Medical Policy

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Title: Contrast-Enhanced Computed Tomography Angiography (CTA) for Coronary Artery Evaluation

See also: *Computed Tomography to Detect Coronary Artery Calcification policy*
CTA and MRA of the Chest (excluding the heart) policy
CTA and MRA of the Head, Neck, Abdomen, Pelvis, Lower Extremity, and Upper Extremity policy
Cardiac Computed Tomography (CT)

Professional
Original Effective Date: November 1, 2001
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DESCRIPTION

Contrast-enhanced computed tomography angiography (CTA) is a noninvasive imaging test that requires the use of intravenously administered contrast material and high-resolution, high-speed CT machinery to obtain detailed volumetric images of blood vessels. CTA can be applied to image blood vessels throughout the body; however, to apply CTA in the coronary arteries, several technical challenges must be overcome to obtain high-quality diagnostic images. First, very short image acquisition times are necessary to avoid blurring artifacts from the rapid motion of the beating heart. In some cases, premedication with beta-blocking agents is used to slow down the heart rate below about 60–65 beats per minute to facilitate adequate scanning, and electrocardiographic triggering or retrospective gating is used to obtain images during diastole when motion is reduced. Second, rapid scanning is also helpful so that the volume of cardiac images can be obtained during breath-holding. Third, very thin sections (1 mm or less) are important to provide adequate spatial resolution and high-quality 3D reconstruction images.

Volumetric imaging permits multiplanar reconstruction (MPR) of cross-sectional images to display the coronary arteries. Curved MPR and thin-slab maximum intensity projections (MIPs) provide an overview of the coronary arteries, and volume-rendering techniques (VRT) provide a 3D anatomical display of the exterior of the heart. Quantification of coronary artery stenosis may be difficult given current techniques, although improvements in image reconstruction algorithms such as automatic vessel tracking are being developed.

Two different CT technologies can achieve high-speed CT imaging. Electron beam CT (EBCT, also known as ultrafast CT) uses an electron gun rather than a standard x-ray tube to generate x-rays, thus permitting very rapid scanning, on the order of 50–100 milliseconds per image. Helical CT scanning (also referred to as spiral CT scanning) also creates images at greater speed than conventional CT by continuously rotating a standard x-ray tube around the patient so that data are gathered in a continuous spiral or helix rather than individual slices. Helical CT is able to achieve scan times of 500 milliseconds or less per image, and use of partial ring scanning or post-processing algorithms may reduce the effective scan time even further.

Multidetector row helical CT (MDCT) or multislice CT (MSCT) scanning is a technological evolution of helical CT, which uses CT machines equipped with an array of multiple x-ray detectors that can simultaneously image multiple sections of the patient during a rapid volumetric image acquisition. Currently available MDCT machines may have 4, 8, 16, 32, 40, or 64 detectors. Diffusion of MDCT machines into the medical community has been occurring over the past several years.

Evaluation of obstructive coronary artery disease (CAD) involves quantifying arterial stenoses to determine whether hemodynamically significant stenosis is present. Symptomatic lesions with greater than 50%–75% diameter stenosis are generally considered significant, and often result in revascularization procedures when viable myocardium is present. It has been suggested that CTA may be helpful to rule out the presence of CAD and to avoid invasive coronary angiography in patients with a very low clinical likelihood of significant CAD. Also of note is the increasing interest in exploring the role of nonsignificant plaques (i.e., those associated with less than 50% stenosis) because it is postulated that some of these plaques that are considered unstable may undergo rupture or erosion and lead to acute myocardial infarction. Cross-sectional angiographic imaging may visualize the presence and composition of these plaques and quantify the plaque burden better than conventional angiography, which only visualizes the vascular lumen. However, it is not yet well established how this information would be used to guide patient management.

The information sought from angiography after coronary artery bypass graft surgery may depend on the length of time since surgery. Bypass graft occlusion may occur during the early postoperative period; whereas, over the long term, recurrence of obstructive CAD may occur in the bypass graft, which requires a similar evaluation as CAD in native vessels.

Congenital coronary arterial anomalies (i.e., abnormal origination or course of a coronary artery) that lead to clinically significant problems are relatively rare lesions. Symptomatic manifestations may include ischemia or syncope. Clinical presentation of anomalous coronary arteries is hard to distinguish from other more common causes of cardiac disease; however, anomalous coronary artery is an important diagnosis to exclude, particularly in young patients who present with unexplained symptoms (e.g., syncope). There is no specific clinical presentation to suggest a coronary artery anomaly.

CTA has several important limitations. The presence of dense arterial calcification or an intracoronary stent can produce significant beam-hardening artifacts and may preclude a satisfactory study. The presence of an uncontrolled rapid heart rate or arrhythmia hinders the ability to obtain diagnostically satisfactory images. Evaluation of the distal coronary arteries is generally more difficult than visualization of the proximal and midsegment coronary arteries due to greater cardiac motion and the smaller caliber of coronary vessels in distal locations.

Also, it is important to consider the radiation dose associated with CTA. Four-row MDCT delivers approximately 7 to 12 mSv, 16-row 7 to 15 mSv, and 64-row 8 to 20 mSv. Electrocardiographically (ECG)-controlled modulation of the x-ray beam during the cardiac cycle can reduce radiation exposure up to 50% by reducing exposure during nonimaging phases of the cardiac cycle. The estimated lifetime cancer risk associated with the radiation delivered from a 64-row scan without dose modulation range from 1 in 143 for cancer in a 20-year-old woman to 1 in 3,261 for an 80-year-old man; with dose modulation estimates decline to 1 in 219 and 1 in 5,017 respectively. (1) EBCT using ECG triggering delivers the lowest dose (approximately 0.7 to 1.1 mSv with 3-mm sections). In comparison, conventional invasive coronary angiography delivers about 4 to 8 mSv.

POLICY

1. Contrast-enhanced computed tomographic angiography for evaluation of anomalous (native) coronary arteries in symptomatic patients may be considered **medically necessary** when conventional angiography is unsuccessful or equivocal and when the results will impact treatment.

2. Contrast-enhanced computed tomographic angiography for coronary artery evaluation is considered **experimental / investigational** for all other indications.

DOCUMENTATION

All coronary CTA studies will be reviewed with the following documentation: history and physical, operative report or cath report, and any other pertinent records.

UTILIZATION

Coronary CTA studies will be allowed subject to multiple procedure guidelines. Multiple procedure guidelines do not apply to institutional providers.

RATIONALE

This policy was originally based on a literature search conducted on MEDLINE via PubMed through February 2004 and updated with a February 2005 TEC Assessment. (2) The objective of the TEC Assessment was to evaluate the clinical effectiveness of contrast-enhanced cardiac computed tomography angiography (CTA) using either electron beam computed tomography (EBCT) or multidetector-row computed tomography (MDCT) as a noninvasive alternative to invasive coronary angiography (CA), particularly in patients with a low probability of significant coronary artery stenosis. Evaluation of the coronary artery anatomy and morphology is the most frequent use of cardiac CTA and was the primary focus of the TEC Assessment. Cardiac CTA may also provide evaluation of the cardiac chambers, myocardial wall thickness, and functional evaluation of the heart including perfusion patterns of enhancement and estimation of ejection fraction, but this use was not addressed in this Assessment.

The TEC Assessment concluded that the use of contrast-enhanced cardiac CT angiography for screening or diagnostic evaluation of the coronary arteries did not meet TEC criteria. The following summarizes the findings from the 2005 TEC Assessment.

Screening for CAD. No eligible studies were identified using contrast-enhanced CTA as a screening test for CAD in asymptomatic subjects or among subjects planned for major noncardiac surgery.

Diagnosis of CAD (Acute). One small study examined the use of CTA in 22 hospitalized patients with non-ST elevation acute coronary syndromes who were scheduled for CA. CTA yielded evaluable images of vessel segments >2 mm in diameter in 98% of cases and achieved 94% sensitivity, 96% specificity, 99% negative predictive value, and 77% positive predictive value for stenosis >50% compared with conventional angiography. The study also suggested that if CTA had been used for initial evaluation in place of CA, 3 patients (14%) with no significant CAD might have been spared CA. The very high NPV in this small study is of interest, but this would need to be confirmed in additional large prospective studies.

Diagnosis of CAD (Non-acute). There are 14 studies (total n=723) reporting the diagnostic performance characteristics of CTA for evaluation of nonacute, symptomatic patients with known or suspected CAD who are scheduled for invasive CA. Most studies were prospective, double-blinded, and used conventional angiography as the reference standard. The results for CTA were variable with technical success in achieving evaluable vessels between 79% and 93% for MDCT and 77% and 89% for EBCT. It is important to consider the patient as the unit of analysis, and 1 study that provided this information found that 74% of patients had all vessels evaluable on CTA. This implies that approximately one fourth of subjects undergoing MDCT may have at least some limitation in the visualization of the coronary arteries.

Within the 11 studies using MDCT (total n=622), 4 studies (total n=289) reported patient-based analyses, CTA achieved 85–100% sensitivity, 78–86% specificity, 81–97% positive predictive value, and 75–100% negative predictive value. It is important to recognize that the higher sensitivity estimates in these ranges addressed only segments greater than 2 mm in diameter. A larger number of studies provide vessel- or vessel-segment-based analyses reporting sensitivity ranging from 63–95%, specificity 86–98%, positive predictive value 64–87%, and negative predictive value (NPV) 96–99%. This NPV is frequently reported as being high enough to exclude the diagnosis of significant stenoses; however, this analysis addresses vessels/segments, and decisions to avoid invasive angiography are not based on a per-vessel analysis. Furthermore, the prevalence of significantly stenotic vessels is only 10–37%, which will make the NPV appear higher than if CTA were analyzed at the patient level where there is a higher prevalence of significant CAD with all vessels summed together. These vessel-/segment-based analyses may be useful in determining treatment decisions about single vessels, but are not the most useful analyses when making treatment decisions about the patient as a whole. Thus, to exclude the diagnosis of CAD and avoid the need for invasive angiography, the negative predictive value for the patient based on all the coronary arteries is the relevant information.

Among the studies using EBCT (total N=101), all 3 studies report diagnostic performance based on vessels or segments with a prevalence of stenotic vessels/segments of 15–21%. Sensitivity range was 70–77%, specificity was 91–95%, NPV was 95%, and PPV was 70–73%.

Diagnosis after coronary artery bypass graft (CABG). One prospective study examined the use of MDCT in 48 patients who were scheduled for CA after CABG. After excluding 3 technical failures, the authors report technical success in visualizing 100% of bypass grafts and 74% of distal anastomoses. Sensitivity, specificity, and positive and negative predictive values for graft occlusion were 96%, 95%, 81%, and 99%, respectively. However, this study provides no information about patient symptoms or how evidence of graft occlusion would affect management.

Diagnosis of CAD after stent. Two small studies (1 MDCT and 1 EBCT) have examined the feasibility of using CTA for evaluation shortly after stent placement and found 74% to 87% of stents evaluable. However, these small studies were very limited in reporting, did not examine subjects with suspicion of clinically recurrent CAD, and 1 did not used double-blinded assessment.

Delineation of coronary artery anomaly. Two small studies including a total of 29 subjects, who were all selected for study based on a known or suspected coronary artery anomaly, suggest that CTA may provide a better evaluation of anomalous arterial anatomy than conventional coronary angiography. However, both studies were retrospective and neither prospectively evaluated the diagnostic performance of CTA in evaluating unknown consecutive clinical cases.

Delineation of coronary artery anatomy prior to cardiovascular procedure. One small study reports that it is feasible to delineate coronary venous anatomy based on simultaneous coronary arterial and venous enhancement on EBCT. Another recently published study examined the predictive value of CTA in 45 patients with chronic total coronary occlusions who were scheduled for percutaneous revascularization. Results of multivariable logistic regression were reported, but performance characteristics for CTA such as sensitivity, specificity, and positive and negative predictive value for procedural failure are not reported. Thus, these results are not sufficient to determine the effect of using CTA on management and health outcomes.

In summary, the TEC Assessment found that the available evidence does not provide sufficient information to permit conclusions on the effect of CTA on health outcomes. Available studies are limited by small sample size, single-center design, possible overlap of patient populations with duplicate reporting, failure to enroll clinically relevant patient population, variable technical success rates for CTA, inconsistent analysis of diagnostic performance characteristics, reporting of diagnostic performance limited to evaluable segments, failure to report diagnostic performance per patient, and, most importantly, the inability to translate diagnostic performance of CTA to expected effects on management and health outcomes.

2006 Update

A 2006 TEC Assessment was completed to determine the usefulness of CTA as a substitute for coronary angiography for two indications: in the diagnosis of coronary artery stenosis and in the evaluation of acute chest pain in the emergency room (ER). (3) Uses of CTA for other indications were not addressed in the Assessment. The Assessment was based on studies that evaluated 32-row or greater CTA and compared CTA to angiography for diagnosis of coronary artery stenosis, and any study evaluating CTA for patients with acute chest pain in the ER were selected.

Seven studies compared CTA to angiography for diagnosis of coronary artery stenosis, ranging in size from 30 to 84 patients. These studies enrolled essentially convenience samples of consecutive patients scheduled to undergo angiography, and thus may be subject to spectrum bias. No study specifically studied a lower-risk subset of those patients referred for angiography, which is the target population for this procedure. A high prevalence of coronary stenosis was noted in all studies. In 5 studies reporting a per-patient analysis, 3 studies excluded patients with indeterminate test results. The sensitivity of CTA in identifying a 50% stenosis ranged from 88–100%, with 4 of 5 studies reporting sensitivities of at least 95%. Specificity ranged from 86–100%. In a per-segment analysis, sensitivity ranged from 79–99%, and specificity ranged from 95–98%. Four of these studies excluded either patients or segments from the analysis.

Two studies evaluated the use of CTA for patients with acute chest pain in the ER. The sample sizes of the studies were 31 and 69. The studies used a mixed reference standard of angiography, clinical data, and noninvasive testing, which allows a calculation of sensitivity and specificity, but does not allow a comparison of performance to an alternative strategy. No alternative strategies for diagnosis were evaluated. Sensitivity of CTA was 83% and 96%, and specificity was 89% and 96%. It is unknown whether this indicates better or worse performance than an alternative strategy.

The studies evaluating the use of CTA in comparison to angiography are relatively small studies from single centers. Their major failing is that they enrolled convenience samples of patients being referred for angiography. The results from these studies may not generalize to lower-risk populations. In addition, such studies only directly address the question of whether CTA can accurately triage patients already referred for angiography. The use of CTA as part of the initial workup of chest pain or possible angina is not addressed at all in these kinds of studies. However, analyzing the information from these studies solely from the perspective of sensitivity and specificity in identifying a specific amount of coronary stenosis may shortchange the potential utility of CTA. Visualizing the coronary anatomy may provide useful prognostic information for optimally managing patients even if no direct referral to angiography results. However, to demonstrate improved patient outcomes, valid prognostication tied to improved management and outcomes must be demonstrated. Clinical trials comparing patients undergoing CTA as part of their diagnostic workup compared to patients not undergoing CTA may be required to demonstrate improved patient outcomes. There is no evidence except in the ER regarding the use of CTA in the early workup of patients in whom CAD is being considered.

Current published studies of CTA in the management of acute chest pain in the ER are clearly inadequate to determine utility. No comparator strategy was specified in any study, and there was no solid reference standard for diagnosis. Clinical trials may be necessary to demonstrate utility in this setting.
Finally, Garcia and colleagues recently reported on a multicenter study using the 16-row multidetector computed tomography for assessing coronary artery stenosis. (4) This study found both a high number of none valuable segments as well as a high false-positive rate. In addition, 37 of 238 eligible patients were excluded from the study because of high calcium scores.

Anomalous coronary arteries are an uncommon finding at angiography, occurring in ~1% of coronary angiograms completed for evaluation of chest pain. However, these congenital anomalies can be very important clinically depending on the course of the anomalous arteries. A number of case series have consistently reported that CTA is able to delineate the course of these anomalous arteries, even when conventional angiography cannot. (5-7) However, none of the studies reported results when the initial reason for the CT study was to identify these anomalies nor did any of the studies discuss impact on therapeutic decisions. Given the uncommon occurrence of these symptomatic anomalies, it is unlikely that a prospective trial of CTA could be completed. Thus, a policy statement is added that this application (i.e., evaluating anomalies in native coronary arteries) is medically necessary in symptomatic patients only when conventional angiography is non-diagnostic and when the result will have an impact on treatment.

Appropriateness criteria have recently been published for both CTA and cardiac MRI. (8) These criteria were developed using a process that compared the expected benefit of the test with the expected negative consequences; having information from peer-reviewed studies was not required in making decisions about expected benefits or harms. A number of scenarios were judged as appropriate for use of CTA in evaluating coronary arteries. The studies cited in the appropriateness criteria report do not provide new information.

2007-2008 Update

A literature search of the MEDLINE database from November 2006 to November 2007 was conducted. Relevant studies identified included meta-analyses comparing diagnostic performance of CTA to angiography for evaluation of native arteries, following coronary artery bypass grafting, and evaluating in-stent restenosis; a single-arm study of the impact of CTA on ER clinical decision making; and a randomized, controlled trial conducted in the emergency setting.

Meta-Analyses of Diagnostic Performance in Native Vessels Hamon and colleagues (9) included studies enrolling 30 or more patients using CTA (16 slices or greater) as a diagnostic test, defining significant CAD as greater than 50% stenosis based on angiography, and required absolute numbers of true and false-positive and true or false-negative results stated or calculable. Per-patient results were combined from 28 studies (median sample size was 60; range, 30 to 187) including 1,987 individuals. The table displays CTA test performance and 95% confidence intervals compared to angiography as the gold standard for 16- and 64-row CTA, respectively

Scanner	Studies	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
16-row	16	95 (93 to 96)	69 (66 to 73)	79 (76 to 82)	92 (88 to 94)
64-row	12	97 (95 to 98)	90 (86 to 93)	93 (91 to 96)	96 (92 to 98)

These results apply to individuals referred for angiography. Mean disease prevalence was 57%. Individual study quality was assessed, but not further examined in the meta-analysis. However, only 3 of 28 studies were judged to have enrolled a patient spectrum representative of those likely to receive the test in practice

Vanhoenacker and colleagues (10) combined results from 54 studies enrolling patients suspected of having CAD using 4-, 16-, and 64-slice scanners. Study inclusion criteria were otherwise similar to those applied by Hamon and colleagues, but sample sizes were not reported In the per-patient analyses sensitivity and specificities were highest with 64-slice scanners — pooled sensitivity of 99% (95% CI: 97% to 100%), specificity of 93% (95% CI: 89% to 98%). The mean disease prevalence was 67% in the included studies (95% CI: 59% to 75%). The meta-analysis found significant between-study variability. Analyses were also consistent with publication bias. No study quality assessment was performed.

Sun and colleagues (11) included 47 studies enrolling 10 or more patients undergoing CTA and angiography — mean sample size of 67 (range, 24 to 149). CAD prevalence in the studies combined was 74% (95% CI: 64% to 84%). Only 21 studies reported per-patient data. Sensitivity and specificity of CTA in per-patient analyses were 91% (95% CI: 88% to 95%) and 86% (95% CI: 81% to 92%), respectively.

These meta-analyses combined numerous case series with high disease prevalence finding high sensitivity (91% to 99%) but lower specificity (86% to 93%). Hamon and colleagues judged the study samples not representative of those likely to receive the test in practice (i.e., a population with lower CAD prevalence). As emphasized in the 2006 TEC Assessment (3) diagnostic characteristics in a low-prevalence population where the test is likely to be used are of primary interest.

Diagnostic Performance Following Coronary Artery Bypass. Jones and colleagues (12) combined results from 13 studies — mean sample size 46 (range 13 to 96). In 8 studies patients were clearly symptomatic. Disease prevalence was not reported. Of 1,861 grafts, 1,791 or 96% were adequately visualized. Nonvisualized grafts (4%) were excluded from the analyses. The positive predictive value for graft occlusion in per-segment analyses was 93.6% (95% CI: 90.5% to 96.0%) and negative predictive value was 99.4% (95% CI: 98.9% to 99.8%). While reported diagnostic accuracy excluding nonvisualized vessels was high, the results do not permit concluding that CTA will allow safely avoiding angiography post-CABG. Finally, per-patient analyses were not provided.

Meta-Analysis of Diagnostic Accuracy for In-Stent Restenosis. Hamon and colleagues (13) identified studies performing both CTA and angiography for examining in-stent restenosis. Fifteen studies (1,175 stents) using 16-slice or greater CTA were included that defined restenosis by greater than 50% obstruction and stated (or had calculable) absolute numbers of true-positive and false-negative results. Thirteen percent of stents were not assessable and were excluded from analyses. Sensitivity of CTA in the remaining stents for restenosis was 84% (95% CI: 77% to 89%) and specificity 91% (95% CI: 89% to 93%), not supporting a role for CTA in this setting.

Impact of CTA on Emergency Room Decision Making. Over a 2-month period, Rubinshtein and colleagues (14) enrolled 58 consecutive patients presenting to the ER with "intermediate probability" of acute coronary syndromes — 22 with known CAD and 36 without. Based on history, risk factors, and presentation, two cardiologists came to consensus regarding the need for hospitalization (those with EKG changes or abnormal biomarkers were excluded). CTA (64-slice) findings were normal in 15 patients, nonobstructive in 20, and 50% or greater narrowing in 23. Angiography was performed in 17 patients, 16 of whom demonstrated significant obstructive disease; which patients had previously known CAD was not reported. Following CTA, 21 of 47 patients for whom hospitalization was originally planned were discharged home; 20 of 32 patients initially triaged to early intervention avoided angiography; and 5 of 15 not planned to have angiography underwent it.

While suggestive, inferences that can be drawn from this small study are limited. Patients were assessed by two cardiologists, there was no usual care group, and patients with and without known CAD were combined.

Randomized, Controlled Trial. Goldstein and colleagues (15) randomized 197 patients presenting to the ER with "low-risk" acute chest pain to 64-slice CTA (n=99) or standard-of-care nuclear stress testing (n=98). In the standard-of-care arm, angiography performed immediately yielded abnormal results in 3 patients and in 4 others following discharge home. In the CTA arm (n=99), angiography was performed immediately in 8 patients, 24 required nuclear stress testing due to intermediate or nondiagnostic CTA, with 3 of 24 subsequently undergoing angiography. One of the 88 patients in the CTA arm discharged home subsequently underwent angiography. There were no major adverse cardiac events in either group over a 6-month follow-up. In this sample, drawn from a low-prevalence population, there was a high proportion of nondiagnostic CTA scans. A second test was required in the CTA arm in 24% of patients and 4% required a third radiation exposure from angiography.

Summary. While relevant studies have been published, none provides convincing evidence supporting indications other than those covered in the policy.

2009 Update

Miller et al conducted a multi-center study to examine the accuracy of coronary angiography by 64 row CT as compared with conventional coronary angiography in patients with suspected coronary artery disease. Coronary CTA had a positive predictive value of 91% and a negative predictive value of 83%. Coronary CTA misclassified 13% of patients as compared with conventional coronary angiography. Exposure to radiation remains a concern at this time. They concluded that the negative and positive predictive values indicate that coronary CTA cannot replace conventional coronary angiography at present and that further studies are needed to define the methods precise role in the diagnostic algorithm for the evaluation of patients with suspected coronary artery disease.

An editorial (reference) accompanying the Miller et al report pointed out that in May 2006 the Medicare Coverage Advisory Committee (now called the Medicare Evidence Development and Coverage Advisory Committee, MED CAC) reviewed the data regarding coronary CTA and found that it did not demonstrate a benefit with regard to outcomes. The editorial also discussed concerns about radiation exposure and evidence that coronary CTA leads to additional unnecessary procedures such as additional diagnostic testing, revascularizations or biopsies for incidental findings. It is noted that Brenner and Hall (reference) estimated that 1.52% of all cancer in the United States may be attributed to CT radiation.

CODING

The following codes for treatment and procedures applicable to this policy are included below for informational purposes. Inclusion or exclusion of a procedure, diagnosis or device code(s) does not constitute or imply member coverage or provider reimbursement. 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.

CPT/HCPCS

0146T Computed tomography, heart, without contrast material followed by contrast material(s) and further sections, including cardiac gating and 3D image post processing; computed tomographic angiography of coronary arteries (including native and anomalous coronary arteries, coronary bypass grafts), without quantitative evaluation of coronary calcium

0147T Computed tomography, heart, without contrast material followed by contrast material(s) and further sections, including cardiac gating and 3D image post processing; computed tomographic angiography of coronary arteries (including native and anomalous coronary arteries, coronary bypass grafts), with quantitative evaluation of coronary calcium

0148T Computed tomography, heart, without contrast material followed by contrast material(s) and further sections, including cardiac gating and 3D image post processing; cardiac structure and morphology and computed tomographic angiography of coronary arteries (including native and anomalous coronary arteries, coronary bypass grafts), without quantitative evaluation of coronary calcium

0149T Computed tomography, heart, without contrast material followed by contrast material(s) and further sections, including cardiac gating and 3D image post processing; cardiac structure and morphology and computed tomographic angiography of coronary arteries (including native and anomalous coronary arteries, coronary bypass grafts), with quantitative evaluation of coronary calcium

DIAGNOSIS

414.00 Coronary atherosclerosis of unspecified type of vessel, native or graft
414.01 Coronary atherosclerosis of native coronary artery
414.02 Coronary atherosclerosis of autologous vein bypass graft
414.03 Coronary atherosclerosis of nonautologous biological bypass graft
414.04 Coronary atherosclerosis of artery bypass graft
414.05 Coronary atherosclerosis of unspecified type of bypass graft

REVISIONS

01-10-2006	In "Policy" section, deleted old policy and added "Computed tomographic angiography (CTA) is considered experimental/investigational for the evaluation of coronary arteries including but not limited to the following: 1. Screening for coronary artery disease (CAD), either in asymptomatic subjects or as part of a preoperative evaluation 2. Diagnosis of CAD, in patients with acute or non-acute symptoms, or after a coronary intervention 3. Delineation of a coronary artery anatomy or anomaly Computed tomographic angiography (CTA) of other anteries may be indicated when medically necessity is properly documented."
	In "Coding", Covered Diagnosis section added "Note: The use of any diagnosis code does not guarantee reimbursement. Medical necessity will be based on documentation in the medical record."
	In "Reference" Government Agency; Medical Society; and Other Authoritative Publications section added #3 – BCBSA, #4 - BCBSKS Medical Consultant (401) and #5 – BCBSKS Medical Consultant (MCMC).
Effective 09-01-2006	In "Policy" section added "Note: As of June 14, 2006, per updated review by consultant, coronary CT angiography remains experimental/investigational because of lack of adequate repeated studies. Further investigation is needed. Consultant (MCMC – S087, Board certified in Internal Medicine, Cardiovascular Disease and Clinical Cardiac Electrophysiology) stated "There are, however, rare, highly specialized cases where a patient is at high risk of complications from coronary angiography, a properly performed SPECT nuclear stress imaging study has been somewhat positive but not definitive, where the noninvasive detection of a significant coronary lesion would lead to an invasive evaluation, in which case multislice CT angiography procedure is medically appropriate and necessary in order to exclude a lesion and prevent a high risk invasive procedure."
	In "Coding" CPT section added CPT codes 0145T, 0150T, and 0151T as directed by the Medical Director.
	In "Reference" Government Agency; Medical Society; and Other Authoritative Publications section added #6, MCMC, Medical Care Ombudsman Program (MCOP), June 14, 2006, MCOP ID 1070-1753.

Effective 01-01-2007	In "Coding" CPT section, CPT code 72175 revised for 2007, the term 'noncoronary' has been added.
Effective 04-01-2007	In "Policy" section, deleted "Consultant (MCMC – S087, Board certified in Internal Medicine, Cardiovascular Disease and Clinical Cardiac Electrophysiology) stated "There are, however, rare, highly specialized cases where a patient is at high risk of complications from coronary angiography, a properly performed SPECT nuclear stress imaging study has been somewhat positive but not definitive, where the noninvasive detection of a significant coronary lesion would lead to an invasive evaluation, in which case multislice CT angiography procedure is medically appropriate and necessary in order to exclude a lesion and prevent a high risk invasive procedure" per Medical Director.
	In "Coding" CPT section, deleted CPT codes 0145T, 0150T, and 0151T per Medical Director.
	In "Coding" section, Covered Diagnosis, deleted "Note: The use of any diagnosis code does not guarantee reimbursement. Medical necessity will be based on documentation in the medical record. Services performed for any other diagnosis requires review with medical records" per Medical Director.
Effective 07-30-2007	• Description section was updated to provide more detail about CTA technology.
	• Policy was liberalized to consider CTA medically necessary for evaluation of anomalous (native) coronary arteries in symptomatic patients when conventional angiography is unsuccessful or equivocal and when results will impact treatment. CTA remains experimental/investigational for all other indications. • Policy section was revised deleting: "Computed tomographic angiography (CTA) is considered experimental/investigational for the evaluation of coronary arteries including but not limited to the following: 1. Screening for coronary artery disease (CAD), either in asymptomatic subjects or as part of a preoperative evaluation 2. Diagnosis of CAD, in patients with acute or non-acute symptoms, or after a coronary intervention 3. Delineation of a coronary artery anatomy or anomaly" AND "Note: As of June 14, 2006, per updated review by consultant, coronary CT angiography remains experimental/investigational because of lack of adequate repeated studies. Further investigation is needed." • Policy section was revised adding the first two paragraphs. • Documentation section was added.
	• CPT codes 0146T, 0147T, 0148T, and 0149T were added for coronary anomalies. • Diagnosis codes 746.85 and 746.87 were added for coronary anomalies. Codes 747, 747.10, 747.11, 747.21, 747.22, and 747.3 were deleted.
	• References were updated.
Effective 01-25-2008	• Changed the name of the Policy to "Coronary CT Angiography and Calcium Scoring" from "Computed Tomographic Angiography (CTA)"
	In Description section: • Added "coronary" to the second paragraph, fifth sentence, "…suggested that ***coronary*** CTA may be…" • Added "coronary" to the third paragraph, first sentence, "***Coronary*** CTA has several..."
	In Policy section: • Removed the third paragraph, "Computed tomographic angiography (CTA) of other arteries may be indicated when medical necessity is properly documented." • Under "Documentation" added "coronary", "All ***coronary*** CTA studies will be..." • Under "Utilization" added "coronary", "***Coronary*** CTA studies will be…"

	In Coding section: • Removed CPT codes 70496, 70498, 71275, 72191 73206, 73706, 74175. • Removed Diagnosis codes 093.0, 414.10, 415.0, 415.11, 417.0, 417.1, 417.8, 441.02, 444.1, 447.0, 447.2, 453.2, 745.0, 745.10, 745.11, 745.12, 745.19, 745.2, 745.3, 746.87, 747.20, 747.29, 747.40, 794.2, 996.1, 996.74, V12.59 • Removed Revenue Codes 32X, 34X, 35X, 40X.
Effective 01-30-2008	In Description section: ▪ Added "The available evidence does not provide sufficient information to permit conclusions on the effect of coronary CT angiography on health outcomes." ▪ "Electron beam computed tomography (EBCT) and multi detector computed tomography (MDCT) are methods used for measurement of coronary artery calcification. Calcium scores have been investigated both as a diagnostic technique in symptomatic patients to determine the necessity of coronary angiography or in asymptomatic patients as a screening technique for coronary artery disease. Published studies do not establish a clear role for detection of coronary artery calcification by computed tomography in coronary disease risk stratification in asymptomatic or symptomatic patients, nor have any studies shown that clinical outcomes can be favorably altered by the use of computed tomography based determination of coronary artery calcification in screening for coronary artery disease"
	In Policy section: ▪ Added "The use of computed tomography to detect coronary artery calcification is considered investigational."
	In Coding section added: ▪ Added CPT/HCPCS codes 0144T S8092. ▪ Added Diagnosis codes 414.01, V81.1
Effective 12-15-2008	In Heading: ▪ Revised title from Coronary CT Angiography and Calcium Scoring to Contrast-Enhanced Computed Tomography Angiography (CTA) for Coronary Artery Evaluation. ▪ Added a "See also" reference to other pertinent policies.
	In Description section: ▪ Updated terminology and discussion.
	In Policy section: ▪ Removed "The use of computed tomography to detect coronary artery calcification is considered investigational." *See Computed Tomography to Detect Coronary Artery Calcification policy.*
	Added Rationale section.
	In Coding section: ▪ Removed CPT / HCPCS codes: 0144T, S8092. ▪ Removed Diagnosis codes: 414.11, 414.19, 441.01, 441.03, 441.1, 441.2, 441.5, 441.3, 441.7, 441.9, 442.82, 446.7, 746.85, V81.0. ▪ Added Diagnosis codes: 414.02, 414.03, 414.04, 414.05.
	Updated Revisions and References sections.
Effective 08-11-2009	In Header: ▪ Added policy reference of Cardiac Computed Tomography (CT)
	In Rationale section: ▪ Added 2009 Update

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