

## Corporate Medical Policy

### CT Perfusion Imaging

**File Name:** ct\_perfusion\_imaging  
**Origination:** 01/2009  
**Last CAP Review:** 6/2011  
**Next CAP Review:** 6/2012  
**Last Review:** 6/2011

#### Description of Procedure or Service

---

Perfusion imaging using CT (computed tomography) 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 and head trauma.

The goal of acute stroke thrombolytic treatment is to rescue the ischemic penumbra, an area of brain that surround the infarct core is hypoperfused but does not die quickly. Multimodal CT and magnetic resonance imaging (MRI) can be used to assess the cerebral parenchyma, vasculature, and tissue viability in the acute ischemic stroke setting, and are used to detect ischemic tissue, and exclude hemorrhage and other conditions that mimic acute cerebral ischemia.

- Noncontrast CT is used to rule out intracranial hemorrhage, tumor or infection. MR diffusion-weighted imaging (DWI) demonstrates acute infarction, and a gradient-recalled echo (GRE) sequence excludes intracerebral hemorrhage.
- CT angiography (CTA) and MR angiography (MRA) are used to evaluate intra- and extra-cranial vasculature to detect the vascular occlusion and potentially guide therapy (e.g., intravenous thrombolytics, or intra-arterial or mechanical thrombolysis).

The approved therapy, intravenous tissue plasminogen activator (tPA), requires only a non-contrast CT scan to exclude the presence of hemorrhage (a contraindication to the use of the drug). Current guidelines are to administer (tPA) within the first 3 hours after an ischemic event, preceded by a CT scan. Many patients, however, do not present within the 3-hour window, and thrombolysis carries a risk of intracranial hemorrhage. Thus, more sophisticated imaging may be needed to select the proper use of intra-arterial thrombolysis or mechanical thrombectomy in patients who present more than 3 hours after an ischemic stroke. Perfusion imaging is also being evaluated in the management of other neurological conditions such as subarachnoid hemorrhage and head trauma.

The potential utility of perfusion imaging of acute stroke is described as the following:

- Identification of brain regions with extremely low cerebral blood flow, which represents the core;
- Identification of patients with at-risk brain regions (acutely ischemic but viable penumbra) that may be salvageable with successful intra-arterial thrombolysis beyond the standard 3-hour window;
- Triage of patients with at-risk brain regions to other available therapies, such as induced hypertension or mechanical clot retrieval;
- Decisions regarding intensive monitoring of patients with large abnormally perfused brain regions;

## CT Perfusion Imaging

- Biologically-based management of patients who awaken with a stroke for which the precise time of onset is unknown.

Similar information can be provided by CT and MRI in terms of infarct core and penumbra. However, multimodal CT has a short protocol time (5-6 min), and since it can be performed with any modern CT equipment is more widely available in the emergency setting. CT perfusion is performed by capturing images as an iodinated contrast agent bolus passes through the cerebral circulation and accumulates in the cerebral tissues. (Older perfusion methodologies such as single-photon emission CT [SPECT] and xenon-enhanced CT [XeCT] scanning use a diffusible tracer.) The quantitative perfusion parameters are calculated from density changes for each pixel over time with commercially available deconvolution-based software, where cerebral blood flow (CBF) is equal to regional cerebral blood volume (CBV) divided by mean transit time (MTT). CT angiography/CT perfusion requires ionizing radiation and iodinated contrast. It is estimated that a typical perfusion CT deposits a slightly greater radiation dose than a routine unenhanced head CT (approximately 3.3 mSv).

On October 8, 2009, the U.S. Food and Drug Administration (FDA) issued an Initial Communication about excess radiation during perfusion CT imaging to aid in the diagnosis and treatment of stroke from one facility. Together with state and local health authorities, the FDA has identified at least 250 patients who were exposed to excess radiation during CT perfusion scans. The FDA has received reports of possible excess exposures at facilities in other states, involving more than one manufacturer of CT scanners. The FDA has provided recommendations for facilities and practitioners, and is continuing to work with manufacturers, professional organizations, and state and local public health authorities to investigate the scope and causes of these excess exposures and their potential public health impact. A December 8, 2009 update of this issue is available at <http://www.fda.gov/MedicalDevices/Safety/AlertsandNotices/umc185898.htm>

**\*\*\*Note: This Medical Policy is complex and technical. For questions concerning the technical language and/or specific clinical indications for its use, please consult your physician.**

### Policy

---

**CT Perfusion Imaging is considered investigational. BCBSNC does not provide coverage for investigational services or procedures.**

### Benefits Application

---

This medical policy relates only to the services or supplies described herein. Please refer to the Member's Benefit Booklet for availability of benefits. Member's benefits may vary according to benefit design; therefore member benefit language should be reviewed before applying the terms of this medical policy.

### When CT Perfusion Imaging is covered

---

Not applicable.

### When CT Perfusion Imaging is not covered

---

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

# CT Perfusion Imaging

## Policy Guidelines

---

While this technique may hold promise for improving care of patients with various neurological conditions, including the potential individualization of thrombolytic therapy in acute stroke, clinical trials are needed to demonstrate improvement in outcomes. Since, the impact of CT perfusion imaging on clinical outcomes is not known, this technique is considered investigational.

In 2009, the American Heart Association (AHA) issued a scientific statement on imaging of acute ischemic stroke. The statement included the following recommendations regarding perfusion imaging:

### Perfusion-Derived Values

Quantitative thresholds of tissue that is dead or destined to die versus tissue that is still living and may be salvageable are the goal of all perfusion techniques. Although the performance of such studies may be considered to identify and differentiate the ischemic penumbra and infarct core, their accuracy and usefulness have not been well established (Class IIb, Level of Evidence B).

### Clinical Role of Perfusion Imaging

- The admission volumes of infarct core and ischemic penumbra may be significant predictors of clinical outcome, possibly exceeding the prognostic value of admission NIHSS score [National Institutes of Health Stroke Score] (Class IIb, Level of Evidence B).
- 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. Together with vascular imaging, these approaches may determine suitability for other therapies such as mechanical clot retrieval and intra-arterial thrombolysis, as well as provide a surrogate marker for treatment efficacy (Class IIb, Level of Evidence B).

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.

## Billing/Coding/Physician Documentation Information

---

This policy may apply to the following codes. Inclusion of a code in this section does not guarantee that it will be reimbursed. For further information on reimbursement guidelines, please see Administrative Policies on the Blue Cross Blue Shield of North Carolina web site at [www.bcbsnc.com](http://www.bcbsnc.com). They are listed in the Category Search on the Medical Policy search page.

*Applicable codes: 0042T*

BCBSNC may request medical records for determination of medical necessity. When medical records are requested, letters of support and/or explanation are often useful, but are not sufficient documentation unless all specific information needed to make a medical necessity determination is included.

# CT Perfusion Imaging

## Scientific Background and Reference Sources

---

BCBSA Medical Policy Reference Manual [Electronic Version]. 6.01.49, 7/10/08

Khandelwal N. (2008). CT perfusion in acute stroke. *Indian J Radiol Imaging*, 18;4, 281-6. Retrieved 1/22/ 09 from <http://medind.nic.in/ibn/t08/i4/ibnt08i4p281.pdf>

Agency for Healthcare Research and Quality. Acute stroke: evaluation and treatment. Evidence Report/Technology Assessment (summary) 2005; (127):107. Retrieved 6/18/10 from: <http://www.ahrq.gov/downloads/pub/evidence/pdf/acutesroke/acstroke.pdf>

Latchaw RE, Alberts MJ, Lev MH et al.; on behalf of the American Heart Association Council on Cardiovascular Radiology and Intervention, Stroke Council, and the interdisciplinary Council on Peripheral Vascular Disease. Recommendations for imaging of acute ischemic stroke: a scientific statement from the American Heart Association. *Stroke* 2009; 40(11):3646-78

BCBSA Medical Policy Reference Manual [Electronic Version]. 6.01.49, 5/13/2010

## Policy Implementation/Update Information

---

- |         |   |
|---------|---|
| 2/16/09 | New policy issued. CT perfusion imaging is considered investigational. Notification given 2/16/09. Effective date 5/18/09. (adn)  |
| 6/22/10 | Policy Number(s) removed (amw)  |
| 9/28/10 | Description section extensively revised. Rationale added to Policy Guidelines section. References updated. Specialty Matched Consultant Advisory Panel review 8/25/2010. No change to policy statement. Draft policy approved as written. (adn) |
| 7/19/11 | Routine annual review. No changes. Specialty Matched Consultant Advisory Panel review. Approved as written. (adn)   |

---

Medical policy is not an authorization, certification, explanation of benefits or a contract. Benefits and eligibility are determined before medical guidelines and payment guidelines are applied. Benefits are determined by the group contract and subscriber certificate that is in effect at the time services are rendered. This document is solely provided for informational purposes only and is based on research of current medical literature and review of common medical practices in the treatment and diagnosis of disease. Medical practices and knowledge are constantly changing and BCBSNC reserves the right to review and revise its medical policies periodically.