CT Chest

Diagnostic Imaging

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CT Chest

Guideline

Computerized tomography (CT) of the chest is considered medically appropriate when the documentation demonstrates **ANY** of the following:

I.   Aneurysm is suspected or known with **ANY** of the following: (***NOTE**: *CTA is preferred.*) [33]

   A.   Clinical status includes echocardiogram, chest X-ray or other imaging suggestive of aneurysm

   B.   Thoracic aneurysm is known, for follow-up with **ANY** of the following:[1][3]

      1.   Aortic root or ascending aorta involvement (size 3.5 cm to 4.4 cm annually; 4.5 cm to 5.4 cm every 6 months)

      2.   Descending aorta involvement (size 4.0 cm to 4.9 cm annually; 5.0 cm to 6.0 cm every 6 months)

      3.   Genetically mediated (Marfans syndrome), aortic root or ascending aorta (3.5 cm to 3.9 cm annually; 4.0 cm to 5.0 cm every 6 months)

II.   Cancer is suspected or known, for **ANY** of the following:

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[1]The mean rate of growth for all thoracic aortic aneurysms is about 1 mm/year. The growth rate increases as the aneurysm diameter increases. Growth rates may be faster for aneurysms involving the descending aorta, dissected vs. nondissected aortas and individuals with Marfan syndrome or with bicuspid vs. tricuspid aortic valves. [15]

A. Low-dose computed tomography (LDCT) for lung cancer screening is considered medically appropriate when the documentation demonstrates that **ALL** of the following criteria are met: [1] [19] [7]

1. Asymptomatic for lung cancer (eg, **NO** hemoptysis or chronic productive cough) and individual does **NOT** have condition that limits ability or willingness to have curative treatment (eg, patient does not have terminal illness).

2. Age 50 to 80 years

3. Smoking status of **ANY** of the following:

   a. Current smoker with more than 20 pack years of smoking

   b. Past smoker (within last 15 years and annual pack year of 20 or more) [29]

> **ℹ NOTICE**
> To calculate pack years for different types of tobacco use (eg, pipe, vape), use a Smoking Pack Year Calculator, such as: www.smokingpackyears.com or www.jeffersonradiology.com/calculate-packs-year.

B. Lung cancer is known, for evaluation of **ANY** of the following situations: (***NOTE**: *When lung cancer is known, the evidence indicates it may be appropriate to do a combination CT with whole body MRI, for staging or metastasis evaluation*.) [12] [2023 Non-Small Cell Lung Cancer Version 1.2023] [8]

1. Malignant pleural effusion is suspected based on cytology. [11] [21]

2. Recurrence or metastasis is suspected. [25] [17] [10]

3. Staging or restaging evaluation [37] [17] [10] [6]

4. Superior vena cava (SVC) syndrome is suspected. [2] [35]

5. Treatment evaluation (during or at completion of treatment)

6. Surveillance following the NCCN Guidelines recommended schedule (*see* Surveillance *section*).

C. Pulmonary nodules incidentally demonstrated on prior imaging and **ANY** of the following: [26] [28]

1. **ANY** of the following when excluding low dose CT:

a. Age 35 years or older **AND** aligned with Fleischner Criteria (see **Definitions** section below).

b. Age under 35 years, non-smoker and non-calcified lung nodule of 1 cm or larger

c. History of primary cancer (imaging follow-up for surveillance is every 3 months to detect interval nodule growth)

d. Immunosuppression (may require a shorter follow-up, such as 1 month, if suspicion of fulminant infection)

2. Pulmonary nodule surveillance (follow-up) for lung nodule detected on initial low dose CT and aligned with American College of Radiology (ACR) Lung RADS Assessment Categories. (in situations with multiple nodules, the largest and/or type should drive imaging type and frequency)

D. Screening for cancer in the lung (eg, metastasis) per the United States Preventative Task Force (USPTF)/National Comprehensive Cancer Network (NCCN) recommendations [12] [2023 Non-Small Cell Lung Cancer Version 1.2023] [8] [19]

III. Congenital malformation (eg, thoracic anomalies), when an anomaly is demonstrated or suspected from prior x-ray or there is the presence of congenital heart disease with pulmonary hypertension. [38]

IV. Granulomatosis with polyangiitis (Wegener's granulomatosis) [22]

V. Infectious condition is suspected or known, including **ANY** of the following:

A. Coronavirus disease/COVID-19 is suspected or known and **ANY** of the following: (***NOTE:** Imaging is not indicated when COVID-19 presents with mild symptoms, unless there is a high-risk for disease progression.)* [41] [23] [16]

1. COVID-19 is suspected with moderate-to-severe clinical signs, a high pre-test probability of disease and suspected false negative test results.

2. COVID-19 test is positive and respiratory status worsens.

3. Long-term/chronic COVID-19 is suspected and **ANY** of the following:

a. COVID-19 history with pulmonary symptoms on follow-up.

b. Fibrosis is known with continued symptoms.

c. Oxygen saturation (O_2 sat) low and prior chest x-ray showing pulmonary involvement. (A low O_2 sat is considered less than 94% in the acutely ill and less than 88% for those at risk for hypercapnic respiratory failure.) [31]

      d.   Pulmonary function test (PFT) shows restriction and decreased diffusion capacity.

    B.   Infection follow up imaging for **ANY** of the following:

      1.   Abscess, empyema or pleural effusions on chest x-ray [34]

      2.   Non-resolving pneumonia or inflammatory disease documented by **AT LEAST 2** imaging studies with **ANY** of the following:

        a.   Unimproved with 4 weeks of antibiotic treatment

        b.   Unresolved at 8 weeks

    C.   Pneumonia is known and **ANY** of the following: [18]

      1.   X-ray **WITHOUT** improvement 4 weeks from diagnosis or with pleural effusion

      2.   Pneumonia, recurrent, within 6 months of previous pneumonia in same location

      3.   Pneumonia complications are suspected (eg, cavitation, empyema, lung abscess) from X-ray or other prior imaging.

VI.   Interstitial lung disease or pulmonary fibrosis is suspected or known and **ANY** of the following: [24] [36] [14]

    A.   Pulmonary function test (PFT) shows a restrictive pattern or signs/symptoms are present, after initial X-ray

    B.   Biopsy guidance for selecting the most appropriate site for biopsy of diffuse lung disease

    C.   Collagen vascular disease is known.

    D.   Interstitial disease/fibrosis is known and imaging for monitoring treatment response.

    E.   Interstitial lung disease signs/symptoms (eg, shortness of air, persistent dyspnea, persistent cough) are unresponsive to treatment.

VII.   Mediastinal or hilar mass is suspected or known with **ANY** of the following:

    A.   Horner's syndrome

    B.   Mediastinal or hilar mass on chest X-ray

    C.   Myasthenia gravis, new diagnosis

    D.   Vocal cord paralysis on endoscopic exam (CT Neck and CT Chest are an approvable combination.)

VIII. Periprocedural planning to guide invasive intervention and postoperative follow-up care. [27]

IX. Prior imaging demonstrates **ANY** of the following:

    A. Chest mass (non-lung parenchymal) and **ANY** of the following:

        1. Mass or lesion, palpable, including lymphadenopathy, after non-diagnostic or indeterminate initial imaging

        2. Thymoma screening when Myasthenia Gravis is present. [39]

    B. Chest x-ray is non-diagnostic or indeterminate and **ANY** of the following:

        1. Cough, chronic (at least 8 weeks) and **ANY** of the following: [30]

            a. Bronchiectasis is known or suspected. [40]

            b. Common causes (eg, angiotensin-converting enzyme [ACE] inhibitor discontinuation, asthma, gastroesophageal reflux disease, postnasal drip) are ruled out.

            c. Failure to respond to conservative measures (eg, incentive spirometer, medications, respiratory therapy).

        2. Fever of unknown origin, lasting 3 weeks or longer, or immunocompromised state [13]

        3. Hemoptysis (bloody sputum) [32]

        4. Pain in the chest wall, after initial evaluation with chest X-ray and/or rib films for **ANY** of the following:

            a. Cancer history is suspected or known.

            b. Infection signs or symptoms are present (eg, fever, elevated inflammatory markers, known infection at other sites).

        5. Tuberculosis is suspected or confirmed.

    C. Pneumothorax is demonstrated on chest X-ray. [20]

    D. Tracheal/bronchial lesion demonstrated on bronchoscopy and prior imaging is non-diagnostic or indeterminate. [42]

CT General Contraindications and Exclusions

Computed tomography (CT) may be contraindicated/excluded for **ANY** of the following: [5] [4] [2022 ACR Manual on Contrast Media] [43]

- Allergy to contrast (if contrast is used)

- Pregnancy
- Renal impairment and dialysis unmanageable (if contrast is used)

> **!** **LCD 33459**
> *See also*, **LCD 33459**: Computerized Axial Tomography (CT), Thorax at https://www.cms.gov/medicare-coverage-database/search.aspx *if applicable to individual's healthplan membership*.

> **!** **LCD 35391**
> *See also*, **LCD 35391**: Multiple Imaging in Oncology at https://www.cms.gov/medicare-coverage-database/search.aspx *if applicable to individual's healthplan membership*.

Chest Imaging Surveillance

Lung Cancer Surveillance

Lung cancer surveillance includes **ANY** of the following:

I. Non-small cell lung cancer (NSCLC) surveillance for **ANY** of the following: [2][9]

    A. Stage I or II and primary treatment included surgery ± chemotherapy: chest CT (± contrast) every 6 months for 2 to 3 years, then low-dose non-contrast-enhanced chest CT annually.

    B. Stage I or II and primary treatment included radiation therapy (RT): chest CT (± contrast) every 3 to 6 months for 3 years, then chest CT (± contrast) every 6 months for 2 years, then low-dose-non-contrast-enhanced chest CT annually. **NOTE: Residual or new radiographic abnormalities may require more frequent imaging.*

    C. Stage III or IV, oligometastatic with all sites treated with definitive intent: chest CT (± contrast) every 3 to 6 months for 3 years, then chest CT (± contrast) every 6 months for 2 years, then low-dose-non-contrast-enhanced chest CT annually. **NOTE: Residual or new radiographic abnormalities may require more frequent imaging.*

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[2]PET/CT or brain MRI is not routinely indicated.

II. Small cell lung cancer (SCLC) surveillance includes **ALL** of the following: [12]

    A. Brain MRI (preferred) or brain CT with contrast: every 3 to 4 months during year 1, then every 6 months during year 2, for all individuals and after year 2, as clinically indicated.

    B. Chest CT (± abdomen/pelvis) every 2 to 6 months (more frequently in years 1 to 2, and less frequently thereafter).

Procedure Codes

Table 1. CT Chest Associated Procedure Codes

CODE	DESCRIPTION
71250	Computed tomography, thorax, diagnostic; without contrast material
71260	Computed tomography, thorax, diagnostic; with contrast material(s)
71270	Computed tomography, thorax, diagnostic; without contrast material, followed by contrast material(s) and further sections
71271	Computed tomography, thorax, low dose for lung cancer screening, without contrast material(s)

Summary of Changes

The CT Chest clinical guideline from 2022 to 2023 had the following changes:

- Added indication under "Interstitial lung disease" regarding signs/symptoms and lack of response to treatment

- Added language defining "Low oxygen saturation."

- Clarified wording in "Interstitial lung disease" indication

- Made "Cough, chronic" a main indication with it's own detailed indications

- Made first line of "Interstitial lung disease" a indication below and removed "CT is required to better..." as this is what current reserch supports

- Removed "No previously identified lung nodules" indication as it is not supported by current research

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Definitions/Key Terms

Abscess is a swollen area within body tissue, containing an accumulation of pus.
Aneurysm refers to weakness in an artery wall, allowing it to abnormally balloon out or widen.
American College of Radiology (ACR) Lung-RADS® Assessment Categories

Table 1. Lung-RADS® Assessment Categories Version 1.1

CATEGORY DESCRIPTOR	Lung-RADS SCORE	FINDINGS	MANAGE-MENT	MALIG-NANCY RISK	POPU-LATION PREVA-LENCE (Est.)
Incomplete	0	• Prior CT Chest being located for comparison • Part/All of lungs cannot be evaluated	Additional lung cancer screening CT images and/or comparison to prior chest CT examinations is needed	N/A	1%
Negative • NO nodules • Nodules definitely benign	1	• No lung nodules • Nodule(s) with specific calcifications: complete, central, popcorn, concentric rings and fat containing nodules	Continue annual screening with LDCT in 12 months	less than 1%	90%
Benign Appearance or Behavior Nodules with a very low likelihood of becoming a clinically active cancer due to size or lack of growth	2	• **Perifissural nodule(s)** less than 10 mm (524 mm^3) • **Solid nodule(s)**: less than 6 mm (less than 113 mm^3); new less than 4 mm (less than 34 mm^3) • **Part solid nodule(s)**: less than 6 mm (less than 113 mm^3) on baseline screening • **Non solid nodule(s) (GGN)**: Less than 30 mm (less than 14137 mm^3 **OR** greater than or equal to 30 mm (greater than or equal to 14137 mm^3 and unchanged or slowly growing • **Category 3 or 4 nodules unchanged for greater than or equal to 3 months**	Continue annual screening with LDCT in 12 months	less than 1%	90%

CATEGORY DESCRIPTOR	Lung-RADS SCORE	FINDINGS	MANAGEMENT	MALIGNANCY RISK	POPULATION PREVALENCE (Est.)
Probably Benign Probably benign finding(s) - short term follow up suggested; includes nodules with a low likelihood of becoming a clinically active cancer	3	• **Solid nodule(s)**: greater or equal to 6 to less than 8 mm (greater than or equal to 113 to less than 268 mm^3) at baseline **OR** new 4 mm to less than 6 mm (34 to less than 113 mm^3) • **Part solid nodule(s)**; greater than or equal to 6 mm total diameter (greater than or equal to 113 mm^3 with solid component less than 6 mm (less than 113 mm^3) **OR** new less than 6 mm total diameter (less than 113 mm^3 • **Non solid nodule(s)**; (GGN) greater than or equal to 30 mm (greater than or equal to 14137 mm^3) on baseline CT or new	6 month LDCT	1-2%	5%

CATEGORY DESCRIPTOR	Lung-RADS SCORE	FINDINGS	MANAGEMENT	MALIGNANCY RISK	POPULATION PREVALENCE (Est.)
Suspicious Findings for which additional diagnostic testing is recommended	4A	• **Solid nodule(s)**: greater than or equal to 8 to less than 15 mm (greater than or equal to 268 to less than 1767 mm^3) at baseline **OR** growing less than 8 mm (less than 268 mm^3) **OR** new 6 to less than 8 mm (113 to less than 268 mm^3) • **Part solid nodule(s)**: greater than or equal to 6 mm (greater than or equal to 113 mm^3) with solid component greater than or equal to 6 mm to less than 8 mm (greater than or equal to 113 to less than 268 mm^3) **OR** with a new or growing less than 4 mm (less than 34 mm^3) solid component • **Endobrachial nodule**	3 month LDCT; PET/CT may be used when there is a greater than or equal to 8 mm (greater than or equal to 268 mm^3) solid componenet	5-15%	2%

CATEGORY DESCRIPTOR	Lung-RADS SCORE	FINDINGS	MANAGEMENT	MALIGNANCY RISK	POPULATION PREVALENCE (Est.)
Very Suspicious Findings for which additional diagnostic testing and/or tissue sampling is recommended	4B	• **Solid nodule(s)** greater than or equal to 15 mm (greater than or equal to 1767 mm^3) **OR** new or growing and greater than or equal to 8 mm (greater than or equal to 268 mm^3) • **Part solid nodule(s) with** a solid component greater than or equal to 8 mm (greater than or equal to 268 mm^3) **OR** a new or growing greater than or equal to 4 mm (greater than or equal to 34 mm^3) solid component	Chest CT with or without contrast, PET/CT and/or tissue sampling depending on the *probability of malignancy and comorbidities. PET/CT may be used when there is a greater than or equal to 8 mm (greater than or equal to 268 mm^3) solid component. For new large nodules that develop on an annual repeat screening CT, a 1 month LDCT may be recommended to address potentially infectious or inflammatory conditions	greater than 15%	2%
See above	4X	Category 3 or 4 nodules with additional features or imaging findings that increases the suspicion of malignancy	see above	see above	see above
Other Clinically significant or potentially clinically significant findings (non lung cancer)	s	**Modifier - may add on to category 0 to 4 coding**	As appropriate to the specific finding	N/A	10%

Bronchiectasis is chronic dilatation of bronchi or bronchioles.

Computed tomography (CT) refers to a computerized X-ray imaging procedure in which a three-dimensional image of a body structure is revealed through a series of plain, cross-sectional images or "slices".

Echocardiogram (echo) is a test that uses high frequency sound waves (ultrasound) to make pictures of the heart. The test is also called echocardiography or diagnostic cardiac ultrasound. An echo uses sound waves to create pictures of the heart's chambers, valves, walls and the blood vessels (aorta, arteries, veins). A probe called a transducer is passed over the chest. The probe produces sound waves that bounce off the heart and "echo" back to the probe. These waves are changed into pictures viewed on a video monitor. [3]

Empyema is a collection of pus in the space between the lung and the inner surface of the chest wall (pleural space).

Fibrosis is a condition marked by increase of interstitial fibrous tissue.

Fleischner Society Guidelines for Management of Incidental Pulmonary Nodules Detected on CT Images: is a characterization tool to support lung cancer diagnosis and treatment planning. The recommendations refer to incidentally encountered lung nodules detected at CT in adult patients that are age 35 years or older. These are not intended for routine screening, when there is metastasis risk with known primary cancer, or when there is risk of infection due to immunocompromise.[4]

Table 2. Solid Nodules, Fleischner Society Guidelines for Incidentally Detected Pulmonary Nodules

NODULE SIZE/ TYPE	SIZE smaller than 6 mm (10 mm^3)	SIZE 6 mm (10 mm^3) to 8 mm (250 mm^3)	SIZE larger than 8 mm (250 mm^3)	COMMENTS
Single	Insert text	Insert text	Insert text	Insert text
• Low risk	**NO** routine follow-up	CT at 6 to 12 months, then consider CT at 18 to 24 months	Consider CT at 3 months, PET/CT or tissue sampling	Nodules smaller than 6 mm do NOT require routine follow-up in low-risk situations (recommendation 1A)
• High risk	Optional CT at 12 months	CT at 6 to 12 months, then consider CT at 18 to 24 months	Consider CT at 3 months, PET/CT, or tissue sampling	Certain high risk individuals with suspicious nodule morphology, upper lobe location (or both), may be appropriate for 12 month follow-up (Recommendation 1A)
Multiple	Insert text	Insert text	Insert text	Insert text

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NODULE SIZE/ TYPE	SIZE smaller than 6 mm (10 mm^3)	SIZE 6 mm (10 mm^3) to 8 mm (250 mm^3)	SIZE larger than 8 mm (250 mm^3)	COMMENTS
• Low risk	**NO** routine follow-up	CT at 3 to 6 months, then consider CT at 18 to 24 months	CT at 3 to 6 months then consider CT at 18 to 24 months	Most suspicious nodule should be used to guide management. Follow-up intervals vary by this nodule's risk and size. (recommentation 2A)
• High risk	Optional CT at 12 months	CT at 3 to 6 months, then consider CT at 18 to 24 months	CT at 3 to 6 months then consider CT at 18 to 24 months	Most suspicious nodule should be used to guide management. Follow-up intervals vary by this nodule's risk and size. (recommendation 2A)

Table 3. Subsolid Nodules, Fleischner Society Guidelines for Incidentally Detected Pulmonary Nodules

NODULE SIZE/TYPE	SIZE smaller than 6 mm (10 mm^3)	SIZE larger than 6 mm (10 mm^3)	COMMENTS
Single	*Insert text*	*Insert text*	*Insert text*
• Ground glass	**NO** routine follow-up	CT at 6 to 12 months to confirm persistence then CT every 2 years until year 5	Certain suspicious nodules smaller than 6 mm consider follow-up at 2 years and 4 years. If solid component develops or growth occurs consider resection (Recommendation 3A and 4A)
• Partly solid	**NO** routine follow-up	CT at 3 to 6 months to confirm persistence, if unchanged lesion with part solid area staying less than 6 mm an annual CT for 5 years	Partly solid nodules are not defined until they are 6 mm or larger. Nodules less than 6 mm usually do NOT require follow-up. Persistent partly solid nodules with solid part 6 mm or larger should be considered as 'highly suspicious." (Recommendation 4A to 4 C)
Multiple	CT at 3-6 months; if lesion is stable, consider CT at 2 years and 4 years	CT at 3 to 6 months, most suspicious nodule guides subsequent management	Multiple ground glass nodules less than 6 mm are usually benign, but consider follow-up at 2 years and 4 years in select individuals at high risk (Recommendation 5A)

Granulomatosis is a chronic condition marked by the formation of numerous masses or nodules of chronically inflamed tissue with granulations that are usually associated with an infective process.

Hemoptysis is the expectoration of blood from some part of the respiratory tract.

Hilar enlargement is the enlargement of the hilar lymph nodes of the lung.

Horner's syndrome is a syndrome marked by sinking in of the eyeball, contraction of the pupil, drooping of the upper eyelid, vasodilation and anhidrosis (abnormal deficiency or absence of

sweating) of the face caused by paralysis of the cervical sympathetic nerve fibers on the affected side.

Indeterminate findings are those that are inconclusive or insufficient for treatment planning.

Interstitial lung disease is a large group of disorders, most of which cause progressive scarring of lung tissue.

Lymphadenopathy refers to the swelling of lymph nodes which can be secondary to bacterial, viral, or fungal infections, autoimmune disease, and malignancy.

Metastases is the spread of a disease-producing agency (such as cancer cells) from the initial or primary site of disease to another part of the body.

Myasthenia gravis is a disease in which antibodies made by the immune system prevent certain nerve-muscle interactions. It causes weakness in the arms and legs, vision problems, and drooping eyelids or head.

Non-smoker or never smoker is a person who has never smoked or who has smoked less than 100 cigarettes in their lifetime

Parenchymal is relating to or affecting the functional tissue of an organ.

Pleural effusion is the oozing of fluid from the blood or lymph into a pleural cavity.

Pneumothorax is a condition in which air or other gas is present in the pleural cavity and which occurs spontaneously as a result of disease or injury of lung tissue, rupture of air-filled pulmonary cysts, or puncture of the chest wall or is induced as a therapeutic measure to collapse the lung.

Polyangiitis is the inflammation of multiple types of vessels, such as small arteries and veins.

Pulmonary Function Test (PFT) is a noninvasive test that show how well the lungs are working.

Recurrence is a new occurrence of something that happened or appeared before.

Staging is a determination of the stage to which a disease, especially a cancer, has progressed.

Staging (cancer) is the process of determining how much cancer is within the body (tumor size) and if it has spread.

Superior vena cava syndrome (SVC) is a condition characterized by elevated venous pressure of the upper extremities with accompanying distension of the affected veins and swelling of the face and neck. Caused by blockage (as by a thrombus or an aneurysm) or compression (as by a tumor) of the superior vena cava.

Surveillance in cancer is the ongoing, timely and systematic collection and analysis of information on new cancer cases, extent of disease, screening tests, treatment, survival and cancer deaths.

Thymoma and thymic carcinoma are diseases in which malignant (cancer) cells form on the outside surface of the thymus.

Tuberculosis (TB) is a potentially serious infectious disease that mainly affects the lungs. The bacteria that cause tuberculosis are spread from person to person through tiny droplets released into the air via coughs and sneezes.

Wegener's Granulomatosis is an uncommon disease of unknown cause that is characterized chiefly by inflammation of small blood vessels and granuloma formation especially in the upper and lower respiratory tracts and kidneys and typically has an onset during the ages of 40 to 65.

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