Premera Blue Cross	Corporate Medical Policy

Title	**CT (Computed Tomography) Perfusion Imaging**
Number	**CP.MP.BC.6.01.49**
Revision Date(s)	
Effective Date	July 10, 2007
Replaces	N/A
Cross References	CP.MP.BC.6.01.43 Contrast Enhanced Computed Tomographic Angiography (CTA) for Coronary Artery Evaluation

Description	Perfusion imaging using CT (computed tomography) is said to provide detailed study of cerebral blood flow that may assist in the identification of ischemic regions of the brain, especially within the first few hours of an acute stroke. Perfusion imaging using CT 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 the cerebral tissues. Potential advantages of CT perfusion imaging are that it is less invasive than CT angiography and more widely available than MR imaging. Results from the CT perfusion studies allow calculation of regional cerebral blood volume, transit time, and regional cerebral blood flow. Several post-processing software packages (e.g., Siemens' syngo Perfusion-CT, GE Healthcare's CT Perfusion 4, Philips Medical System's Brain Perfusion Option) have received 510(k) marketing clearance from the U.S. Food and Drug Administration (FDA) for use with a CT system to perform perfusion imaging.
Scope	Medical policies are systematically developed guidelines that serve as a resource for Company staff when determining coverage for specific medical procedures, drugs or devices. Coverage for medical services is subject to the limits and conditions of the member benefit plan. Members and their providers should consult the member benefit booklet or contact a customer services representative to determine whether there are any benefit limitations applicable to this service or supply.
Policy	CT-based perfusion imaging 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	N/A
Rationale/ Source	The current literature focuses on technical capabilities and feasibility. A number of retrospective studies have indicated that blood flow values obtained using a diffusible gas indicator are accurate and also that the flow rates correlate with physiological changes such as the onset of neurological deficits. However, prospective controlled studies have not been reported that demonstrate that use of perfusion CT imaging improves outcomes in patients with acute stroke. The limited availability of medical-grade Xe gas is another issue with this approach to CT perfusion imaging. Because of more widespread availability, studies are also being done using non-diffusible tracers, i.e., contrast agents. However, the evidence is also not clear about how useful this technique is in differentiating reversible from irreversible ischemic cerebral tissue. In addition, the incremental impact of this technique on clinical decisions and clinical outcomes is not yet known. Studies to date appear to primarily report results of the imaging findings. How these findings relate to clinical outcomes, particularly through prospective trials using this technique, is not clear. Kilpatrick reported that patients who had no infarction on initial CT and normal Xe-CT cerebral blood flow had significantly fewer new infarctions than those with compromised cerebral blood flow measurement. However, this series of 51 patients had too few patients to be able to assess the potential role of CT, CT angiography, and perfusion-CT using Xe. (1) Wintermark and colleagues reported on findings from perfusion CT scans on 22 patients with acute stroke; they found it was helpful in predicting infarct size and clinical prognosis. They also commented that it could be a valuable tool in the early management of acute stroke patients. (2) The authors later reported on the accuracy of perfusion CT in 46 patients who were believed to have acute strokes, although the final diagnosis was stroke in just 26 patients. Based on this small series, they concluded that perfusion CT maps were more accurate than non-enhanced CT in detecting hemispheric strokes. (3) However, how this measurement would impact either overall clinical diagnostic accuracy or outcomes was not presented. Wintermark and colleagues also reported on measurement of the infarct core and penumbra in 130 patients with stroke. (4) They mention that different definitions have been used in measurement of perfusion imaging by CT. For their study group they indicate that mean transit time (MMT) most accurately describes the tissue at risk of

	infarction in cases of persistent arterial occlusion and that the infarct core at admission is best described by the absolute cerebral blood volume. The Agency for Healthcare Research and Quality (AHRQ) published a report on acute stroke in 2005. (5) 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. This technique is also being evaluated in the management of other neurological conditions such as subarachnoid hemorrhage and head trauma. 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. Thus, this technique is considered investigational. References: 1. Kilpatrick MM, Yonas H, Goldstein S et al. CT-based assessment of acute stroke: CT, CT angiography, and xenon-enhanced CT cerebral blood flow. *Stroke* 2001; 32(11):2543-9. 2. Wintermark M, Reichhart M, Thiran JP et al. Prognostic accuracy of cerebral blood flow measurement by perfusion computed tomography, at the time of emergency room admission, in acute stroke patients. *Ann Neurol* 2002;51(4):417-32. 3. Wintermark M, Fischbein NJ, Smith WS et al. Accuracy of dynamic perfusion CT with deconvolution in detecting acute hemispheric stroke. *AJNR Am J Neuroradiol* 2005;26(1):104-12. 4. Wintermark M, Flanders AE, Velthuis B et al. Perfusion-CT assessment of infarct core and penumbra: receiver operating characteristic curve analysis in 130 patients suspected of acute hemispheric stroke. *Stroke* 2006;37(4):979-85. 5. Agency for Healthcare Research and Quality. Acute stroke: evaluation and treatment. Evidence Report/Technology Assessment (summary) 2005; (127):1-7. Accessible at http://www.ahrq.gov/downloads/pub/evidence/pdf/acutestroke/acstroke.pdf. (Accessed May 25, 2007.)

Codes	Number	Description
CPT	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
ICD-9 Procedure		

Codes	Number	Description
ICD-9 Diagnosis		
HCPCS		
Type of Service		
Place of Service		