered **investigational** for all indications including the diagnosis and management of acute cerebral ischemia (stroke).

**Policy Guidelines**

There is a CPT category III code specific to this test:

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

**Benefit Application**

Benefit determinations should be based in all cases on the applicable contract language. To the extent there are any conflicts between these guidelines and the contract language, the contract language will control. Please refer to the member's contract benefits in effect at the time of service to determine coverage or non-coverage of these services as it applies to an individual member.

Some state or federal mandates (e.g., Federal Employee Program (FEP)) prohibit Plans from denying Food and Drug Administration (FDA) - approved technologies as investigational. In these instances, Plans may have to consider the coverage eligibility of FDA-approved technologies on the basis of medical necessity alone.
Rationale

Literature Review

Acute Cerebral Ischemia

At the time this policy was created, the literature focused on technical capabilities and feasibility. A number of retrospective studies indicated that blood flow values obtained using a diffusible gas indicator are accurate and that the flow rates correlate with physiologic changes such as the onset of neurologic deficits.1 The limited availability of medical-grade Xe gas was another issue with this approach to computed tomography (CT) perfusion imaging. Because of more widespread availability, studies were also being done using non-diffusible tracers, i.e., contrast agents.2,3 As of 2008, studies were identified that reported on the use of CT perfusion imaging to identify infarcted tissue versus viable tissue (penumbra).4-7 However, many studies evaluating use of thrombolytic therapy in acute stroke beyond 3 hours of symptom onset were based on magnetic resonance (MR) imaging with perfusion-diffusion mismatching.8 As Lev commented in an editorial, although many investigators have advocated CT perfusion imaging as a reliable method for detecting both infarct core and penumbra, almost all the major clinical trials aimed at extending the time window for thrombolysis used advanced MR rather than CT imaging for triage.9 Prospective controlled studies had not been reported that demonstrated that use of perfusion imaging (CT or MR) improved outcomes in patients with acute stroke.

In 2009, the American Heart Association (AHA) Council on Cardiovascular Radiology and Intervention, Stroke Council, and the Interdisciplinary Council on Peripheral Vascular Disease published a scientific statement that included a review of the evidence on CT perfusion.10 The scientific review determined that:

Creation of accurate, quantitative CT perfusion has been validated in comparison with xenon-CT, PET [positron emission tomography], and MR perfusion. CT perfusion appears to have greater spatial resolution than MR perfusion, and MR perfusion may be more sensitive to contamination by large vascular structure, leading to the possibility that visual assessment of core/penumbra mismatch is more reliable with CT perfusion than with MR perfusion.

Studies are evaluating various thresholds to predict the upper and lower limits of final infarct size, and outcome prediction studies suggest that CT perfusion has the potential to serve as a surrogate marker of stroke severity (final size of infarction), possibly exceeding current predictors of outcome such as the National Institutes of Health Stroke Score (NIHSS). Because of the superior quantitative capability compared with MR perfusion imaging, application of specific CT perfusion thresholds to predict tissue survival or infarction appears promising; however, it is essential that these thresholds be validated in larger patient cohorts for which reperfusion status is known.

There is increasing but as yet indirect evidence that even relatively imprecise measures of core/penumbra mismatch may be used to select patients for treatment beyond a strict 3-hour time window for intravenous thrombolysis. Multimodal CT may also determine suitability for other therapies, such as mechanical clot retrieval and intra-arterial thrombolysis, and increase patient access to new treatments.
A systematic review from 2011 examined definitions and thresholds for MR and CT perfusion imaging.\(^1\) Twenty papers on CT perfusion met the inclusion criteria for analysis of definitions, and 10 papers on CT perfusion (median sample size of 22) provided thresholds. The quality of the studies was generally poor. There were multiple definitions for tissue states. For example, there were 8 different definitions of at-risk tissue, resulting in many-fold differences in the extent of tissue defined as tissue at risk. There was also considerable variability in quantitative thresholds. The review concluded that CT perfusion thresholds in stroke are derived from small numbers of patients, variable perfusion analysis methods and definitions of tissue states. As indicated in the 2009 AHA statement, thresholds should be validated in larger patient cohorts for which reperfusion status is known. Assessment of functional outcomes is also needed to evaluate if CT perfusion improves clinical outcomes.

Five relevant cohort studies have been identified that were published after the AHA review.

One of these studies attempted to define the technical CT parameters that best detect perfusion mismatches. In 2011, Bivard et al reported a prospective clinical validation study of perfusion CT for acute (<6 hr) ischemic stroke in 314 consecutive patients.\(^2\) If eligible, patients were treated with intravenous thrombolysis. All patients underwent baseline multimodal CT examination and follow-up MRI at 24 hours, with MRI used as the criterion standard for tissue perfusion. The most accurate CT perfusion threshold at defining infarct core was determined to be cerebral blood flow less than 40% of contralateral with a relative delay time less than 2 sec (area under the curve [AUC] of 0.86). Using this threshold, the correlation between extent of CT perfusion mismatch tissue (the volume of “at-risk” tissue) salvaged from infarction and clinical improvement was \(R^2=0.59\) at 24 h (NIHSS) and \(R^2=0.42\) at 90 days (Rankin scale).

Obach et al compared outcomes of 106 patients with acute stroke who were assessed with multimodal CT (CT/CT angiography [CTA]/CT perfusion) versus a cohort of 262 patients with acute stroke who were assessed without full multimodal brain imaging during a 5-year period.\(^3\) Clinical and imaging data were collected prospectively, and all imaging studies were assessed by investigators blinded to prognostic data. The 2 groups were comparable at baseline, with the exception of a greater percentage of patients with a time-to-treatment of greater than 3 hours (28% vs 16%) and a greater percentage treated with endovascular therapy (26% vs 11%, all respectively) in the multimodal CT group. Good outcome (modified Rankin scale score \(<2\)) at 3 months was increased in the multimodal group compared with controls (adjusted \(OR=2.88\)) in models adjusted for age, gender, NIHSS, glucose, and treatment delay or modality. Fifty-six percent of patients assessed by multimodal CT had a Rankin score of 2 or less in comparison with 41% of controls (\(p=0.008\)). In a sensitivity analysis, multimodal-assisted thrombolysis yielded superior benefits in those patients treated after 3 hours (adjusted \(OR=4.48\)) than for patients treated within 3 hours (adjusted \(OR=1.31\)). For patients treated after 3 hours, 63% of patients assessed by multimodal CT had a Rankin score of 2 or less in comparison with 24% of controls. Mortality (14% and 15%, all respectively) and symptomatic hemorrhage (5% and 7%, all respectively) were similar in the 2 groups.

Sztriha et al evaluated whether CT perfusion imaging mismatch could help to select ischemic stroke patients for thrombolysis between 3 and 6 hours.\(^4\) A cohort of 254 thrombolysed patients were studied; 174 (69%) were thrombolysed at 0 to 3 hours using noncontrast CT, and 80 (31%) were thrombolysed at 3 to 6 hours by using CT perfusion mismatch criteria, defined as a cerebral blood volume ASPECTS [Alberta Stroke Program Early CT Score] of at least 7 and an ASPECTS mismatch of at least 2. Baseline characteristics were comparable in the 2 groups. Efficacy end points included disability
at 3 months, as assessed by the Rankin score. Safety end points included overall mortality, any intracerebral hemorrhage, and symptomatic intracerebral hemorrhage. At 3 months, there were no differences between patients thrombolysed at 0 to 3 hours or at 3 to 6 hours in symptomatic intracerebral hemorrhage (3% vs 4%), or in any intracerebral hemorrhage (7% vs 9%). There were also no differences at 3 months in mortality (16% vs 9%) or the modified Rankin scale score 0-2 (55% vs 54%, all respectively). The NIHSS score was the only independent determinant of a favorable functional outcome at 3 months (Rankin score of 0-2 OR=of 0.89) in patients treated using CT perfusion mismatch criteria beyond 3 hours. This study is limited by the lack of a control group of patients without CT perfusion. The authors also note that results of this study cannot be generalized to patients with symptoms in the posterior circulation, an area where CT perfusion is known to underperform.

Rai et al evaluated rates of recanalization and functional outcomes in a cohort of 99 patients selected by CT perfusion for treatment with endovascular stroke therapy and compared results with historical controls from the MERCI [Mechanical Embolus Removal in Cerebral Ischemia], Multi-MERCI, and Penumbra device trials that treated all comers.15 Patients were included if they had anterior circulation symptoms at presentation with a baseline NIHSS score of 8 or greater and intracerebral vascular occlusion on admission CT angiography correlating with the neurologic deficit. There was no cut-off time for treatment. The type of endovascular therapy involved intra-arterial thrombolytics in 33.3% of patients, mechanical device in 24.2%, and both thrombolytics and mechanical thrombectomy in 42.4%. Successful recanalization was achieved in 55.6%, with a good outcome in 41.4% of patients. The recanalization rate in this study was not significantly different from the 46% for MERCI and 68% for Multi-MERCI but was significantly lower than the 82% recanalization rate in the Penumbra trial. In patients who were successfully recanalized, good outcomes were obtained in 67% of patients in this study in comparison with 46% in MERCI, 49% in Multi-MERCI, and 29% in Penumbra. The rate of futile recanalization (defined as a poor outcome despite successful recanalization) was 33% compared with 54% in MERCI, 51% in Multi-MERCI, and 71% in Penumbra. A small cerebral blood volume abnormality and large mean transit time-cerebral blood volume mismatch were strong predictors of a good outcome. This study is limited by the comparison of a retrospective cohort with results from prospective device trials and by the reliance on recanalization rates as the primary outcome rather than clinical measures.

In 2013, Sheth et al reported a retrospective study of the effect of multimodal CT on outcomes from endovascular therapy in 556 patients from 10 stroke centers.16 Patients were included if they presented within 8 hours of symptom onset and were then divided into groups based on the imaging modality employed before treatment. Noncontrast CT was used in 51% of patients, CT perfusion in 34%, and MRI in 14% of patients. Patients were selected for endovascular therapy based on specific imaging criteria. Noncontrast CT patients had significantly lower median times to groin puncture (61 min.) compared with CT perfusion (114 min.) or MRI (124 min.). There were no differences in clinical outcomes, hemorrhage rates, or final infarct volumes among the groups. This study is limited by the retrospective analysis and differences between groups at baseline. Patients selected for endovascular treatment by noncontrast CT alone had a higher baseline NIHSS score and were more likely to have been transferred from an outside facility. In addition, there was limited information regarding the patients who did not proceed to endovascular therapy.

A large number of case series have been published that have retrospectively assessed how CT perfusion at admission might facilitate clinical decision making and predict
outcomes in patients with suspected acute ischemic stroke. Prospective trials are needed to evaluate the impact of this technology on health outcomes.

Section Summary

Four recent cohort studies describe how CT perfusion can be used in clinical care to select patients for endovascular therapy. However, these trials lack concurrent control groups and, therefore do not provide relevant evidence on the comparative efficacy of this approach compared with alternative strategies. A fifth stratified cohort study found shorter time to treatment and no difference in clinical outcomes in patients who underwent CT perfusion compared with noncontrast CT or MRI. Randomized trials are needed to establish with greater certainty the value of CT perfusion to assist decision making for thrombolytic or mechanical therapy in acute stroke.

Subarachnoid Hemorrhage and Cerebral Vasospasm

A 2010 meta-analysis on the diagnostic accuracy of CTA and CT perfusion for cerebral vasospasm identified 3 studies (64 patients) that met the inclusion criteria and contained the appropriate data for statistical analysis. In these studies, “vasospasm” was defined on CT perfusion as a perfusion deficit demonstrating prolonged mean transit time and decreased cerebral blood flow. However, there were no standardized thresholds of mean transit time and cerebral blood flow to determine vasospasm, contributing to the heterogeneity among these studies. For this meta-analysis, “angiographic vasospasm” was defined as evidence of arterial narrowing compared with the parent vessel or with a baseline examination, with both symptomatic and asymptomatic patients included. In comparison with digital subtraction angiography, CT perfusion pooled estimates had 74% sensitivity and 93% specificity. Given the small sample size and the heterogeneity in the CT perfusion data, these results are considered preliminary. A 2014 meta-analysis by Cremers et al included 11 studies (570 patients) on the use of CT perfusion to identify delayed cerebral ischemia. CT perfusion measures at admission did not differ between patients who did and did not develop delayed cerebral ischemia. Some measures of CT perfusion (cerebral blood flow and mean transit time, but not cerebral blood volume) were found to differ between the 2 groups during the period of 4 to 14 days after subarachnoid hemorrhage, suggesting a possible role in diagnoses of delayed cerebral ischemia.

One of the studies included in the systematic review was a prospective 2011 study with 97 patients that evaluated the accuracy of CT perfusion to diagnose delayed cerebral ischemia following aneurysmal subarachnoid hemorrhage. CT perfusion was performed between days 6 and 8 in asymptomatic patients and on the day of clinical deterioration in symptomatic patients. Perfusion maps were qualitatively evaluated by 2 neuroradiologists who were blinded to clinical and imaging data and compared with the reference standard. Based on a multistage hierarchical reference standard that incorporated both imaging and clinical criteria, 40 patients (41%) were diagnosed with delayed cerebral ischemia. Overall diagnostic accuracy for CT perfusion, determined from receiver operating characteristic (ROC) curves, was 93% for cerebral blood flow, 88% for mean transit time, and 72% for cerebral blood volume. The study also sought to determine a quantitative threshold for delayed cerebral ischemia with CT perfusion, although it was noted that absolute thresholds may not be generalizable due to differences in scanner equipment and postprocessing methods. Clinical outcomes of the delayed cerebral ischemia group included 19 patients (48%) with no permanent neurologic deficit, 16 (40%) with permanent neurologic deficit, and 5 (13%) who died during hospitalization.
Sanelli et al also reported a retrospective study of the development of vasospasm in 75 patients with aneurysmal subarachnoid hemorrhage who had an earlier CT perfusion assessment (likely overlap in subjects with the study described above). Based on a multistage reference standard, 28 patients (37%) were classified as vasospasm. CT perfusion values (cerebral blood flow and mean transit time) on days 0 to 3 were found to be significantly lower in the vasospasm group. Optimal thresholds were then determined for cerebral blood flow (50% sensitivity and 91% specificity), mean transit time (61% sensitivity and 70% specificity), and cerebral blood volume (36% sensitivity and 89% specificity). Clinical outcomes of the vasospasm group included 15 patients (54%) with no permanent neurologic deficit, 11 (39%) with permanent neurologic deficit, and 2 (7%) who died during hospitalization.

**Section Summary**

CT perfusion is being evaluated for the diagnosis of vasospasm and delayed cerebral ischemia following aneurysmal subarachnoid hemorrhage. A prospective trial showed a qualitative measure of cerebral blood flow to have 93% accuracy for the detection of delayed cerebral ischemia with lower accuracy for cerebral blood volume. Prospective trials are needed to evaluate whether CT perfusion in patients with aneurysmal subarachnoid hemorrhage leads to the early identification of patients at high risk for vasospasm/delayed cerebral ischemia, alters treatment decisions, and improves health outcomes.

**Brain Tumors**

A 2011 review by Jain indicates that most of the literature on the utility of perfusion imaging for glioma grading is based on various MR perfusion techniques. One study compared CT perfusion with conventional MRI in 19 patients. With a cut-off point of greater than 1.92 normalized cerebral blood volume (nCBV), there was sensitivity of 85.7% and specificity of 100% to differentiate high-grade gliomas. There were no significant differences in nCBV between grade III or IV tumors. A subsequent study by Jain et al correlated CT perfusion findings with histopathologic grade in 32 patients with astroglial tumors. Eight additional patients with oligodendrogliomas were excluded from analysis because of the known higher blood volume compared with astroglial tumors. Of the 32 patients included in the study, 8 had low-grade gliomas and 24 had high-grade gliomas. In this selected set of patients, CT perfusion showed significant differences in the grade III and grade IV tumors. Prospective studies in an appropriate population of patients are needed to evaluate the sensitivity and specificity of CT perfusion glioma grading, with histopathologic assessment of tumors as the independent reference standard.

In 2011, Xyda et al reported a prospective study of the feasibility and efficacy of volume perfusion CT (VPCT) for the preoperative assessment of cerebral gliomas in 46 consecutive patients with suspected cerebral gliomas. (Whereas typical perfusion CT covers a relatively narrow range of brain tissue, the VPCT system with multispiral acquisition covers the entire tumor.) Two blinded readers independently evaluated VPCT by drawing volumes of interest (VOIs) around the tumor according to maximum intensity projection volumes. The VOIs were mapped onto the cerebral blood volume, flow, and permeability perfusion datasets, which correspond to histopathologic microvascular density. VPCT was followed by stereotactic biopsy or surgery to evaluate the histopathology of the tumor and classified into low-grade (I and II) and high-grade (III and IV). The diagnostic power of the perfusion parameters were analyzed by ROC curve analysis. Permeability demonstrated the highest diagnostic accuracy (97% sensitivity, 100% specificity), positive predictive value (100%), and negative predictive value (94%)
to identify or exclude high-grade tumors. Potential uses of VPCT are to guide biopsy and to monitor low-grade gliomas. This is the first report using VPCT to differentiate gliomas; therefore, replication of these findings in an independent sample of patients is needed.

**Ongoing Clinical Trials**

A search of online site [ClinicalTrials.gov](http://ClinicalTrials.gov) in July 2014 found the following trials:

Dutch acute stroke trial (DUST): Prediction of outcome with computed tomography (CT) - perfusion and CT-angiography to assess whether combined CT perfusion and CT angiography parameters can predict patient outcome and guide treatment decisions in acute ischemic stroke (NCT00880113). This multicenter cohort study will include patients with acute stroke symptoms who present in the hospital within 9 hours of onset of symptoms. Patients who awaken with stroke symptoms can only be included if they went to sleep without any stroke symptoms, and the time from going to sleep until imaging is less than 9 hours. Estimated enrollment is 1500 patients with completion in December 2013. The recruitment status of this study is unknown; the posting was last verified June 2012.

Extending the Time for Thrombolysis in Emergency Neurological Deficits (EXTEND, NCT00887328 and NCT01580839) are multicenter randomized, double-blinded, placebo-controlled trials that will test the hypothesis that ischemic stroke patients selected with significant penumbral mismatch at 4.5 (or 3 hours depending on local guidelines) - 9 hours post onset of stroke or after ‘wake up stroke’ will have improved clinical outcomes when given intravenous tissue plasminogen activator (tPA) compared with placebo. NCT00887328 has an estimated enrollment of 400 patients with completion expected December 2014. NCT01580839 has an estimated enrollment of 200 patients with completion expected December 2015.

**Summary**

Perfusion imaging using computed tomography (CT) provides an assessment of cerebral blood flow that may assist in the identification of ischemic regions of the brain. This technology is proposed as a method to aid treatment decisions in patients being evaluated for acute ischemic stroke, subarachnoid hemorrhage, cerebral vasospasm, brain tumors, and head trauma. One of the potential areas of benefit is greater individualization of therapy for acute stroke by better defining ischemic areas at risk that may benefit from thrombolysis and/or endovascular intervention. However, the current evidence is insufficient to determine whether outcomes are improved with use of this technique. Randomized clinical trials are needed in which a strategy employing CT perfusion in the treatment of acute stroke is compared with traditional strategies. For other indications such as subarachnoid hemorrhage and brain tumors, the data on CT perfusion are limited. Because the impact of CT perfusion imaging on clinical outcomes is not known, this technique is considered investigational.

**Practice Guidelines and Position Statements**

American Heart Association (AHA) and American Stroke Association (ASA) 2012 guidelines for the management of aneurysmal subarachnoid hemorrhage recommend that perfusion imaging with CT or MR can be useful to identify regions of potential brain ischemia (Class IIa; Level of Evidence B). The guidelines state that there are emerging data that perfusion imaging, demonstrating regions of hypoperfusion, may be more accurate for identification of delayed cerebral ischemia than anatomic imaging of arterial narrowing or changes in blood flow velocity by transcranial Doppler. The
guidelines concluded that CT perfusion is a promising technology, although repeat measurements are limited by the risks of dye load and radiation exposure.

AHA/ASA 2013 guidelines for the early management of adults with ischemic stroke recommend that CT perfusion and MRI perfusion and diffusion imaging, including measures of infarct core and penumbra, may be considered for selecting patients for acute reperfusion therapy beyond IV fibrinolytic time windows. The guidelines state that these techniques provide additional information that may improve diagnosis, mechanism, and severity of ischemic stroke and allow more informed clinical decision making. (Class IIb, Level of Evidence B)

In 2013, the American Society of Neuroradiology, the American College of Radiology, and the Society of NeuroInterventional Surgery issued a joint statement on imaging recommendations for acute stroke and transient ischemic attack patients. The following statements were made regarding perfusion imaging:

- In acute stroke patients who are candidates for endovascular therapy, vascular imaging (CTA, MRA, DSA) is strongly recommended during the initial imaging evaluation. Perfusion imaging may be considered to assess the target tissue “at risk” for reperfusion therapy. However, the accuracy and usefulness of perfusion imaging to identify and differentiate viable tissue have not been well-established.
- Determination of tissue viability based on imaging has the potential to individualize thrombolytic therapy and extend the therapeutic time window for some acute stroke patients. Although perfusion imaging has been incorporated into acute stroke imaging algorithms at some institutions, its clinical utility has not been proved.
- It is important to note that perfusion imaging has many applications beyond characterization of the penumbra and triage of patients to acute revascularization therapy. These applications include, but are not limited to, the following: 1) improving the sensitivity and accuracy of stroke diagnosis (in some cases, a lesion on PCT [perfusion CT] leads to more careful scrutiny and identification of a vascular occlusion that was not evident prospectively, particularly in the M2 and more distal MCA branches); 2) excluding stroke mimics; 3) better assessment of the ischemic core and collateral flow; and 4) prediction of hemorrhagic transformation and malignant edema.

American College of Radiology (ACR) Appropriateness Criteria® from 2011 provides the following ratings for CT head perfusion with contrast:

- Rating of 2 (usually not appropriate) for asymptomatic individuals with structural lesion on physical examination (cervical bruit) and/or risk factors.
- Rating of 6 (may be appropriate) if directly employed in decision making and planning treatment for carotid territory or vertebrobasilar transient ischemic attack; initial screening survey.
- Rating of 6 (may be appropriate) for a new focal neurologic defect, fixed or worsening; less than 3 hours, if CT is used for planning treatment such as thrombectomy.
- Rating of 6 (may be appropriate) for a new focal neurologic defect, fixed or worsening; 3 to 24 hours, if CT is used for planning treatment such as thrombectomy within 8 hours of symptom onset.
• Rating of 5 (may be appropriate) for a new focal neurologic defect, fixed or worsening; longer than 24 hours, if used for decision making or planning treatment such as angioplasty and stenting.

The ACR also notes that CT stroke protocols combining a brain non-contrast CT, CT angiography, and CT perfusion may produce a relative radiation level of 1-10 mSv, and repeated use of this protocol in an individual patient may result in high radiation exposure to the scalp and eyes.

The Agency for Healthcare Research and Quality (AHRQ) published a report on acute stroke in 2005. This report addressed multiple issues regarding CT perfusion and also angiography in terms of how these modalities affect the use of thrombolytic therapy for acute ischemic stroke. This report indicated that studies with prospective use of CT perfusion and angiography techniques in patient selection for thrombolysis were not identified.

U.S. Preventive Services Task Force Recommendations:
Perfusion CT imaging is not a preventive service.

Medicare National Coverage
There is no national coverage determination (NCD). In the absence of an NCD, coverage decisions are left to the discretion of local Medicare carriers.

References


### Documentation Required for Clinical Review

- No records required

### Coding

This Policy relates only to the services or supplies described herein. Benefits may vary according to benefit design; therefore, contract language should be reviewed before applying the terms of the Policy. Inclusion or exclusion of a procedure, diagnosis or device code(s) does not constitute or imply member coverage or provider reimbursement.

IE

The following services are considered investigational and therefore not covered for any indication.

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<th>Type</th>
<th>Code</th>
<th>Description</th>
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<td>Cerebral perfusion analysis using computed tomography with contrast administration, including post-processing of parametric maps with determination of cerebral blood flow, cerebral blood volume, and mean transit time</td>
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<td>HCPC</td>
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ICD-9 Procedure | None
---|---
ICD-10 Procedure | For dates of service on or after 10/01/2015
- Imaging, central nervous system, computerized tomography (CT), code by body part (brain, cisterna, cerebral ventricles), type of contrast (high osmolar, low osmolar, other) and whether enhanced (unenhanced and enhanced or none)
ICD-9 Diagnosis | All Diagnoses
ICD-10 Diagnosis | All Diagnoses

**Policy History**

This section provides a chronological history of the activities, updates and changes that have occurred with this Medical Policy.

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<td>6/28/2007</td>
<td>BCBSA Medical Policy adoption</td>
<td>Medical Policy Committee</td>
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<tr>
<td>10/1/2010</td>
<td>Policy Revision with title change from CT (Computed Tomography) Cerebral Perfusion Imaging</td>
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<td>8/23/2013</td>
<td>Title change from Computed Tomography Perfusion Imaging and policy revision without position change. Policy placed on No Further Routine Literature Review and Update status.</td>
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<td>10/31/2014</td>
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**Definitions of Decision Determinations**

**Medically Necessary:** A treatment, procedure or drug is medically necessary only when it has been established as safe and effective for the particular symptoms or diagnosis, is not investigational or experimental, is not being provided primarily for the convenience of the patient or the provider, and is provided at the most appropriate level to treat the condition.

**Investigational/Experimental:** A treatment, procedure or drug is investigational when it has not been recognized as safe and effective for use in treating the particular condition in accordance with generally accepted professional medical standards. This includes
services where approval by the federal or state governmental is required prior to use, but has not yet been granted.

**Split Evaluation:** Blue Shield of California / Blue Shield of California Life & Health Insurance Company (Blue Shield) policy review can result in a Split Evaluation, where a treatment, procedure or drug will be considered to be investigational for certain indications or conditions, but will be deemed safe and effective for other indications or conditions, and therefore potentially medically necessary in those instances.

**Prior Authorization Requirements**

This service (or procedure) is considered **medically necessary** in certain instances and **investigational** in others (refer to policy for details).

For instances when the indication is **medically necessary**, clinical evidence is required to determine **medical necessity**.

For instances when the indication is **investigational**, you may submit additional information to the Prior Authorization Department.

Within five days before the actual date of service, the Provider MUST confirm with Blue Shield that the member's health plan coverage is still in effect. Blue Shield reserves the right to revoke an authorization prior to services being rendered based on cancellation of the member's eligibility. Final determination of benefits will be made after review of the claim for limitations or exclusions.

Questions regarding the applicability of this policy should also be directed to the Prior Authorization Department. Please call 1-800-541-6652 or visit the Provider Portal www.blueshieldca.com/provider.

The materials provided to you are guidelines used by this plan to authorize, modify, or deny care for persons with similar illness or conditions. Specific care and treatment may vary depending on individual need and the benefits covered under your contract. These Policies are subject to change as new information becomes available.