

<b>National Imaging Associates, Inc.*</b>	
<b>Clinical guidelines</b> <b>CHEST (Thorax) CT</b>	<b>Original Date: September 1997</b>
<b>CPT Codes: 71250, 71260, 71270, 71271</b>	<b>Last Revised Date: November 2020</b>
<b>Guideline Number: NIA_CG_020</b>	<b>Implementation Date: January 2021</b>

This Chest CT Guideline covers CPT codes 71250 (CT chest without contrast), CT chest with contrast (71260), CT chest without and with contrast (71270) and Low dose CT scan (LDCT) for lung cancer screening (71271). **When the case is listed as CT chest in BBI and the clinical scenario or request for LDCT in the office notes meets appropriate use criteria for a LDCT, the LDCT is approvable due to these overlapping CPT codes. Reprocessing of the case to a separate LDCT request is not required.**

#### INDICATIONS FOR CHEST CT:

##### For Annual Lung Cancer Screening:

The use of low-dose, non-contrast spiral (helical) multi-detector CT imaging as an annual screening technique for lung cancer is considered **medically necessary ONLY** when used to screen for lung cancer for certain high-risk **asymptomatic** individuals when **ALL** of the following criteria are met:

##### Group 1:

- Individual is between 55-80 years of age; AND
- There is at least a 30 pack-year history of cigarette smoking; AND
- If the individual is a former smoker, that individual had quit smoking within the previous 15 years.

##### Group 2:

- Age  $\geq$  50 years old; AND
- $\geq$  20 pack-year history of smoking; AND
- Additional risk factors (other than second-hand smoke)\*

\*Additional risk factors include: Survivors of lung cancer, lymphoma, cancers of the head and neck and bladder (smoking related cancers), first degree family members with a history of lung cancer, history of COPD or pulmonary fibrosis, radon exposure, retinoblastoma, Li Fraumeni

---

\* National Imaging Associates, Inc. (NIA) is a subsidiary of Magellan Healthcare, Inc.

syndrome, occupational exposure to arsenic, chromium, asbestos, nickel, cadmium, beryllium, silica, diesel fumes, coal smoke and soot.

**Nodule on Initial LDCT:**

(Wood, 2018)

- If multiple nodules, the largest and type is used for decision

**Lung Nodules** (Bueno, 2018)

- Incidental pulmonary nodules detected on CT (use Fleischner Table)
  - Age  $\geq$  35 years old – use Fleischner table
  - Excludes lung cancer screening, patients with history of primary cancer, or immunosuppression (see specific section in current guideline)
- **Incidental pulmonary nodules on non-chest CT:**
  - Nodules  $>8$ mm or those with very suspicious features need further Chest CT as early as possible
  - Nodules  $\leq$  8mm should follow the Fleischner table

**Table 1: 2017 Fleischner Society Guidelines for Management of Incidentally Detected Pulmonary Nodules**

<b>A: Solid Nodules*</b>				
Nodule Type	Nodules <6 mm (<100 mm <sup>3</sup> )	Nodules 6–8 mm (100–250 mm <sup>3</sup> )	Nodules >8 mm (>250 mm <sup>3</sup> )	Comments
<b>Single</b>				
Low risk	No routine follow-up	CT at 6–12 mo, then consider CT at 18–24 mo	Consider CT at 3 mo, PET/CT, or tissue sampling	Nodules <6 mm do not require routine follow-up in low-risk patients (recommendation 1A)
High risk	Optional CT at 12 mo	CT at 6–12 mo, then at 18–24 mo	Consider CT at 3 mo, PET/CT, or tissue sampling	Certain patients at high risk with suspicious nodule morphology, upper lobe location, or both may warrant 12-mo follow-up (recommendation 1A)
<b>Multiple</b>				
Low risk	No routine follow-up	CT at 3–6 mo, then consider CT at 18–24 mo	CT at 3–6 mo, then consider CT at 18–24 mo	Use most suspicious nodule as guide to management; follow-up intervals may vary according to size and risk (recommendation 2A)
High risk	Optional CT at 12 mo	CT at 3–6 mo, then at 18–24 mo	CT at 3–6 mo, then at 18–24 mo	Use most suspicious nodule as guide to management; follow-up intervals may vary according to size and risk (recommendation 2A)
<b>B: Subsolid Nodules*</b>				
Nodule Type	Nodules <6 mm (<100 mm <sup>3</sup> )	Nodules ≥6 mm (≥100 mm <sup>3</sup> )	Comments	
<b>Single</b>				
Ground glass	No routine follow-up	CT at 6–12 mo to confirm persistence, then CT every 2 y until 5 y	For certain suspicious nodules <6 mm, consider follow-up at 2 y and 4 y; if solid component(s) develops or growth occurs, consider resection (recommendations 3A and 4A)	
Partly solid	No routine follow-up	CT at 3–6 mo to confirm persistence; if lesion is unchanged and solid component remains <6 mm, annual CT should be performed for 5 y	In practice, partly solid nodules cannot be defined as such until they are ≥6 mm, and nodules <6 mm usually do not require follow-up; persistent partly solid nodules with a solid component ≥6 mm should be considered highly suspicious (recommendations 4A–4C)	
Multiple	CT at 3–6 mo; if lesion is stable, consider CT at 2 y and 4 y	CT at 3–6 mo; subsequent management based on the most suspicious nodule(s)	Multiple <6-mm pure GGNs <sup>1</sup> usually are benign, but consider follow-up at 2 y and 4 y in select patients at high risk (recommendation 5A)	

**Known Cancer:**

(Carter, 2018; Hong, 2014; Lee, 2014)

- For follow-up intervals for malignancies ([NCCN, 2019](#))
- Cancer staging (includes unknown primary)
- Cancer restaging
- Suspicious signs or symptoms of recurrence
- Suspected cancer based on prior imaging (Greco, 2012)

**Lung or Chest Wall Mass (Mullan, 2011):**

(Preference should be given to MRI over chest CT for chest wall mass)

- Mass or lesion, including lymphadenopathy, after non-diagnostic initial imaging
- Thymoma screening in Myasthenia Gravis patients (Kumar, 2015)

### **Interstitial Lung Disease:**

(ACR, 2019; Vij, 2013)

- Suspected or known based on restrictive pattern pulmonary function test or signs or symptoms after initial chest x-ray
- Signs or symptoms unresponsive to treatment such as:
  - Shortness of breath
  - Persistent dyspnea
  - Persistent cough
- Monitoring treatment response of known interstitial lung disease
- Patients with known collagen vascular disease (Antoniou, 2009)
- Guidance in selection of the most appropriate site for biopsy of diffuse lung disease (ACR, 2015)

### **Chronic Cough (> 8 weeks) and chest x-ray completed (Turner, 2016):**

- After evaluation for other causes and failed treatment for those diagnosed with:
  - Asthma
  - Gastroesophageal Reflux Disease
  - Discontinuation of ACE inhibitors
  - Post nasal drip
- Clinical concern for bronchiectasis

### **Tuberculosis (TB):**

(Ko, 2018)

- Known or suspected tuberculosis and initial chest x-ray done

### **Infection Follow-up Imaging:**

- Abscess, empyema, or pleural effusions on chest x-ray (Dean, 2016)
- For evaluation of non-resolving pneumonia or inflammatory disease documented by **at least two** imaging studies:
  - Unimproved with 4 weeks of antibiotic treatment; **OR**
  - Unresolved at 8 weeks (Bryl, 2018; Little, 2014)

### **Pneumothorax on Chest X-ray (Melamed, 2017)**

### **Vocal Cord Paralysis on Endoscopic Exam (Paquette, 2012)**

- Neck and Chest CT is an approvable combo

### **Granulomatosis with Polyangiitis (Wegener's Granulomatosis) (Li, 2018)**

**Vascular Disease:**

- CT chest is not preferred study for vascular disease, CTA should be considered. See Chest CTA guideline.
- Chest CT can be used to detect and follow-up thoracic aortic aneurysms. See Background section.

**Suspected Pulmonary Embolism (PE):**

- Chest CT not approvable for PE

**Congenital Malformations**

- Thoracic malformation on chest x-ray (Ferreira, 2015)
- Congenital Heart Disease with pulmonary hypertension (Pascall, 2018)

**Hemoptysis after x-ray completed** (ACR, 2019; Ketai, 2014)**Pre-operative evaluation****Post-operative/procedural evaluation:**

- Post-surgical follow up when records document medical reason requiring additional imaging
- Pre-operative evaluation for Electromagnetic Navigation Bronchoscopy (Khan, 2016)

**Chest Wall Pain (after initial evaluation with chest x-ray and/or rib films)** (Winzenberg, 2015)

- History of known or suspected cancer
- Signs and symptoms of infection, such as:
  - Accompanying fever
  - Elevated inflammatory markers
  - Known infection at other sites

**Combination of studies with Chest CT:**

- **Abdomen CT/Pelvis CT/Chest CT/Neck MRI/Neck CT with MUGA** – known tumor/cancer for initial staging or evaluation before starting chemotherapy or radiation treatment.
- **Neck and Chest CT** - Neck and Chest CT is an approvable combo with vocal cord paralysis and concern for recurrent laryngeal nerve lesion

---

**BACKGROUND:**

Computed tomography (CT) scans provide greater clarity than regular x-rays and are used to further examine abnormalities found on chest x-rays. They may be used for detection and evaluation of various disease and conditions in the chest, e.g., tumor, inflammatory disease, vascular disease, congenital abnormalities, trauma, and symptoms such as hemoptysis.

**OVERVIEW:**

**LDCT for Lung Cancer Screening** - Screening should be discontinued once a person has not smoked for 15 years or develops a health problem that substantially limits life expectancy or the ability or willingness to have curative lung surgery

### **CT and Aneurysm**

- Initial evaluation of aneurysm (Erbel, 2014; Hannuksela, 2015; Hiratzka, 2010)
  - Echocardiogram shows aneurysm
  - Echocardiogram inconclusive of proximal aorta and first degree relative with thoracic aneurysm
  - Chest x-ray shows possible aneurysm
- Follow-up after established Thoracic Aneurysm (above these sizes surgery is usually recommended) (Erbel, 2014; Hannuksela 2015; Hiratzka, 2010)
  - Aortic Root or Ascending Aorta
    - 3.5 to 4.5 Annual
    - 4.5 to 5.4 Every 6 months
  - Genetically mediated (Marfans syndrome, Aortic Root or Ascending Aorta)
    - 3.5 to 4.0 Annual
    - 4.0 to 5.0 Every 6 months
  - Descending Aorta
    - 4.0 to 5.0 Annual
    - 5.0 to 6.0 Every 6 months

**CT and Interstitial Lung Disease** (ACR, 2019) - Radiography of the chest is usually appropriate for the initial imaging of patients who undergo screening and surveillance for lung disease when occupational exposure is present

**Costochondritis** (Proulx, 2009) - If physical exam findings are suggestive of costochondritis but the pain is persistent despite conservative care, it should be kept in mind that costochondritis can be recurrent and persistent. It is associated with fibromyalgia. Chest CT should be considered if the findings are not consistent with typical costochondritis such as fever or elevated inflammatory markers suggestive of infection or a suspicion of cancer based on history or current findings.

**CT for Management of Hemoptysis** – High-resolution CT (HRCT) is useful for estimating the severity of hemoptysis, localizing the bleeding site and determining the cause of the bleeding. Its results can be related to the severity of bleeding. The volume of expectorated blood and the amount of blood that may be retained within the lungs without being coughed up are important. HRCT is a way to evaluate the amount of bleeding and its severity. It may also help in the localization of bleeding sites and help in detecting the cause of bleeding.

**CT and Solitary Pulmonary Nodules** – Solitary Pulmonary nodules are abnormalities that are solid, semisolid and non-solid; another term to describe a nodule is focal opacity. CT makes it possible to find smaller nodules and contrast-enhanced CT is used to differentiate benign from malignant pulmonary modules. When a nodule is increasing in size or has spiculated margins or

mixed solid and ground-glass attenuation, malignancy should be expected. Patients who have pulmonary nodules and who are immunocompromised may be subject to inflammatory processes.

**CT and Empyema** – Contrast-enhanced CT used in the evaluation of the chest wall may detect pleural effusion and differentiate a peripheral pulmonary abscess from a thoracic empyema. CT may also detect pleural space infections and help in the diagnosis and staging of thoracic empyema.

**CT and Rib fractures** (ACR, 2018) - CT Chest CT may be useful for characterizing a pathologic fracture, and some features may be helpful in differentiating a primary malignant tumor of bone from metastasis. CT may also be helpful to search for a primary malignancy in patients with a suspected pathologic fracture; however, there is no strong indication that CT serves a significant use as the initial imaging modality to detect pathologic rib fractures.

**CT and Occupational Lung Disease** (ACR, 2019) - The chest radiograph and CT are complementary in the initial workup of suspected occupational lung disease. When patients with occupational exposures present with respiratory symptoms, chest radiography serves as the primary function of excluding alternative diagnoses, such as infectious pneumonia or pulmonary edema, with HRCT findings offering the best characterization of lung disease.

**CT and Tuberculosis** - “The chest radiograph is usually the first study performed in patients suspected of having TB. Although frontal and lateral radiographs are often performed in this setting, it has been shown that the lateral radiograph does not improve the detection of findings related to TB. In those with signs or symptoms of disease, the radiographic pattern of upper-lobe or superior-segment lower-lobe fibrocavitary disease in the appropriate clinical setting is sufficient to warrant respiratory isolation and sputum culture for definitive diagnosis. Using radiographs in combination with clinical evaluation results in a high sensitivity for the diagnosis but a relatively low specificity for both latent and active TB. In addition, radiographs may reveal ancillary findings of TB such as pleural effusion or spondylitis. For immunocompromised hosts, particularly those with a low CD4 count, computed tomography (CT) should be considered.” CT may be of value in the severely immunocompromised patient with a normal or near-normal radiograph by revealing abnormal lymph nodes or subtle parenchymal disease. Finally, CT may also have a role in identifying patients with latent TB who will be at risk for reactivation disease.

**CT and Superior Vena Cava (SVC) Syndrome** – SVC is associated with cancer, e.g., lung, breast and mediastinal neoplasms. These malignant diseases cause invasion of the venous intima or an extrinsic mass effect. Adenocarcinoma of the lung is the most common cause of SVC. SVC is a clinical diagnosis with typical symptoms of shortness of breath along with facial and upper extremity edema. Computed tomography (CT), often the most readily available technology, may be used as confirmation and may provide information including possible causes.

**CT and Family History of Lung Cancer** (Loverdos, 2019) - Family history is equally important. Individuals with a family history of lung cancer among first-degree relatives have been consistently shown to have a two-fold higher risk of developing lung cancer themselves. Those with multiple affected family members diagnosed at younger age appear to be at greater risk.

**POLICY HISTORY:**

**Review Date:** May 2019

**Review Summary:**

- Added chart for f/u interval at which LDCT can be approved
- Removed pulmonary embolism indication
- Added statement about CPT codes
- Separate diagnostic criteria for Thoracic aneurysm
- Separated individual diagnoses.
- Expanded criteria for chronic cough.
- Updated references.

**Review Date:** May 2020

**Review Summary:**

- For Annual Lung Cancer Screening:
  - Changed upper age limit from 77 to 80 yrs old
  - Added:
    - *Age ≥ 50 years old; AND*
    - *≥ 20 pack-year history of smoking; AND*
    - *Additional risk factors (other than second-hand smoke)\* (see pg 2)*

*\*Additional risk factors include: Survivors of lung cancer, lymphoma, cancers of the head and neck and bladder (smoking related cancers), first degree family members with a history of lung cancer, history of COPD or pulmonary fibrosis, radon exposure, retinoblastoma, Li Fraumeni syndrome, occupational exposure to arsenic, chromium, asbestos, nickel, cadmium, beryllium, silica, diesel fumes, coal smoke and soot*

- Expanded lung nodules section to include:
  - *Incidental pulmonary nodules detected on CT (use Fleischner Table)*
    - *Age ≥ 35 years old – use Fleischner table*
    - *Excludes lung cancer screening, patients with history of primary cancer, or immunosuppression (see specific section in current guideline)*
  - *Incidental pulmonary nodules on non-chest CT:*
    - *Nodules >8mm or those with very suspicious features need further Chest CT as early as possible*
    - *Nodules ≤ 8mm should follow the Fleischner table*
- For Known Cancer, added: *For follow-up intervals for malignancies*
- For Lung or Chest Wall Mass:



- Added statement: *Preference should be given to MRI over chest CT for chest wall mass*
  - Removed descriptive variables for ‘Mass with increased risk for malignancy’ including: *Fixation to adjacent tissues; Firm consistency; Size > 1.5 cm; Ulceration of overlying skin*
- Expanded Interstitial Lung Disease section to include:
  - *Suspected or known based on restrictive pattern pulmonary function test or signs or symptoms after initial chest x-ray*
  - *Signs or symptoms unresponsive to treatment such as:*
    - *Shortness of breath*
    - *Persistent dyspnea*
    - *Persistent cough*
  - *Patients with known collagen vascular disease*
  - *Guidance in selection of the most appropriate site for biopsy of diffuse lung disease*
- Infection f/u imaging: added *inflammatory disease*
- Vocal Cord Paralysis on Endoscopic Exam: added ‘*Neck and Chest CT is an approvable combo*’
- Removed Vascular Disease section and added the following:
  - CT chest is not preferred study for vascular disease, CTA should be considered. See Chest CTA guideline.
  - Chest CT can be used to detect and follow-up thoracic aortic aneurysms.
- Added indication: Chest Wall Pain
  - *Chest Wall Pain (after initial evaluation with chest x-ray and/or rib films)*
    - *History of known or suspected cancer*
    - *Signs and symptoms of infection, such as:*
      - *Accompanying fever*
      - *Elevated inflammatory markers*
      - *Known infection at other sites*
- Added Neck and Chest CT combo study

Review Date: November 9, 2020

Review Summary: Replaced CPT code G0297 with 71271

## REFERENCES:

American College of Chest Physicians (ACCP). Chest the 83<sup>rd</sup> annual meeting of the American College of Chest Physicians, Toronto, Ontario. 2017.

American College of Radiology (ACR). ACR Appropriateness Criteria<sup>®</sup>. <https://acsearch.acr.org/list>. Published 2014.

American College of Radiology (ACR). ACR Appropriateness Criteria<sup>®</sup>. <https://acsearch.acr.org/list>. Published 2018.

American College of Radiology (ACR). ACR Appropriateness Criteria<sup>®</sup>. Acute Chest Pain—doi: <https://doi.org/10.1016/j.jacr.2017.02.027>.

American College of Radiology (ACR). ACR Appropriateness Criteria<sup>®</sup>. Hemoptysis. Revised 2019. <https://acsearch.acr.org/docs/69449/Narrative/>.

American College of Radiology (ACR). Lung - RADS Assessment Categories v1.1. 2019. <https://www.acr.org/Clinical-Resources/Reporting-and-Data-Systems/Lung-Rads>.

American College of Radiology (ACR). ACR Appropriateness Criteria<sup>®</sup>. Occupational Lung Diseases. Revised 2019. <https://acsearch.acr.org/docs/3091680/Narrative/>.

American College of Radiology (ACR). ACR-STR Practice Parameter for the Performance of High-Resolution Computed Tomography (HRCT) of the Lungs in Adults, Resolution 17. Revised 2015.

Antoniou KM, Margaritopoulos G, Economidou F, et al. Pivotal clinical dilemmas in collagen vascular diseases associated with interstitial lung involvement. *Eur Resp J*. 2009; 33:882-96.

Barman M. Acute aortic dissection. *Eur Soc Cardiol*. 2014 July 2; 12(25).

Bryl B, Barlow E, Davies H. P182 Follow up chest X-rays (CXR) after community acquired pneumonia (CAP): Are they done and are they useful? *BMJ*. 2018; 73(4).

Bueno J, Landeras L, Chung JH, et al. Updated Fleischner Society Guidelines for Managing Incidental Pulmonary Nodules: Common Questions and Challenging Scenarios. Epub 2018 Sep 12.

Carter BW, Lichtenberger JP, Benveniste MK, et al. Revisions to the TNM staging of lung cancer: Rationale, significance, and clinical application. *RadioGraphics*. 2018; 38:374–391.

Ceriani E, Combescure C, Le Gal G, et al. Clinical prediction rules for pulmonary embolism: a systematic review and meta-analysis. *J Thromb Hemost*. 2010; 8(5):957-970. doi: 10.1111/j.1538-7836.2010.03801.x.

Corrigan D, Prucnal C, Kabrhel C. Pulmonary embolism: The diagnosis, risk-stratification, treatment and disposition of emergency department patients. *Clin Exp Emerg Med*. 2016 Sep; 3(3):117–125.

Cohen R, Mena D, Carbajal-Mendoza R, et al. Superior vena CVA syndrome: A medical emergency? *Int J Angiol*. 2008; 17(1):43-46.  
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2728369/pdf/ija17043.pdf>.

De Koning HJ, Meza R, Plevritis SK, et al. Benefits and harms of computed tomography lung cancer screening strategies: A comparative modeling study for the U.S. Preventative Services Task Force. *Ann Int Med*. March 4, 2014; 160(5):311-320. doi: 10.7326/M13-2316.

Dean NC, Griffith PP, Sorensen JS, et al. Pleural effusions at first ED encounter predict worse clinical outcomes in patients with pneumonia. *Chest*. 2016; 149(6):1509.

Dogan DO, Berk S, Gumus C, et al. A longitudinal study on lung disease in dental technicians: What has changed after seven years? *Int J Occup Med Environ Health*. 2013; 26:693-701.

Dyer DS, Khan AR, Mohammed TL. ACR Appropriateness Criteria on chronic dyspnea: Suspected pulmonary origin. *J Thorac Imaging*. 2010 May; 25(2):W21-3.

Erbel R, Aboyans V, Boileau C, et al. 2014 ESC Guidelines on the diagnosis and treatment of aortic diseases: Document covering acute and chronic aortic diseases of the thoracic and abdominal aorta of the adult. The Task Force for the Diagnosis and Treatment of Aortic Diseases of the European Society of Cardiology (ESC). *Eur Heart J*. 2014; 35(41):2873. Epub 2014 Aug 29.

Ferreira TdA, Chagas ISS, Ramos RTT, et al. Congenital thoracic malformations in pediatric patients: Two decades of experience. *J Bras Pneumol*. 2015 Mar-Apr; 41(2):196-199.

Friedman T, Quencer KB, Kishore SA, et al. Malignant venous obstruction: Superior vena cava syndrome and beyond. *Semin Intervent Radiol*. 2017; 34(4):398. Epub 2017 Dec 14.

Greco FA, Oien K, Erlander M, et al. Cancer of unknown primary: Progress in the search for improved and rapid diagnosis leading toward upper patient outcomes. *Ann Oncol*. 2012; 23:298-304.

Hannuksela M, Stattin EL, Johansson B, et al. Screening for familial thoracic aortic aneurysms with aortic imaging does not detect all potential carriers of the disease. *Aorta (Stamford)*. 2015 Feb; 3(1):1–8.

Hiratzka LF, Bakris GL, Beckman JA, et al. 2010 ACCF / AHA / AATS / ACR / ASA / SCA / SCAI / SIR / STS / SVM guidelines for the diagnosis and management of patients with Thoracic Aortic Disease: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines, American Association for Thoracic Surgery, American College

of Radiology, American Stroke Association, Society of Cardiovascular Anesthesiologists, Society for Cardiovascular Angiography and Interventions, Society of Interventional Radiology, Society of Thoracic Surgeons, and Society for Vascular Medicine. *Circulation*. 2010; 121(13):e266.

Hong SJ, Kim TJ, Nam KB, et al. New TNM staging system for esophageal cancer: What chest radiologists need to know. *RadioGraphics*. 2014; 34(6).

Latief KH, White CS, Protopapas Z, et al. Search for a primary lung neoplasm in patients with brain metastasis: Is the chest radiograph sufficient? *AJR Am J Roentgenol*. 1997; 168:1339–44.

Lee SC, Jain PA, Jethwa SC, et al. Radiologist's role in breast cancer staging: Providing key information for clinicians. *RadioGraphics*. 2014; 34(2).

Loverdos K, Fotiadis A, Kontogianni C, et al. Lung nodules: A comprehensive review on current approach and management. *Ann Thorac Med*. 2019 Oct-Dec; 14(4):226-238.

Kalemkerian GP, Akerley W, Bogner P, et al. Small Cell Lung Cancer - NCCN Clinical Practice Guidelines in Oncology. February 2013; 1-48.  
[http://www.nccn.org/professionals/physician\\_gls/pdf/sclc.pdf](http://www.nccn.org/professionals/physician_gls/pdf/sclc.pdf).

Ketai LH, Mohammed TL, Kirsch J, et al. ACR Appropriateness Criteria® Hemoptysis. *J Thorac Imaging*. 2014 May; 29(3):W19-22.

Khan KA, Nardelli P, Jaeger A, et al. Navigational bronchoscopy for early lung cancer: A road to therapy. *Adv Ther*. 2016; 33:580-596.

Ko Y, Lee HY, Park YB, et al. Correlation of microbiological yield with radiographic activity on chest computed tomography in cases of suspected pulmonary tuberculosis. *PLoS One*. 2018 Aug 9; 13(8):e0201748.

Konstantinides SV, Torbicki A, Agnelli G, et al. 2014 ESC Guidelines on the diagnosis and management of acute pulmonary embolism: The Task Force for the Diagnosis and Management of Acute Pulmonary Embolism of the European Society of Cardiology (ESC). *Eur Heart J*. 2014 Nov 14; 35(43):3033–80.

Kovalchik SA, Tammemagi M, Berg CD, et al. Targeting of low-dose CT screening according to the risk of lung-cancer death. *NEJM*. July 2013; 369(3):245-54. doi: 10.1056/NEJMoa1301851.

Kumar R. Myasthenia gravis and thymic neoplasms: A brief review. *World J Clin Cases*. 2015 Dec 16; 3(12):980–83.

Li J, Li C, Li J. Thoracic manifestation of Wegener's granulomatosis: Computed tomography findings and analysis of misdiagnosis. *Exp Ther Med*. 2018 Jul; 16(1):413–419.

Little BP, Gilman MD, Humphrey KL, et al. Outcome of recommendations for radiographic follow-up of pneumonia on outpatient chest radiography. *AJR*. 2014; 202:54–59.

MacMahon H, Naidich DP, Goo JM, et al. [Guidelines for management of incidental pulmonary nodules detected on CT images: From the Fleischner Society 2017](#). *Radiology*. 2017 July; 284(1):228-243. Epub 2017 Feb 23. doi: 10.1148/radiol.2017161659.

Mazzone PJ, Silvestri GA, Patel S, et al. Screening for lung cancer CHEST guideline and expert panel report. *CHEST*. 2018; 153(4):954-985.

Melamed KH, Fereidoun AF, Barjakterevic I, et al. Diagnostic value of quantitative chest CT in a case of spontaneous pneumothorax. *Chest*. 2017; 152(5):e109-114.

Miller A, Warshaw R, Nezamis J. Diffusing capacity and forced vital capacity in 5,003 asbestos-exposed workers: Relationships to interstitial fibrosis (ILO profusion score) and pleural thickening. *Am J Ind Med*. 2013; 56:1383-93.

Mullan CP, Madan R, Trotman-Dickenson B, et al. Radiology of chest wall masses. *AJR*. 2011; 197(3).

National Comprehensive Cancer Network (NCCN). NCCN Imaging Guidelines. 2019. <https://www.nccn.org/store/login/login.aspx?ReturnURL=/professionals/imaging/content>.

Nishino M, Itoh H, Hatabu H. A practical approach to high-resolution CT of diffuse lung disease. *Eur J Radiol*. 2014; 83(1):6-19.

Paquette CM, Manos DC, Psooy BJ. Unilateral vocal cord paralysis: A review of CT findings, mediastinal causes, and the course of the recurrent laryngeal nerves. *RadioGraphics*. 2012; 32(3).

Pascall E, Tulloh RMR. Pulmonary hypertension in congenital heart disease. *Future Cardiol*. 2018 Jul; 14(4):343–353.

Pratter MR, Abouzgheib W, Akers S, et al. An algorithmic approach to chronic dyspnea. *Respir Med*. 2011; 105:1014-21.

Pynnonen MA, Gillespie MB, Roman B, et al. Clinical practice guideline: Evaluation of the neck mass in adults. *Otolaryngol Head Neck Surg*. 2017; 157(2 Suppl):S1.

Singh B, Mommer SK, Erwin PJ, et al. Pulmonary embolism rule-out criteria (PERC) in pulmonary embolism--revisited: A systematic review and meta-analysis. *Emerg Med J*. 2013 Sep; 30(9):701-6. doi: 10.1136/emered-2012-201730. Epub 2012 Oct 4.

Tsao YC, Liu SH, Tzeng IS, et al. Do sanitary ceramic workers have a worse presentation of chest radiographs or pulmonary function tests than other ceramic workers? *J Formos Med Assoc*. 2017; 116:139-44.

Turner RD, Bothamley GH. Chronic cough and a normal chest X-ray - a simple systematic approach to exclude common causes before referral to secondary care: a retrospective cohort study. *NPJ Prim Care Respir Med*. 2016; 26:15081.

Vij R, Strek ME. Diagnosis and treatment of connective tissue disease-associated interstitial lung disease. *Chest*. 2013; 143(3):814.


Winzenberg T, Jones G, Callisaya M. Musculoskeletal chest wall pain. *Aust Fam Physician*. 2015 Aug; 44(8):540-4.

Wood DE, Eapen GA, Ettinger DS, et al. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines™). *National Comprehensive Cancer Network*. 2012; 10:240-265. <http://www.jnccn.org/content/10/2/240.full.pdf+html>.

Yang C, Liu R, Ming X, et al. Thoracic organ doses and cancer risk from low pitch helical 4-dimensional computed tomography scans. *Biomed Res Int*. 2018 Sep 24; 2018:8927290. doi: 10.1155/2018/8927290. eCollection 2018.

Yankelevitz DF, Smith JP. Understanding the core result of the National Lung Screening Trial. *NEJM*. May 2013; 368(18):1757. doi: 10.1056/NEJMc1213744.

Yoo S, Lee MH, White C. MDCT evaluation of acute aortic syndrome. *Radiol Clin North Am*. 2010; 48(1):67-83. doi: 10.1016/j.rcl.2009.09.006.

Reviewed / Approved by  M. Atif Khalid, M.D., Medical Director, Radiology

**Disclaimer:** Magellan Healthcare service authorization policies do not constitute medical advice and are not intended to govern or otherwise influence the practice of medicine. These policies are not meant to supplant your normal procedures, evaluation, diagnosis, treatment and/or care plans for your patients. Your professional judgement must be exercised and followed in all respects with regard to the treatment and care of your patients. These policies apply to all Magellan Healthcare subsidiaries including, but not limited to, National Imaging Associates (“Magellan”). The policies constitute only the reimbursement and coverage guidelines of Magellan. Coverage for services varies for individual members in accordance with the terms and conditions of applicable Certificates of Coverage, Summary Plan Descriptions, or contracts with governing regulatory agencies. Magellan reserves the right to review and update the guidelines at its sole discretion. Notice of such changes, if necessary, shall be provided in accordance with the terms and conditions of provider agreements and any applicable laws or regulations.