

**SUBJECT: TRANSCRANIAL DOPPLER
ULTRASOUND**

POLICY NUMBER: 6.01.18
CATEGORY: Technology Assessment

EFFECTIVE DATE: 09/16/99
REVISED DATE: 7/22/00, 09/19/01, 10/16/02
ARCHIVED DATE: 10/15/03
**EDITED DATE: 11/10/05, 11/16/06, 12/20/07, 12/18/08,
12/17/09, 12/16/10, 12/15/11, 12/20/12,
12/19/13**
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- *If the member's subscriber contract excludes coverage for a specific service it is not covered under that contract. In such cases, medical policy criteria are not applied.*
- *Medical policies apply to commercial and Medicaid products only when a contract benefit for the specific service exists.*
- *Medical policies only apply to Medicare products when a contract benefit exists and where there are no National or Local Medicare coverage decisions for the specific service.*

POLICY STATEMENT:

- I. Based on our criteria and review of the peer-reviewed literature transcranial Doppler ultrasound has been medically proven to be effective and therefore, **medically appropriate** for the following indications:
 - A. Arteriovenous malformations - Detection and assessment of the circulatory patterns of arteriovenous malformations;
 - B. Brain death - Assessing cerebral circulatory arrest as a measure of brain death;
 - C. Carotid endarterectomy - Assessing initial collateral blood flow and immobilization during carotid endarterectomy in order to detect severe ischemia so that a shunt can be placed to reduce stroke;
 - D. Intracranial artery stenosis and occlusion - Assessment of patients suspected of having stenosis or occlusion of the intracranial arteries due to a cerebral infarction (stroke) or transient ischemic attack of diverse causes;
 - E. TIA/cerebral infarction risk in Sickle Cell Disease - As a tool to determine risk for transient ischemic attacks (TIA) or cerebral infarctions in patients with sickle cell disease; or
 - F. Vasospasm/vasoconstriction - Evaluating and following patients with vasospasm or vasoconstriction of any cause, especially in patients with subarachnoid hemorrhage.
- II. Based upon our criteria and review of the peer-reviewed literature transcranial Doppler ultrasound has not been medically proven to be effective and is considered **investigational** for:
 - A. Behavior or developmental disorders - Monitoring vasodilator therapy as a treatment of behavior or developmental disorders including, but not limited to, attention deficit hyperactivity disorder (ADHD), autism, or Tourette's syndrome;
 - B. Cardiopulmonary bypass surgery - Assessing the adequacy of cerebral blood flow and embolic events during cardiopulmonary bypass surgery;
 - C. Central nervous system infections - Evaluating blood flow patterns in central nervous system infections;
 - D. Cerebral flow - Evaluating cerebral blood flow after trauma;
 - E. Dementia - Evaluating dementia;
 - F. Extracranial vascular atherosclerosis - Evaluating the hemodynamic significance of extracranial vascular atherosclerosis;
 - G. Glaucoma - Assessing glaucoma;
 - H. Headaches - Assessing migraine and tension headaches;
 - I. Hydrocephalus - Assessing hydrocephalus;
 - J. Intracranial aneurysms - Detection of intracranial aneurysms;
 - K. Ischemic stroke - to improve the thromboembolic efficacy of recombinant tissue plasminogen activator (rtPA) for treatment of peripheral arterial thrombosis; or
 - L. All other indications.

POLICY GUIDELINES:

The Federal Employees Health Benefit Program (FEHBP/FEP) requires that procedures, devices or laboratory tests approved by the U.S. Food and Drug Administration (FDA) may not be considered investigational and thus these procedures, devices or laboratory tests may be assessed only on the basis of their medical necessity.

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DESCRIPTION:

Transcranial Doppler ultrasound (TCD) is an ultrasound technology that measures physiological parameters of blood flow in the major intracranial arteries. TCD uses a pulsed Doppler system with low frequencies that enables recording of blood velocities from intracranial arteries through selected cranial foramina and thin regions of the skull. It is a non-invasive test. Advantages of TCD are: the capability of bedside studies, ease of use in serial studies, “real-time” assessment, its ability to detect flow direction (not well seen by CT or MR angiography), minimal patient risk (no contrast, radiation, invasive component), and its use as an option for people with contraindications for conventional cerebral angiography or CT angiography (dye allergy, metal artifacts in the head), or MRI (claustrophobia, pacemakers, other metal artifacts).

RATIONALE:

The FDA has approved several versions of transcranial Doppler ultrasound systems. Although this technology has been considered as an alternative to cerebral angiography, MRI, and MRA, published clinical evidence does not support its efficacy for the indications listed as investigational in this policy. Literature remains promising for the use of TCD in assessing the adequacy of cerebral blood flow and embolic events during cardiopulmonary bypass surgery. Clinical studies do not support that the use of TCD for the assessment of migraine or tension headaches improves health outcomes. There is a lack of sufficient scientific evidence that TCD improves health outcomes as a technique to monitor vasodilator therapy in patients with developmental or behavioral disorders. It has been hypothesized that these disorders are related to cerebral vasospasm that can be relieved by vasodilator therapy. There is a lack of clinical evidence to support that TCD improves the thromboembolic efficacy of recombinant tissue plasminogen activator (rtPA) for treatment of peripheral arterial thrombosis in ischemic stroke. An in vitro study using a human stroke model concluded that combined treatment of clots with rtPA and pulsed-wave Doppler, through temporal bone 1.91 mm thickness, did not significantly enhance thrombolysis over rtPA alone.

CODES: Number Description

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.

CPT: 93886 Transcranial doppler study of the intracranial arteries; complete study
93888 limited study

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HCPCS: No code(s)

ICD9: 88.71 Diagnostic ultrasound of head and neck

282.60-282.69	Sickle cell anemia (code range)
348.0-348.8	Other conditions of brain (code range)
362.31-362.37	Retinal vascular occlusion (code range)
368.2	Diplopia
430	Subarachnoid hemorrhage
433.0-433.9	Occlusion and stenosis of precerebral arteries (code range)
434.0-434.9	Occlusion of cerebral arteries (code range)
435.0-435.9	Transient cerebral ischemia (code range)
436	Acute, but ill-defined, cerebrovascular disease
437.0	Cerebral atherosclerosis

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ICD10:	747.81 852.0 852.1 853.0 D57.00-D57.219 D57.80-D57.819 G45.0-G45.9 G46.0-G46.2 G93.0-G93.2 G93.40-G93.6 G93.81-G93.9 H34.00-H34.9 H53.2 I60.00-I60.9 I63.00-I63.9 I65.01-I66.9 I67.2 I67.83-I67.89 Q28.2-Q28.3 S01.90xA S06.1x0A-S06.1x9A (only A encounters) S06.340A-S06.369A (only A encounters) S06.6x0A-S06.6x9A (only A encounters)	Arteriovenous malformation of brain Subarachnoid hemorrhage following injury, without mention of open intracranial wound Subarachnoid hemorrhage following injury with open intracranial wound Subarachnoid hemorrhage following injury, with open intracranial wound Sickle-cell disease with or without crisis (code range) Other sickle-cell disorders (code range) Transient cerebral ischemic attacks and related syndromes (code range) Vascular syndromes of brain in cerebrovascular diseases (code range) Other disorders of brain (code range) Other and unspecified encephalopathy (code range) Other specified and unspecified disorders of brain (code range) Retinal vascular occlusions (code range) Diplopia Nontraumatic subarachnoid hemorrhage (code range) Cerebral infarction (code range) Occlusion and stenosis of precerebral or cerebral arteries, not resulting in cerebral infarction (code range) Cerebral atherosclerosis Cerebral vasospasm and vasoconstriction (code range) Arteriovenous malformation and other malformations of cerebral vessels Unspecified open wound of unspecified part of head, initial encounter Traumatic cerebral edema with or without loss of consciousness (code range) Concussion with or without loss of consciousness (code range) Traumatic subarachnoid hemorrhage with or without loss of consciousness (code range)
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REFERENCES:

Arenillas JF, et al. Progression and clinical recurrence of symptomatic middle cerebral artery stenosis; a long-term follow-up of transcranial Doppler ultrasound study. *Stroke* 2001 Dec 1;32(12):2898-904.

Babikian VL, et al. Transcranial Doppler ultrasonography: year 2000 update. *J Neuroimaging* 2000 Apr;10(2):101-15.

BlueCross BlueShield Association. Transcranial Doppler ultrasound. Medical Policy Reference Manual Policy #6.01.07. 2010 Jul 08.

de Oliveira RS, Machado HR. Transcranial color-coded Doppler ultrasonography for evaluation of children with hydrocephalus. *Neurosurg Focus* 2003 Oct 15;15(4):ECP3.

Diegeler A, et al. Neuromonitoring and neurocognitive outcome in off-pump vs. conventional coronary bypass operation. *Ann Thorac Surg* 2000 Apr;69(4):1162-6.

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Heckmann JG, et al. Myogenic cerebrovascular autoregulation in migraine measured by stress transcranial Doppler sonography. *Cephalgia* 1998 Apr;18(3):133-7.

Hennerici MG, et al. Cerebral embolism and Doppler ultrasound. *Cerebrovasc Dis* 1999 May-Jun;9(3):188-92.

Kaposzta Z, et al. Clinical application of asymptomatic embolic signal detection in acute stroke: a prospective study. *Stroke* 1999 Sep;30(9):1814-8.

Kochi K, et al. Comparative study of noninvasive cerebrovascular monitoring methods in cardiac surgery. *Hiroshima J Med Sci* 2002 Jun;51(2):49-54.

Lee JD, et al. Benefits of off-pump bypass on neurologic and clinical morbidity: a prospective randomized trial. *Ann Thorac Surg* 2003 Jul;76(1):18-25.

Lund C, et al. Comparison of cerebral embolization during off-pump and on-pump coronary artery bypass surgery. *Ann Thorac Surg* 2003 Sep;76(3):765-70.

Miller ST, et al. Impact of chronic transfusion on incidence of pain and acute chest syndrome during the stroke prevention trial (STOP) in sickle-cell anemia. *J Pediatr* 2001 Dec;139(6):785-9.

Pfaffenberger S, et al. Can a commercial diagnostic ultrasound device accelerate thrombolysis? An in vitro skull model. *Stroke* 2005 Jan;36(1):124-8.

Razumovsky AY. TCD, MRA and MRI in acute cerebral ischemia. *Acta Neurol Scand* 1999 Jan;99(1):65-76.

Ringelstein EB, et al. Consensus on microembolus detection by TCD. International consensus group on microembolus detection. *Stroke* 1998 Mar;29(3):725-9.

Rosengarten B, et al. Cerebrovascular reactivity in adolescents with migraine and tension-type headache during headache-free interval and attack. *Headache* 2003 May;43(5):458-63.

Sloan MA, et al. Assessment: transcranial Doppler ultrasonography. Report of the therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology. *Neurology* 2004 May 11;62(9):1468-81.

Wardlaw JM, et al. Does the size of intracranial aneurysms change with intracranial pressure? Observations based on color "power" transcranial Doppler ultrasound. *J Neurosurg* 1998 May;88(5):846-50.

Watters MP, et al. Reduced cerebral embolic signals in beating heart coronary surgery detected by transcranial Doppler ultrasound. *Br J Anaesth* 2000 May;84(5):549-51.

White PM, et al. Power transcranial Doppler ultrasound in the detection of intracranial aneurysms. *Stroke* 2001 Jun;32(6):1291-7.

Van Zuilen EV, et al. The clinical relevance of cerebral microemboli detection by transcranial Doppler ultrasound. *J Neuroimaging* 1998 Jan;8(1):32-7.

KEY WORDS:

Sickle cell anemia, Transcranial Doppler, Ultrasonography.

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CMS COVERAGE FOR MEDICARE PRODUCT MEMBERS

There is currently a Local Coverage Determination (LCD) for Non-Invasive Vascular Studies. Please refer to the following LCD website for Medicare Members:

[http://www.cms.gov/medicare-coverage-database/details/lcd-details.aspx?LCDId=27355&ContrId=181&ver=76&ContrVer=1&CntrctrSelected=181*1&Cntrctr=181&name=National+Government+Services%2c+Inc.+\(13202%2c+MAC+-+Part+B\)&s=41&DocType=All&bc=AggAAAAIAAAAAAA%3d%3d&](http://www.cms.gov/medicare-coverage-database/details/lcd-details.aspx?LCDId=27355&ContrId=181&ver=76&ContrVer=1&CntrctrSelected=181*1&Cntrctr=181&name=National+Government+Services%2c+Inc.+(13202%2c+MAC+-+Part+B)&s=41&DocType=All&bc=AggAAAAIAAAAAAA%3d%3d&)