Effective for dates of service on or after April 1, 2013, refer to: https://www.bcbsal.org/providers/policies/careCore.cfm

Name of Policy:
Computed Tomography and Computed Tomographic Angiography of the Chest and Thorax

Policy #: 273  Latest Review Date: February 2013
Category: Radiology  Policy Grade: A

Background/Definitions:
As a general rule, benefits are payable under Blue Cross and Blue Shield of Alabama health plans only in cases of medical necessity and only if services or supplies are not investigational, provided the customer group contracts have such coverage.

The following Association Technology Evaluation Criteria must be met for a service/supply to be considered for coverage:

1. The technology must have final approval from the appropriate government regulatory bodies;
2. The scientific evidence must permit conclusions concerning the effect of the technology on health outcomes;
3. The technology must improve the net health outcome;
4. The technology must be as beneficial as any established alternatives;
5. The improvement must be attainable outside the investigational setting.

Medical Necessity means that health care services (e.g., procedures, treatments, supplies, devices, equipment, facilities or drugs) that a physician, exercising prudent clinical judgment, would provide to a patient for the purpose of preventing, evaluating, diagnosing or treating an illness, injury or disease or its symptoms, and that are:

1. In accordance with generally accepted standards of medical practice; and
2. Clinically appropriate in terms of type, frequency, extent, site and duration and considered effective for the patient’s illness, injury or disease; and
3. Not primarily for the convenience of the patient, physician or other health care provider; and
4. Not more costly than an alternative service or sequence of services at least as likely to produce equivalent therapeutic or diagnostic results as to the diagnosis or treatment of that patient’s illness, injury or disease.
Description of Procedure or Service:
Computed tomography (CT) uses a highly collimated x-ray beam that passes through the patient and is differentially absorbed by tissue. The photons are detected and imaged, and contrast is dependent on the differential absorption of the photons by the tissue being studied. On axial CT, each revolution of the gantry around the patient produces one data set or slice. In other CT technology, the x-ray tube rotates continually (i.e., helical CT), allowing a continuous volume of transaxial data to be acquired rapidly and yielding slices at a rate of more than one slice per second at a thickness of 1 mm or less. Gating refers to the use of programs to time data acquisition with organ movements, such as the heart or lungs.

Per the American College of Radiology (ACR), the definition of CT angiography (CTA) is a CT examination that is primarily performed for assessment of the heart, arteries, or veins of the body. It requires at a minimum a thin section helical (spiral) CT acquisition coupled with a power injection of intravenous iodinated contrast medium. Three dimensional rendering and multiplanar reformations are important components of many CTA examinations.

Policy:
Effective April 1, 2013 refer to:
https://www.bcbsal.org/providers/policies/careCore.cfm

Effective for dates of service on or after January 27, 2009 through March 31, 2013:
Computed tomography of the chest and thorax meets Blue Cross and Blue Shield of Alabama’s medical criteria for coverage for the following disorders when medically necessary and supported by clinical and laboratory findings:

- Evaluation of cough
- Evaluation of hemoptysis
- Evaluation of vocal cord paralysis or hoarseness
- Evaluation of abnormal findings of abnormality by prior chest imaging
- Evaluation of lung cancer detected by bronchoscopy, cytology or other imaging
- Suspected pulmonary embolism
- Evaluation for metastases to lung or mediastinum, or restaging after completion of therapy
- Known primary or metastatic lung or mediastinal tumor
- Syndrome of Inappropriate Anti-diuretic Hormone
- Suspected or evaluation of esophageal cancer
- Interstitial lung disease
- Suspected thoracic aortic dissection
- Thoracic or thoracoabdominal aneurysm by PE or other imaging
- Evaluation of chest trauma
- Preoperative study for pneumothorax repair, pleural effusions or prior to Video Assisted Thoroscopic Surgery (VATS)
- Evaluation of possible thymoma in patients with myasthenia gravis
- Suspected bronchiectasis
- Cystic fibrosis
- Paraneoplastic syndrome suspicious for lung cancer
- Fever of unknown origin
- Evaluation of pneumonia
- Evaluation of mediastinal mass
- Evaluation of hilar adenopathy, prominent hilum, or elevated diaphragm identified by chest x-ray
- Evaluation of new pleural effusion
- Evaluation of lung abscess
- Evaluation of paracardiac mass previously diagnosed by chest x-ray or transthoracic echocardiography
- Preoperative study for pneumothorax repair
- Scleroderma (Progressive Systemic Sclerosis) (effective September 1, 2010)
- Soft tissue mass of the chest wall (effective September 1, 2010)

Individual case consideration will be given to patients with conditions not described above. Clinical notes will be required for review.

**Computed tomographic angiography of chest and thorax meets** Blue Cross and Blue Shield of Alabama’s medical criteria for coverage for the following disorders **when medically necessary and supported by clinical and laboratory findings:**

- For evaluation of suspected pulmonary embolism (CT with contrast or CT pulmonary arteriography are both appropriate)
- Developmental anomalies of the thoracic vasculature for initial evaluation, treatment planning and post-operative evaluation
- Suspected thoracic aortic dissection (CT and MRI are alternative studies)
- Aortic pathology
- Assess thoracic venous structures
- Peripheral arterial vascular disease
- Aneurysm of the thoracic aorta or thoracoabdominal aneurysm (effective September 1, 2010)
- Trauma (effective September 1, 2010)

Please refer to Blue Cross and Blue Shield of Alabama’s medical policy #244 CT Scanning for Lung Cancer Screening.

Please refer to Blue Cross and Blue Shield of Alabama’s medical policy #104 Electron Beam Computed Tomography to Detect Coronary Artery Calcification.

Please refer to Blue Cross and Blue Shield of Alabama’s medical policy #230 Contrast-Enhanced Computed Tomographic Angiography for Coronary Artery Evaluation.

**Effective for dates of service on or after July 1, 2006 thru January 26, 2009:**
Computed tomography of the chest and thorax meets Blue Cross and Blue Shield of Alabama’s medical criteria for coverage for the following disorders when medically necessary and supported by clinical and laboratory findings:

- Suspected pulmonary embolism
- Evaluation of abnormal findings of abnormality by prior chest imaging
- Evaluation of pneumonia
- Evaluation of lung cancer detected by bronchoscopy, cytology or other imaging
- Evaluation of mediastinal mass
- Evaluation of hilar adenopathy, prominent hilum, or elevated diaphragm identified by chest x-ray
- Evaluation of new pleural effusion
- Evaluation of hemoptysis
- Evaluation of lung abscess
- Evaluation for metastases to lung or mediastinum
- Known primary or metastatic lung or mediastinal tumor
- Suspected thoracic aortic dissection
- Evaluation of paracardiac mass previously diagnosed by chest x-ray or transthoracic echocardiography
- Evaluation of chest trauma
- Preoperative study for pneumothorax repair
- Evaluation of possible thymoma in patients with myasthenia gravis
- Suspected bronchiectasis
- Suspected esophageal cancer
- Interstitial lung disease
- Evaluation of vocal cord paralysis

Effective for dates of service on or after February 1, 2007 through March 31, 2013:
- Evaluation of cough
- Preoperative study for pneumothorax repair, pleural effusions

Effective for dates of service on or after September 1, 2007 through March 31, 2013:
- Cystic fibrosis, (must have at least one of the following)

Individual case consideration will be given to patients with conditions not described above. Clinical notes will be required for review.

Computed tomography screening for the detection of lung cancer does not meet Blue Cross and Blue Shield of Alabama’s medical criteria for coverage and is not covered. Please refer to Blue Cross and Blue Shield of Alabama’s medical policy #244 CT Scanning for Lung Cancer Screening.

Computed tomography for coronary artery calcification evaluation does not meet Blue Cross and Blue Shield of Alabama’s medical criteria for coverage and is considered
investigational. Please refer to Blue Cross and Blue Shield of Alabama’s medical policy #104 Electron Beam Computed Tomography to Detect Coronary Artery Calcification.

Contrast-enhanced computed tomographic angiography for coronary artery evaluation does not meet Blue Cross and Blue Shield of Alabama’s medical criteria for coverage and is considered investigational. Please refer to Blue Cross and Blue Shield of Alabama’s medical policy #230 Contrast-Enhanced Computed Tomographic Angiography for Coronary Artery Evaluation.

Computed tomographic angiography of chest and thorax meets Blue Cross and Blue Shield of Alabama’s medical criteria for coverage for the following disorders when medically necessary and supported by clinical and laboratory findings:

- For evaluation of suspected pulmonary embolism (CT with contrast or CT pulmonary arteriography are both appropriate)
- Developmental anomalies of the thoracic vasculature for initial evaluation, treatment planning and post-operative evaluation
- Suspected thoracic aortic dissection (CT and MRI are alternative studies)
- Aortic pathology
- Assess thoracic venous structures
- Peripheral arterial vascular disease
- Aneurysm

Blue Cross and Blue Shield of Alabama does not approve or deny procedures, services, testing, or equipment for our members. Our decisions concern coverage only. The decision of whether or not to have a certain test, treatment or procedure is one made between the physician and his/her patient. Blue Cross and Blue Shield of Alabama administers benefits based on the members' contract and corporate medical policies. Physicians should always exercise their best medical judgment in providing the care they feel is most appropriate for their patients. Needed care should not be delayed or refused because of a coverage determination.

Key Points:
The indications for thoracic computed tomography have been refined over the years and are:
- further evaluation of an abnormality identified on chest radiography; assessment of patients with clinically suspected pulmonary disease that have a normal or near-normal chest radiograph;
- investigation of suspected airway abnormalities; staging of lung cancer; evaluation of thoracic trauma; evaluation of thoracic manifestations of known extrathoracic diseases; and guidance for biopsy and drainage procedures.

Pulmonary Embolism (PE)
Ventilation/perfusion (V/Q) lung scan is historically performed on all patients with suspected PE. V/Q scan has shown to be of limited usefulness due to high percentage of non-diagnostic studies and a V/Q mismatch is suggestive of PE but is not by itself diagnostic, therefore, a lung scan should follow. Spiral CT is a newer, more sensitive modality in the diagnosis of PE. It has generally replaced V/Q scanning as principal imaging study, and may identify other pulmonary pathology whose symptoms mimic PE. CT scanning may aid in a provider decision to withhold
anti-coagulant therapy in patients with low clinical suspicion for PE. Sensitivity is not high enough to determine withholding of anticoagulation in patients with intermediate to high clinical suspicion of a negative scan. Pulmonary angiography is the diagnostic gold standard for PE, however it is invasive and costly and is not readily available in some clinical settings.

**Lung Abnormality**
A solitary pulmonary nodule on a CXR, especially if it is new, poses the possibility of a malignancy and requires immediate diagnostic evaluation. The presence of calcification in at least 10 to 20% of the nodule near its center is the most reliable indicator of a benign lesion. However calcification of a solitary nodule is not specific for benign disease, because a cancer can develop within a scar or granuloma. The steps in evaluation of a single pulmonary nodule as noted in Cecil’s Textbook of Medicine are to compare the finding to previous chest films as available. CT scan should be performed for further evaluation. If there is a calcification or stable size (i.e., doubling time > 400 days), then the step is to observe the site. If the nodule is newly appeared after previously negative film and no calcification, especially in smokers > 35 years of age, a positron emission tomography (PET) scan may be appropriate. If the scan is negative then bronchoscopy, needle biopsy, thorascopic surgery or thoracotomy to obtain tissue should be performed.

Atelectasis may include the whole lung due to an intrinsic mainstem mass or extrinsic compression from lymph node enlargement. Lobar, segmental or subsegmental regions may be involved. In some cases, chest x-rays findings may not be diagnostic. In such cases, CT scanning is a useful next imaging study. CT can also be used to assess obstructive atelectasis. CT is helpful in evaluation of the mediastinum, hilum, chest wall, pleura and adjacent lung. MRI does not have particular value in the diagnosis of lobar atelectasis, except for distinguishing obstructed from non-obstructive atelectasis. When bulla or localized emphysema is detected on CXR, a high-resolution CT (HRCT) scan is more sensitive than standard CT. HRCT is highly specific to emphysema and outlines bullae that are not always visible on x-rays.

**Pneumonia**
Most patients respond to antibiotic regimens over the first 3 days of therapy. It is not advisable to alter the antibiotic program in the first 72 hours, unless the patient is deteriorating or culture results indicate alternative therapy. In a minority of patients who do not respond to initial antibiotic therapy, additional diagnostic testing will be necessary. Testing may include CT of the chest, sampling of pleural fluid, and/or bronchoscopy with collection of respiratory secretions, brushings, and bronchoalveolar lavage. CXR signs tend to resolve more slowly than other clinical signs and symptoms. Usual practice includes obtaining repeat radiography 6 to 8 weeks after completion of antibiotics. Follow-up CT scanning is usually to prelude the formal pulmonary consultation for consideration of bronchoscopy and other further diagnostic tests. An algorithm for treatment of community-acquired pneumonia by the Institute For Clinical Symptoms (ICSI) include: symptoms such as; chest pain, shortness of breath, chest tightness, deep cough, sputum production, fever over 100 degrees lasting more than 72 hours, night sweats and wheezing. After identification of symptoms, CXR should follow.
**Lung Cancer**
Evaluation should occur if a patient develops symptoms associated with lung cancer, such as; persistent cough or worsening of an existing chronic cough, hemoptysis, persistent bronchitis or repeated respiratory infections, chest pain, unexplained weight loss and/or fatigue, breathing difficulties such as shortness of breath or wheezing. CXR is the most common first diagnostic step when any new symptoms of lung cancer are present. CT scan may be performed on the chest, abdomen, and/or brain to examine for both metastatic and primary tumor. A CT scan may be ordered when x-rays are negative or do not yield sufficient information about the extent or location of a tumor. MRI scans may be indicated when precise detail about a tumor’s location is required. PET scanning is a specialized imaging technique that uses short-lived radioactive substances to produce three-dimensional colored images of those substances functioning within the body. PET scans measure metabolic activity and functioning of tissue. PET scans can determine whether a tumor tissue is actively growing and can aid in determining the type of cells within a particular tumor.

**Mediastinal Mass**
Most mediastinal masses are detected on a plain CXR. Chest CT is the initial procedure of choice because it provides good definition of mediastinal structures. The role of MRI is being investigated.

**New Pleural Effusion**
CXR can usually identify effusions of more than 175mL, while lateral decubitus films more reliably detect smaller pleural effusions. CXR can reveal other diagnostic clues to the cause of an effusion. Ultrasounds help identify the safest site for performing a thoracentesis or pleural biopsy that can be performed at bedside. CT scans can reveal very small effusion of 10mL or even less and can provide detailed information about pleural and parenchymal lesions which may indicate underlying disease causing the pleural effusion. CT scanning is typically preferred over ultrasonography for the placement. Spiral CT angiography may be useful if PE is suspected as the cause of the effusion.

**Cough**
In patients with cough, the starting point is the medical history and physical examination. Per the “ACCP Evidence-Based conical Practice Guidelines for Diagnosis and Management of Cough”, patients with chronic cough, uncommon causes should be considered when cough persists after evaluation for common causes (receiving an angiotensin-converting enzyme inhibitor, smoker, asthma, GERD, respiratory tract infection, etc.) and when the diagnostic evaluation suggests that an uncommon cause, pulmonary or extrapulmonary may be contributing. Until uncommon causes that potentially may be contributing to the patient’s cough have been ruled out, the diagnosis of unexplained cough should note be made. When a cough persists after consideration of the most common diseases; a chest CT should be performed and possibly a bronchoscopy evaluation.

**Hemoptysis**
The most common cause of hemoptysis is pneumonia or pulmonary infection, including bronchiectasis. The sudden appearance of hemoptysis without other cause must be considered a possible manifestation of lung tumor, either benign or malignant. Bleeding in bronchiectasis can
be brisk and life threatening. If is often associated with acute infective episodes and is produced by injury to superficial mucosal neovascular bronchial arterioles. HRCT and bronchoscopy may help localize the bleeding to a lobe or segment. Chest trauma from injury may necessitate further evaluation by CT scan.

**Lung Abscess**

The classic x-ray appearances of lung abscess is a cavity with an air-fluid level, with or without surrounding infiltrate; in some patients, however repeat CXR or CT scanning may be needed to detect the cavity. Clinical manifestations include insidious onset of infection in many. After 1-2 weeks, tissue necrosis, with abscess formation or empyema occurs. Following cavitation, putrid sputum is noted in 50% or more of patients, and hemoptysis may be seen. On occasion, with acute onset are fever, malaise, cough and pleurisy.

**Lung/Mediastinal Metastases**

CXR is often the most important radiologic study in the evaluation of lung nodules, especially when comparing to old films. The stability of a lesion over time can be very helpful in suggesting either a benign or a malignant diagnosis. Doubling times of less than 6 weeks or more than 18 months strongly suggest benign diagnosis. Common sites of metastases of bronchogenic carcinomas include brain, bone, adrenal gland, and liver. CT scanning of the thorax is usually undertaken in patients with suspicious nodules. CT scans also reliably detect enlarged lymph nodes, although biopsy is required to determine whether the lymphadenopathy is due to metastatic tumor. The CT scan can easily be extended to include the liver and adrenal glands to assess common sites of metastatic disease. MRI studies are particularly useful to detect vertebral, spinal cord, and mediastinal invasion in selected patients. PET scans have the advantage of potentially detecting metastatic disease, either in the mediastinal lymph nodes or in extrathoracic sites.

NCCN Practice Guidelines in Oncology has listed the following indications for CT of the chest in relation to diagnosis and restaging:

**Bone Cancer**

In a diagnostic work-up for patients 40 and over, if plain films and history do not suggest a specific diagnosis, evaluation for a metastatic carcinoma including chest radiograph, chest CT, abdominal and pelvic CT, bone scan, mammogram and other imaging studies as clinically indicated, should be performed.

The standard staging work-up for a suspected primary bone sarcoma should include imaging of the chest (chest radiograph or chest CT to detect pulmonary metastases), appropriate imaging of the primary site (plain radiographs, MRI for local staging and/or CT scan) and bone scan.

**Esophageal Cancer**

Surgical management of patients with esophageal cancer may include staging, resection with curative intent, and palliative techniques. All patients should be assessed for physiologic ability to undergo esophageal resection. Clinical staging using chest and abdomen CT scan, and PET-CT scan (preferred over PET alone) should be performed before surgery to assess resectability. PET/CT scans may be useful for detection of distant lymphatic and hematogenous metastases.
PET/CT scan has also been shown to improve lymph node staging and the detection of stage IV esophageal cancer.

**Hepatobiliary Cancer**
A suspicious mass detected on ultrasound should warrant further evaluation, including CT or MRI, liver function tests, chest x-ray and staging laparoscopy in hepatobiliary cancers. Chest CT is part of the recommended postoperative work-up in gallbladder cancer. In hepatocellular carcinoma, MRI/CT scan is used to define extent and number of primary lesions, vascular anatomy, involvement with tumor, and extrahepatic disease; triphasic helical CT or MRI to include early arterial phase enhancement.

**Kidney Cancer**
CT of the abdomen and pelvis with and without contrast and chest imaging are essential studies in the initial workup. A bone scan is not routinely performed unless the patient has an elevated serum alkaline phosphatase or complains of bone pain. CT or MRI of the brain is performed if the history or physical exam suggests brain metastases. A PET scan is not a routine part to the initial workup. After surgical excision, follow-up is recommended at 4-6 months then as indicated for chest and abdominal CT.

**Lung Cancer**
NCCN panel states that for long term follow-up in NSCLC, a contrast-enhanced chest CT scan every 4-6 months for two years, then H&P and a non-contrast-enhanced Chest CT scan annually. The NCCN panel does not recommend the routine use of screening CT as standard clinical practice for lung cancer. When using CT scans, node positivity is based on the size of the lymph nodes. The CT scan has known limitations for evaluation the extent of lymph node involvement in lung cancer. PET scans may be more sensitive than CT scans. NCCN feels that PET scans can play a role in evaluation and more accurate staging of NSCLC. PET/CT is even more sensitive and is now recommended by NCCN.

**Lymphoma**
Workup for diagnosis recommended by NCCN includes a Chest/abdominal/pelvic CT with contrast of diagnostic quality. In some cases a Neck CT may be performed to assist in defining extent of local disease and if radiation therapy to the neck is planned. Restaging after chemotherapy with PET-CT, or a PET with a diagnostic CT is recommended by NCCN through stage I-IV. Follow-up after completion of treatment and monitoring for late effects especially with an oncologist during the first five years interval to detect recurrence, then annually due to the risk of late complications including second cancers and cardiovascular disease. Chest imaging is part of this follow-up with chest x-ray or CT every 6-12 months during the first 2-5 years. Monitoring for late effects after five years is also recommended by the NCCN to include annual chest imaging (chest x-ray or chest CT) for patients at increase risk for lung cancer. Chest imaging may be optional after five years if patient treated with a non-alkylating agent, no radiation therapy to the chest and no other risk factors are present.

**Melanoma**
Routine imaging studies such as a CT scan, PET scan, or MRI are not recommended for patients with localized thin melanoma (stage I). NCCN recommendations are consistent with the NIH consensus guidelines. These tests may be performed as clinically indicated to evaluate specific signs or symptoms in patients with stage II melanoma and higher.

**Ovarian Cancer**
A suspicious pelvic mass detected on exam without other obvious sources of malignancy should include an ultrasound and/or abdominal/pelvic CT scan (if clinically indicated) after a complete PE and lab studies per the NCCN recommendations. There is no direct evidence that a chest x-ray is necessary, NCCN panel felt that it should be part of the overall evaluation of a patient before surgical staging. Follow-up recommendations may include a chest/abdominal/pelvic CT or PET scans and chest x-ray may be ordered if clinically necessary. Per the ACR, CT is the imaging modality of choice in the preoperative evaluation of ovarian cancer and has been validated as an accurate method to predict successful surgical cytoreduction. It is also the recommended modality for staging and recurrence of ovarian cancer. CT of the chest is recommended by ACR only for abnormal chest x-ray including pleural effusion, supraclavicular adenopathy.

**Soft Tissue Sarcoma**
In a diagnosis of an extremity with soft tissue sarcoma, NCCN recommends in follow-up an H&P and chest imaging (x-ray or chest CT) every 3-6 months for 2-3 years then every six months for the next two years and then annually. Retroperitoneal/abdominal sarcoma abdominal/pelvic CT with contrast with possible MRI and chest imaging is recommended as part of initial workup. The same is recommended for GIST in the initial work-up and follow-up. Patients with low-grade tumors that have been successfully resected should have a follow-up physical examination with imaging that includes chest/abdominal/pelvic CT every six months for 2-3 years and then annually. Patients with high-grade tumors that have been successfully resected need more frequent surveillance with follow-up PE with chest/abdominal/pelvic imaging every six months for 2-3 years, then every six months for the next two years, and then annually.

**Testicular Cancer**
Once a diagnosis is made, a chest CT is recommended to be performed if positive abdominal CT or abnormal CT or abnormal chest x-ray. In stages IIB, IIC, & III, after primary treatment with chemotherapy, NCCN recommends a chest/ abdominal/pelvic scan and as followup the abdominal/pelvic scans at month four of year one status post-surgery, otherwise abdominal/pelvic CT every three month until stable. The chest CT is performed if abnormal abdominal CT or abnormal chest x-ray.

**Uterine Neoplasms**
If there is known or suspected extraterine disease then MRI or CT base on symptoms or clinical suspicion of metastases. For surveillance, NCCN recommends chest/abdomen/pelvic imaging every 3-6 months for two years, then annually. In local recurrence a negative chest and abdominal/pelvic CT can confirm a local vaginal recurrence.

**Syndrome of Inappropriate Antidiuretic Hormone (SIADH)**
The causes of SIADH are numerous and can be related to malignant disease, pulmonary disease and disorders of the central nervous system among others. In order to begin diagnostic evaluation of hyponatremia with moderate symptoms and unknown duration it has been suggested as part of this evaluation to consider CT or MRI to rule out lung cancer (typically non-small cell), pulmonary disorders or other malignant disease.

**Paraneoplastic syndromes**
Paraneoplastic syndromes are a group of clinical disorders that are associated with malignant disease. Initial presenting symptoms in patients with lung cancer may be respiratory related, but are often constitutional and attributable to metastatic disease. Many times there are delays from the development of lung cancer and initial symptoms and possible other delays before treatment are eventually initiated. Guidelines specific for the treatment of pulmonary nodules as determined by CXR is to follow with CT scan.

**Known Lung/Mediastinal Tumor**
Evaluation should occur if a patient develops symptoms associated with lung cancer, such as; persistent cough or worsening of an existing chronic cough, hemoptysis, persistent bronchitis or repeated respiratory infections, chest pain, unexplained weight loss and/or fatigue, breathing difficulties such as shortness of breath or wheezing. CXR is the most common first diagnostic step when any new symptoms of lung cancer are present. CT scan may be performed on the chest, abdomen, and/or brain to examine for both metastatic and primary tumor. A CT scan may be ordered when x-rays are negative or do not yield sufficient information about the extent or location of a tumor. MRI scans may be indicated when precise detail about a tumor’s location is required. PET scanning is a specialized imaging technique that uses short-lived radioactive substances to produce three-dimensional colored images of those substances functioning within the body. PET scans measure metabolic activity and functioning of tissue. PET scans can determine whether a tumor tissue is actively growing and can aid in determining the type of cells within a particular tumor.

**Possible Interstitial Lung Disease (ILD)**
Breathlessness is the most prevalent complaint. Initially, dyspnea develops only on exertion. Later with disease progression, dyspnea develops at rest. Non-productive cough and fatigue are also prominent complaints. CXR plays a major role in establishing the presence of ILD and may suggest a specific diagnosis. HRCT allows a detailed evaluation of the lung parenchyma and allows earlier diagnosis of ILD. HRCT can detect ILD despite normal CXRs in patients with asbestosis, silicosis, sarcoidosis, and scleroderma. HRCT abnormalities may be present before pulmonary function tests are abnormal. Physiologic testing can document the physiologic abnormalities associated with ILD, determine the severity, and determine the course and response to treating the ILD. The classic physiologic alterations in ILD include reduced lung volumes, (vital capacity, total lung capacity) reduced diffusing capacity (DLCO) and a normal or supernormal ratio of forced expiratory volume in 1 second (FEV1) to forced vital capacity (FVC).

**Cancer of Esophagus**
Tumors of esophagus may be benign or malignant. Benign tumors are uncommon. Tumors metastatic to the esophagus usually originate from breast, lung, or skin. Clinical presentation is
usually with rapidly progressive dysphagia for solids, anorexia and weight loss. Less commonly, squamous cell carcinoma presents with hypercalcemia, hoarseness, or tracheoesophageal fistula. A barium swallow usually reveals a bulky, eroded, partially obstructing esophageal mass. Endoscopic ultrasonography and/or CT scans are used for staging. Adenocarcinoma has seen a rise in the incidence in the last 30 years. Adenocarcinomas principally arise in the distal esophagus as the predominant risk comes from the presence of Barrett’s esophagus, complication of GERD. Lymphatic spread is common.

**Possible Thoracic Aortic Dissection**
Severe pain is the most common presenting symptom with aortic dissection. Pain may be retrosternal, in the neck or throat, interscapular, in the lower back, abdominal or in the lower extremities depending on location of the aortic dissection. Thoracic pain is often of sudden onset and at its most severe at the start. Pain may present as tearing, sharp, or stabbing. Patients also may present with acute aortic insufficiency, right coronary artery occlusion, hemopericardium, syncope, a cerebrovascular accident, or ischemic peripheral neuropathy. Hypertension is a common finding on PE. If there is suspicion of aortic dissection, it is essential to confirm or exclude the diagnosis promptly with an imaging study. Aortography, CT, MRI, and transesophageal echocardiography (TEE) are imaging modalities that can accurately diagnose the aortic dissection. When suspicion is high for aortic dissection, TEE is the most rapid way to provide sufficient detail to enable the surgeon to take the patient directly to the operating room. When suspicion is low, contrast medium-enhanced CT is preferred because it is entirely non-invasive. Electrocardiogram findings in aortic dissection are non-specific.

**Possible Thoracic/Thoracoabdominal Aneurysm**
Aneurysms are described in terms of their location, size, shape, and etiology. Aneurysms can involve any part of the aorta, but abdominal aortic aneurysms are much more common than thoracic aneurysms. Most aneurysms are asymptomatic and are discovered incidentally on a routine physical examination or imaging study. Symptoms may be demonstrated as pain in the hypogastrium or lower back and have a gnawing quality that may last hours or days. If rupture occurs the pain often is associated with hypotension and the presence of a pulsatile abdominal mass. Thoracic aortic aneurysms may have chest pain or, less often, back pain. Vascular complications include aortic insufficiency, hemoptysis, and thromboembolism. An enlarging aneurysm may produce local mass effects owing to compression of adjacent mediastinal structures, producing symptoms such as coughing, wheezing, dyspnea, hoarseness, recurrent pneumonia, or dysphagia. Some aneurysms may be palpable on PE. Thoracic aortic aneurysms usually cannot be palpated. Definitive diagnosis of an aortic aneurysm is made by radiographic exam. Abdominal aortic aneurysms can be detected and sized by either abdominal ultrasound or CT. Ultrasound is extremely sensitive and is the most practical method to use in screening for aortic aneurysms. CT is even more accurate. CT is less practical than ultrasound; it is the preferred modality for following the serial changes in aneurysm size over time. Thoracic aortic aneurysms frequently are noted on CXR. CT is an excellent modality for detecting and sizing thoracic aneurysms. Transthoracic echocardiogram (TTE) is useful for screening patients with Marfan syndrome because this group is at particular risk for aneurysms involving this portion of the aorta.
**Paracardiac Mass**
CT is useful to determine that the paracardiac mass has fat density.

**Chest Trauma**
All trauma patients should have a supine chest radiograph to examine the lung fields, the mediastinal contour, and the chest wall. Thoracic aortic injury, which is a feared complication of severe acceleration-deceleration injury, results in the immediate death of 90% of persons with this injury. Survivors who reach medical care often have a contained mediastinal hematoma that appears as a widened superior mediastinum and/or loss of the aortic contour on the CXR. These patients historically have been evaluated by arteriography, but now chest CT scan is used to screen for this injury. A contained mediastinal hematoma is an unstable condition that demands timely intervention.

**Preoperative Study for Pneumothorax Repair, VATS**
Chest x-ray confirms a pneumothorax. CT scan is not recommended for routine use but can help to distinguish between a large bulla and a pneumothorax, to indicate underlying emphysema or emphysema like changes, to determine the exact size of the pneumothorax, especially if is small, and to confirm the diagnosis of pneumothorax in patients with head injury. CT is used with increasing frequency in patients with pneumothorax. It is necessary to diagnose pneumothorax in critically ill patients in whom upright or decubitus films are not possible. Video-assisted thoracoscopic surgery (VAT) is the procedure of choice for the diagnosis and management of diseases of the pleura, nondiagnosed small peripheral pulmonary nodules, and interstitial lung disease. However, this procedure is not always readily available.

Primary spontaneous pneumothorax (PSP) primarily occurs while the patient is at rest. Chest pain and dyspnea, either alone or in combination, are the classic symptoms of spontaneous pneumothorax. Secondary spontaneous pneumothorax (SSP) occurs when there is impaired pulmonary reserve and has more severe dyspnea than that occurring in PSP. One procedure that may prevent the recurrence of spontaneous pneumothoraces is chest tube instillation of a sclerosing agent.

**Possible Thymoma in Patient with Myasthenia Gravis**
Thymomas account for 20% of mediastinal tumors and are located in the superior portion of the anterior mediastinum. Two-thirds are malignant. Myasthenia gravis is seen in 40% of the cases. Posteroanterior (PA) and lateral CXR can detect most thymomas. CT scan may delineate a mass further or detect a smaller tumor on radiograph. Chest CT is the imaging modality of choice in patients with myasthenia gravis. CT scan with IV contrast is preferred in order to show the relationship between thymoma and surrounding vascular structures, to define the degree of its vascularity and assist the surgeon in removal of a large tumor, possibly involving other mediastinal structures.

**Possible Bronchiectasis**
The induction of bronchiectasis requires two factors: an infectious insult and impairment of drainage, airway obstruction, and/or a defect in host defense. Clinical manifestations include frequent bouts of bronchitis requiring antibiotic therapy. Symptoms include daily cough production, intermittent hemoptysis, pleurisy and shortness of breath. Physical finding on chest
exam include crackles, rhonchi, and/or wheezing. Pulmonary function tests provide assessment of the impairment caused by bronchiectasis. Findings may include reduced or normal forced vital capacity (FVC), low forced expiratory volume in one second (FEV1), and/or the FEV1/FVC ratio is the most frequent finding. CXR is abnormal and with the clinical findings may be enough for a diagnosis. HRCT of the chest is the defining modality for diagnosis of bronchiectasis.

**Cystic Fibrosis**

Brody et al published the results of the use of high-resolution computed tomography (HRCT) to assess pulmonary abnormalities in 60 children with cystic fibrosis (CF) and mild to moderate disease. Correlations between HRCT scores and FEV1 were significant and showed fair to moderate correlation. The authors concluded that HRCT demonstrated a broad range of pulmonary abnormalities in young patients with CF and mild to moderate lung disease. Davis published the results of a study on detecting regional airway distribution via HRCT, correlating abnormalities to lower airway inflammation and comparing computed tomography findings before and after treatment on 17 children less than four years of age with CF. Modified Brody scores were assigned by two radiologists before and after treatment. Total Modified Brody score, hyperinflation subscore and bronchial dilatation subscore improved after treatment. The results indicated that in this group, CT detects regional differences in airway inflammation, may be a sensitive outcome to evaluate therapeutic interventions, and identifies early lung disease as being more prominent on the right. Robinson authored an article on imaging in cystic fibrosis. Robinson stated that during the last decade HRCT has been recognized increasingly as the most effective imaging modality for following progressive CF lung disease. Because of its ability to detect disease in patients who have asymptomatic CF, normal chest radiographs, and normal pulmonary function measurements and its ability to monitor the progression of disease more effectively than pulmonary function measurements in patients who have more advanced CF disease, it now is recognized as the imaging modality that can provide the most information for initial and progressive changes. According to Robinson, the Cystic Fibrosis Foundation has not issued current guidelines specifying the use of HRCT or spiral CT imaging to monitor the progression of CF lung disease. Robinson cites that the lack of guidelines comes from this modality being used initially in a research setting to describe progression of CF lung disease and more recently in clinical trials to evaluate specific therapeutic interventions. Another major reason may be the concern that CT scanning with higher radiation exposures than chest radiographs, may lead to significant cumulative exposure in children and adults as they are followed with serial scanning to monitor early and progressive disease.

**Vocal Cord Paralysis or Hoarseness**

Causes of vocal cord paralysis are varied and the majority classes as either toxic or idiopathic. Many times sectional may not be able to identify a lesion. With multidetector CT, this has allowed more definitive analysis of the larynx for determining the presence of ipsilateral vocal cord paralysis. Evaluation may include laryngoscopy, bronchoscopy and esophagoscopy as well as a neurological exam. Enhanced CT of the head, neck and chest, a thyroid gland scan and an upper GI series may also be indicated.

**CT Angiography, Coronary Artery Evaluation**
Despite the promising results of the clinical studies, there remain several important limitations which must be considered. First, in the study by Hoffmann, the average dose used was 8.1 msv for 75kg patient. This dose is equivalent to 2-3 times the dose typically administered during the diagnostic invasive angiogram. Although, the risk associated with this level of radiation exposure is relatively low, it does raise concerns about the repeat use of this type of testing in younger individuals and women of child-bearing age.

Another study by Cole et al performed a comparison of radiation doses from multislice computed tomography coronary angiography and conventional diagnostic angiography. A CTA with an effective dose of 14.7 mSv has a risk of approximately inducing a fatal cancer in 1 of 1,400 while the conventional coronary angiogram at 5.6 mSv has a risk of 1 in 3,600. This article concludes that the clinical role of non-invasive CTA should take into account that the amount of ionizing radiation should be justified and optimized.

Second, the test is limited by the extent and severity of coronary calcification in the population which may be studied. In addition, in-stent visualization is either not feasible or is inaccurate in a lot of the cases depending on the machine used for the scanning. There is limited evidence to suggest that this type of scanning could be useful for individuals with stents or status-post coronary bypass surgery.

In February 2006, the AHA Science Advisory issued a statement on the utilization of Cardiac Imaging. The statement issued principles to be used in the development and use of existing and emerging cardiac imaging modalities. Included in the principles are that rigorous scientific research should continue to critically exam these emerging modalities and define their advantages and limitations.

**CT Angiography**

CT angiography is a proven and useful procedure for the detection and characterization of vascular diseases and of vascular anatomy relevant to the treatment of extravascular disorders. CT angiography may be used as the primary modality for detecting disease or as an adjunctive tool for better characterizing known disease or assessing changes in disease state over time. CT angiography should be performed only for a valid medical reason and with the minimum radiation exposure that provides the image quality necessary for adequate diagnostic information. (ACR Practice Guideline for the Performance and Interpretation of CT Angiography)

The number of Computer Tomography (CT) scanners continues to increase as well as the usage of those scanners. It is estimated that more than 62 million CT scans per year are currently done in the United States, including at least four million children.

Conventional radiography doses of radiation are much smaller than CT; an abdominal CT delivers about 50 times more radiation to the stomach than conventional x-ray. Data has been gathered on the correlating radiation exposure and subsequent cancer rates from the Japanese survivors of atomic bombs, it is estimated by Brenner and Hall that 1.5% to 2.0% of cancers in the U.S. could be attributable to CT radiation. One study is now underway to gather direct data on CT-associated cancer with results not being available for some years. Per the December 6,
2007, Journal Watch, a recent survey suggested that many physician are unaware of radiation doses and potential risks associated with CT. (Radiology 2004; 231:393)

**Key Words:**
Computed tomography, CT, computerized tomography, computerized axial tomography, CAT, computed tomography angiogram, CTA, thoracic computed tomography, coronary artery evaluation, coronary

**Approved by Governing Bodies:**
Not applicable

**Benefit Application:**
Coverage is subject to member’s specific benefits. Group specific policy will supersede this policy when applicable.

ITS: Home Policy provisions apply
BellSouth/AT&T contracts: No special consideration
FEP contracts: Special benefit consideration may apply. Refer to member’s benefit plan.
FEP does not consider investigational if FDA approved. Will be reviewed for medical necessity.
Wal-Mart: Special benefit consideration may apply. Refer to member’s benefit plan.

**Pre-certification requirements:** Effective for dates of service on or after November 1, 2007, required when ordered by a provider in a Blue Cross and Blue Shield of Alabama’s Preferred or Participating Network for a patient covered by Blue Cross and Blue Shield of Alabama who will receive outpatient imaging services(s) from a Preferred Medical Doctor (PMD) or Preferred Radiology Participating (PRP) provider

**Exceptions to the Alabama PMD and PRP pre-certification requirement:** NASCO, Wal-Mart, Blue Advantage, Flowers Foods, Inc., FEP.

In addition to the above Blue Cross and Blue Shield of Alabama PMD/PRP Network requirement, some self-insured national account groups may require pre-certification for all MRIs effective for dates of service on or after January 1, 2009. Please confirm during your benefit verification process if a pre-certification is required.

**Coding:**
CPT Codes:

- **71250**  Computed tomography, thorax; without contrast material
- **71260**  Computed tomography, thorax; with contrast material(s)
- **71270**  Computed tomography, thorax; without contrast material, followed by contrast material(s) and further sections
Computed tomographic angiography, chest (noncoronary), with contrast material(s), including noncontrast images, if performed, and image postprocessing

Computed tomographic angiography, abdominal aorta and bilateral iliofemoral lower extremity runoff, with contrast material(s), including noncontrast images, if performed, and image postprocessing

Computed tomography, limited or localized follow-up study

HCPCS:

G0288 Reconstruction, computed tomographic angiography of aorta for surgical planning for vascular surgery

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Policy History:
Medical Policy Group, March 2006 (1)
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Medical Policy Administration Committee, June 2006
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Medical Policy Group, January 2007 (1)
Medical Policy Administration Committee, January 2007
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Available for comment February 27-April 13, 2009
Medical Policy Group, August 2010 (1)
Medical Policy Administration Committee, September 2010
Available for comment September 4-October 18, 2010
Medical Policy Group, February 2013 (2): Updated policy with link to CareCore National©
Medical policies effective April 1, 2013
Medical Policy Administration Committee, March 2013
Available for comment February 15 through March 31, 2013
Medical Policy Group, February 2013 (2): Updated link to CareCore National©
This medical policy is not an authorization, certification, explanation of benefits, or a contract. Eligibility and benefits are determined on a case-by-case basis according to the terms of the member’s plan in effect as of the date services are rendered. All medical policies are based on (i) research of current medical literature and (ii) review of common medical practices in the treatment and diagnosis of disease as of the date hereof. Physicians and other providers are solely responsible for all aspects of medical care and treatment, including the type, quality, and levels of care and treatment.

This policy is intended to be used for adjudication of claims (including pre-admission certification, pre-determinations, and pre-procedure review) in Blue Cross and Blue Shield’s administration of plan contracts.