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2024 Computed Tomography (CT) Chest

Diagnostic Imaging

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Guideline Initiated: 06/30/2019

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Computed Tomography (CT) Chest

NCD 220.1
See also, **NCD 220.1**: Computed Tomography at https://www.cms.gov/medicare-coverage-database/search.aspx *if applicable to individual's healthplan membership*.

NCD 210.14
See also, **NCD 210.14**: Lung Cancer Screening with Low Dose Computed Tomography (LDCT) at https://www.cms.gov/medicare-coverage-database/search.aspx *if applicable to individual's healthplan membership*.

CT General Contraindications

Computed tomography (CT) may be contraindicated for **ANY** of the following: [2] [41]

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

CT Chest Contraindications

Computerized tomography (CT) of the chest may be contraindicated for **ANY** of the following: [8] [5]

- Lung nodule monitoring for nodule(s) size less than 6 mm and low-risk for lung cancer[1]. [40]
- Hemodynamic instability (eg, abnormal laboratory values, blood pressure uncontrolled, renal failure)
- Safety concern with ability to tolerate procedure (eg, contrast allergy, comorbid lung disease or injury makes lying in prone position intolerable).

Preamble: Pediatric Diagnostic Imaging

[1]Fleischner Criteria recommendations for nodule(s) sized less than 6 mm are that CT may be appropriate if nodules are in the upper lobe, with suspicious morphology, or when high-risk for lung cancer. [40]

HealthHelp's clinical guidelines for the Diagnostic Imaging program, are intended to apply to both adults and pediatrics (21 years of age or younger), unless otherwise specified within the criteria.

CT Chest Guideline

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

1. Cancer is suspected or known for **ANY** of the following: (*__NOTE__: for lung cancer screening with low-dose CT (LDCT), see the CT: Low Dose CT (LDCT) for Lung Cancer Screening Guideline)
    a. Cancer is known and **ANY** of the following:
        i. Active treatment within the past 12 months
        ii. Recurrence or metastasis is suspected. [10]
        iii. Staging or restaging evaluation [10] [9]
        iv. Surveillance following the **National Comprehensive Cancer Network (NCCN) Guidelines** recommended schedule (*see* **Surveillance** *section*).
    b. Cancer is suspected when prior imaging is non-diagnostic or indeterminate.
    c. Pulmonary nodules incidentally demonstrated on prior imaging and **ANY** of the following: [11] [28]
        i. **ANY** of the following when **EXCLUDING** low dose CT:
            A. Nodules are detected on non-chest CT and **ANY** of the following:
                I. Nodules are 8 mm or less, follow-up according to Fleischner Criteria (*see* ***Definitions*** *section below*).
                II. Nodules are more than 8 mm **OR** their features are very suspicious.
            B. Nodules are detected on non-screening, non-LDCT of the chest, age is 35 years or older **AND** are aligned with Fleischner Criteria *(see* ***Definitions*** *section below*). (*__NOTE__: ***EXCLUDES*** *lung cancer screening, history of cancer and immunosuppression*) [24]
            C. Nodules are detected on X-rays that are non-diagnostic or indeterminate.
        ii. 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 [3] [32]

2. Chest mass (non-lung parenchymal) and **EITHER** of the following: [1]
   a. Mass or lesion, including lymphadenopathy, when initial imaging is non-diagnostic or indeterminate.
   b. Thymoma screening when myasthenia gravis is known. [36]
3. Chest wall area and **ANY** of the following: [25] [33]
   a. Injuries are suspected (eg, costochondral cartilage, manubriosternal joint injuries, musculotendinous, pectoralis major, sternoclavicular joint), for treatment planning.
   b. Malformations (eg, pectus carinatum, pectus excavatum, scoliosis) are known, with cardiorespiratory symptoms (eg, chest pain, shortness of breath), when treatment is being considered. [14]
   c. Mass or lesion and initial imaging is non-diagnostic or indeterminate. (*__NOTE__: *MRI is preferred*.) [1]
   d. Pain is known **AND** chest and/or rib films are completed. [35]
4. 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. [14]
5. Gestational trophoblastic disease is known, surgery is completed **AND** human chorionic gonadotropin (hCG) is **NOT** declining. [23]
6. Granulomatosis with polyangiitis (Wegener's granulomatosis) [12]
7. 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.)* [39] [21] [16]
      i. Acute COVID-19 is known, respiratory status is worsening **AND** chest X-ray is abnormal, non-diagnostic or indeterminate.
      ii. Long-term/chronic COVID-19 is suspected and **ANY** of the following:
         A. COVID-19 history with hypoxia or impaired lung function.
         B. Fibrosis is known with continued symptoms (eg, cough, fatigue, shortness of breath).
         C. Oxygen saturation (O_2 sat) is low and chest X-ray is completed. (*__NOTE__: *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.)

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

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

i. Abscess, empyema or pleural effusions is visualized on chest X-ray. [30] [44]

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

A. Unimproved with 4 weeks of antibiotic treatment

B. Unresolved at 8 weeks

c. Signs/symptoms of infection are present (eg, elevated inflammatory markers, fever) **AND** X-ray is non-diagnostic or indeterminate. [20]

d. Tuberculosis is suspected or known and prior X-ray is non-diagnostic or indeterminate. [31]

8. Interstitial lung disease/diffuse lung disease is suspected or known, initial X-ray is completed and **ANY** of the following: (*__NOTE__: *X-ray is **NOT** required for chronic disease*) [25] [15] [7]

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

b. Collagen vascular disease is known **AND** interstitial lung disease is suspected.

c. Interstitial disease/fibrosis is known, for monitoring treatment response.

d. Pulmonary function test (PFT) shows a restrictive pattern **OR** signs/symptoms (anorexia, chest discomfort, shortness of breath) are present, after initial X-ray

e. Signs/symptoms (eg, shortness of breath, persistent dyspnea, persistent cough) are **UNRESPONSIVE** to treatment.

9. Multiple endocrine neoplasia 1 (MEN1), for follow-up every 1 to 3 years

10. Peri-procedural planning to guide invasive intervention in the chest area and post-operative follow-up care. [6]

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

a. Chest X-ray is completed and **ANY** of the following:

i. Cough, chronic (at least 8 weeks) and **EITHER** of the following: [27] [19]

A. Bronchiectasis is suspected. [37]

B. **NO** common causes (eg, angiotensin-converting enzyme [ACE] inhibitor discontinuation, asthma, gastroesophageal reflux disease, postnasal drip) are found.

ii. Hemoptysis (bloody sputum) [29]

iii. Pneumothorax is demonstrated on chest X-ray.

b. Vocal cord paralysis on endoscopic exam (CT neck and CT chest are an approvable combination.)

12. Prior CT of chest is non-diagnostic or indeterminate. (*__NOTE__: *One follow-up is appropriate to evaluate for changes since preceding imaging finding[s]. Further surveillance is appropriate when lesion is specified as highly suspicious or there is a change since last exam.*)

13. Pulmonary hypertension is suspected. [34]

14. Thoracic aneurysm is suspected or known and **ANY** of the following: [4] [6]

a. Aortic root or ascending aorta surveillance for **EITHER** of the following:

i. 3.5 cm to 4.4 cm, follow-up annually

ii. 4.5 cm to 5.5 cm or growth rate more than 0.5 cm per year, follow-up every 6 months

b. Descending aorta surveillance for **EITHER** of the following:

i. 4.0 cm to 4.9 cm, follow-up annually

ii. 5.0 cm to 6.0 cm or growth rate greater than 0.5 cm, follow-up every 6 months

c. Genetically mediated (aortic root or ascending aorta, Marfan's syndrome) surveillance for **EITHER** of the following:

i. 3.5 cm to 3.9 cm, follow-up annually

ii. 4.0 cm to 5.0 cm, follow-up every 6 months

d. Initial detection

15. Weight loss occurred and is unintentional and unexplained (more than 10% of body weight in 2 months or more than 5% of body weight in 6 months) **AND** prior imaging is abnormal, non-diagnostic or indeterminate.

Combination CT Abdomen/CT Chest/CT Neck with MUGA/CT Pelvis/MRI Neck

A computed tomography (CT) of the abdomen combined with CT of the chest, CT of the neck with mulitigated acquisition scan (MUGA), CT of the pelvis and magnetic resonance imaging (MRI) of the neck is considered medically appropriate when the documentation demonstrates a known tumor or cancer, for initial staging or baseline evaluation before chemotherapy or radiation treatment.

Combination CT Chest/CT Neck

A computed tomography (CT) of the chest combined with a CT of the neck is considered medically appropriate when the documentation demonstrates **ANY** of the following:

1. Laryngeal nerve lesion recurrence is suspected.
2. Vocal cord paralysis

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*.

2024 Computed Tomography (CT) Low Dose for Lung Cancer (LDCT) Screening

Diagnostic Imaging

Last Review Date: 08/29/2024
Previous Review Date: 04/03/2024
Guideline Initiated: 06/30/2023

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Low Dose Computed Tomography (LDCT) for Lung Cancer Screening

NCD 210.14
See also, **NCD 210.14**: Lung Cancer Screening with Low Dose Computed Tomography (LDCT) at https://www.cms.gov/medicare-coverage-database/search.aspx *if applicable to individual's healthplan membership*.

NCD 220.1
See also, **NCD 220.1**: Computed Tomography at https://www.cms.gov/medicare-coverage-database/search.aspx *if applicable to individual's healthplan membership*.

LDCT for Lung Cancer Screening Guideline

A low-dose computed tomography (LDCT) for lung cancer screening of high risk, asymptomatic (eg, **NO** hemoptysis or chronic productive cough) individuals is considered medically appropriate when the documentation demonstrates that **ANY** of the following criteria are met: [17] [32] [42] [43] [3]

I. **ALL** of the following:

A. Age is 50 to 80 years. (*__NOTE__: *May approve for individuals over the age limit if the individual is a candidate for and willing to undergo curative treatment*.)

B. Current cigarette smoker with 20 pack years or more of smoking **OR** past smoker, with 20 pack years or more of smoking, who quit within the past 15 years.

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

II. Definitive treatment of non-small cell lung cancer is completed, for annual LDCT surveillance, for **EITHER** of the following:

1. Stage I to stage II (treated with surgery, ± chemotherapy); starting at year 2 to 3 of surveillance

2. Stage I to stage II (treated primarily with radiation) **OR** stage III to stage IV, with all sites treated with definitive intent; starting at year 5 of surveillance

III. Nodule seen on initial LDCT, for follow-up per Lung Rads criteria (*See **Definitions** section*) (*__NOTE__: *If multple nodules, the largest and type is used for decision making*.)

IV. Prior LDCT imaging is non-diagnostic or indeterminate. (*__NOTE__: *One follow-up is appropriate to evaluate for changes, since preceding imaging finding[s] and at least 12 months after previous exam, unless significant symptomatic changes have occurred. Further surveillance is appropriate when lesion is specified as highly suspicious or there is a change since last exam.*)

LDCT Procedure Codes

Table 1. LDCT Associated Procedure Codes

CODE	DESCRIPTION
71271	Computed tomography, thorax, low dose for lung cancer screening, without contrast material(s)

CT Low Dose for Lung Cancer (LDCT) Screening Summary of Changes

CT Low Dose for Lung Cancer (LDCT) Screening had the following changes from 2023 to 2024:

- Added the following to keep in line with current research:
  - "Definitive treatment" indication
  - "Nodule seen on initial LDCT" indication
  - "Prior imaging" indication

Chest Cancer Surveillance

Bone Cancer Surveillance

NCCN Bone Cancer Version 2.2024

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

1. Chondrosarcoma surveillance for **ANY** of the following:
   a. Atypical cartilaginous tumor surveillance with **ALL** of the following:
      i. Chest imaging every 6 to 12 months for 2 years, then annually as clinically indicated
      ii. Primary site X-rays and/or cross-sectional imaging magnetic resonance imaging (MRI) (with and without contrast) or computed tomography (CT) (with contrast) every 6 to 12 months for 2 years, then annually as clinically indicated

b. Low-grade, extracompartmental appendicular tumor, grade I axial tumors or high-grade (grade II or III, clear cell or extracompartmental) tumors surveillance with **ALL** of the following:

i. Chest imaging every 3 to 6 months, may include CT at least every 6 months for 5 years, then annually for at least 10 years, as clinically indicated

ii. Primary site X-rays and/or cross-sectional imaging MRI (with and without contrast) or CT (with contrast) as clinically indicated.

2. Chordoma surveillance with **ALL** of the following:

a. Chest imaging every 6 months, with CT included, annually for 5 years, then annually thereafter as clinically indicated

b. Imaging of primary site, timing and modality (eg, MRI ± CT [both with contrast], X-ray) as clinically indicated up to 10 years

3. Ewing Sarcoma after primary treatment completed and stable/improved disease, surveillance with **ALL** of the following:

a. Chest imaging with X-ray or CT: every 2 to 3 months

b. Primary site imaging with MRI ± CT (both with contrast) and X-ray, increase intervals after 24 months and after 5 years, annually as clinically indicated (indefinitely) (*__NOTE__: *Consider PET/CT [head-to-toe] and/or bone scan.*)

4. Giant cell tumor of the bone surveillance with **ALL** of the following:

a. Chest imaging every 6 to 12 months for 4 years, then annually thereafter as clinically indicated

b. Surgical site imaging as clinically indicated (eg, CT and/or MRI, both with contrast, X-ray)

5. Osteosarcoma surveillance with primary site and chest imaging (using same imaging that was done for initial work-up) for **ANY** of the following: (*__NOTE__: *Consider PET/CT [head-to-toe] and/or bone scan*.)

a. Image every 3 months for years 1 and 2

b. Image every 4 months for year 3

c. Image every 6 months for years 4 and 5

d. Image annually for year 6 and thereafter, as clinically indicated

Breast Cancer Surveillance v4.2024

Breast cancer 07/2024

1. Ductal Carcinoma in Situ (DCIS)
    a. DCIS Tis, N0, M0, Encapsulated **OR** solid papillary carcinoma (SPC)
        i. Workup
            A. Diagnostic bilateral mammogram
            B. Breast MRI as indicated
        ii. Primary treatment DCIS Postsurgical treatment Surveillance/follow-up
            A. First mammogram first mammogram 6–12 months, after breast-conservation therapy (category 2B) and annually thereafter
2. Invasive breast cancer
    a. Localized breast cancer: Invasive, non-inflammatory, non-metastatic (M0)
        i. Workup
            A. Imaging:
                I. Diagnostic bilateral mammogram
                II. Ultrasound as necessary
                III. Breast MRI (optional), with special consideration for mammographically occult tumors
        ii. Workup prior to preoperative systemic therapy
            A. Clinical stage: c greater than or equal to T2 **OR** cN+ and M0 **OR** cT1c, cN0 HER2-positive disease **OR** cT1c, cN0 TNBC
                I. Additional workup
                    1. Axillary assessment with exam
                        a. Consider ultrasound
                II. Additional tests to consider as clinically indicated
                    1. Chest diagnostic CT ± contrast
                    2. Abdominal ± pelvic diagnostic CT with contrast **OR** MRI with contrast
                    3. Bone scan or sodium fluoride PET/CT (category 2B)
                    4. FDG PET/CT
                    5. Breast MRI (optional), with special consideration for mammographically occult tumors, if **NOT** previously done

III. Operable disease: Breast and axillary evaluation prior to pre-operative systemic therapy

1. Axillary imaging with ultrasound **OR** MRI (if not previously done)

b. Surveillance/Follow-up

i. Breast imaging:

A. Mammography every 12 months, beginning 6 months or more after completion of BCT

B. Routine imaging of reconstructed breast is not indicated

c. Recurrent/Stage IV (M1) disease

i. Workup

A. Imaging for systemic staging:

I. Chest diagnostic CT ± contrast

II. Abdominal ± pelvic diagnostic CT with contrast **OR** MRI with contrast

III. Brain MRI with contrast if suspicious CNS symptoms

IV. Spine MRI with contrast if back pain or symptoms of cord compression

V. Bone scan **OR** sodium fluoride PET/CT (category 2B)

VI. Useful in certain circumstances: FDG-PET/CT (consider FES-PET/CT for ER-positive disease)

VII. X-rays of symptomatic bones and long and weight-bearing bones abnormal on bone scan

ii. Principles of monitoring metastatic disease

A. CT chest/abdomen/pelvis with contrast

I. Baseline prior to new therapy - yes

II. Chemotherapy - Every 2-4 cycles

III. Endocrine therapy - Every 2-6 months

IV. Restaging if concern for progression of disease - yes

B. Bone scan

I. Baseline prior to new therapy -yes

II. Chemotherapy- Every 4-6 cycles

III. Endocrine therapy - Every 2-6 months

IV. Restaging if concern for progression of disease - Yes

C. PET/CT

I. Baseline prior to new therapy - as clinically indicated

II. Chemotherapy – as clinically indicated

III. Endocrine therapy – as clinically indicated

IV. Restaging if concern for progression of disease – as clinically indicated

D. Brain MRI with contrast

I. Baseline prior to new therapy - as clinically indicated

II. Chemotherapy – as clinically indicated

III. Endocrine therapy – as clinically indicated

IV. Restaging if concern for progression of disease – as clinically indicated

3. Inflammatory breast cancer (IBC)

a. Clinical pathologic diagnosis of IBC

i. Workup- Imaging:

A. Bilateral diagnostic mammogram, ultrasound as necessary

B. Chest diagnostic CT ± contrast

C. Abdomen ± pelvis diagnostic CT with contrast or MRI with contrast

D. Bone scan or FDG- PET/CT

E. Breast MRI (optional)

4. Phyllodes Tumor

a. Workup

i. Ultrasound

ii. Mammogram for patients greater than or equal to 30 years

b. Phyllodes tumor recurrence

i. Locally recurrent breast mass following excision of phyllodes tumor

A. Workup

I. Ultrasound

II. Mammogram

III. Consider chest imaging (x-ray **OR** CT, CT contrast optional)

5. Paget Disease
    a. Workup
        i. Diagnostic bilateral mammogram, ultrasound as necessary
            A. Examination or imaging positive for breast lesion
                I. Core biopsy of breast lesion and full-thickness skin biopsy of involved NAC- Breast negative for cancer and positive NAC Paget
                    1. Consider breast MRI and tissue sampling
            B. Examination and imaging negative for breast lesion
                I. Full-thickness skin biopsy of involved NAC
                    1. NAC biopsy positive for Paget
                        a. Consider breast MRI and tissue sampling
6. Breast cancer during pregnancy
    a. Workup
        i. If indicated:
            A. Chest x-ray (with abdominal shielding)
            B. Abdominal ultrasound to assess liver metastases
            C. Consider non-contrast MRI of spine if indicated to assess for bone metastases

Reference: https://www.nccn.org/professionals/physician_gls/pdf/breast.pdf

Esophageal and Esophagogastric Junction Cancer Surveillance v4.2024

Esophageal and Esophagogastric Junction Cancers NCCN guidelines 07/2024

1. Workup
    a. Upper gastrointestinal (GI) endoscopy and biopsy
    b. Chest/abdomen Computed Tomography (CT)with oral and IV contrast

c. Pelvis CT with contrast as clinically indicated

d. Fludeoxyglucose-18-positron emission tomography (FDG-PET)/CT evaluation (skull base to mid-thigh) if no evidence of M1 disease

e. Endoscopic ultrasound (EUS), if no evidence of M1 unresectable disease

f. Endoscopic resection (ER) is recommended for the accurate staging of early-stage cancers (T1a or T1b). Early-stage cancers can best be diagnosed by ER

g. Bronchoscopy, if tumor is at or above the carina with no evidence of M1 disease

2. Primary treatment for patients who are medically fit with squamous cell carcinoma

   a. Preoperative chemoradiation

      i. Response assessment

         A. FDG-PET/CT

         B. Chest/abdomen CT with oral and IV contrast (**not** required if FDG-PET/CT is done)

         C. Upper GI endoscopy and biopsy (optional if surgery is planned)

   b. Definitive chemoradiation

      i. Response assessment

         A. FDG-PET/CT

         B. Chest/abdomen CT with oral and IV contrast (not required if FDG-PET/CT is done)

         C. Upper GI endoscopy and biopsy

3. Follow-up/Surveillance for squamous cell carcinoma

   a. Imaging studies as clinically indicated

   b. Upper GI endoscopy and biopsy as clinically indicated

   c. Recurrence

      i. Locoregional recurrence: Prior esophagectomy, no prior chemoradiation

         A. Palliative management, Response assessment

            I. Chest/abdomen CT with contrast

      ii. Locoregional recurrence: Prior chemoradiation, no prior esophagectomy

         A. Palliative management, Response assessment

            I. Chest/abdomen CT with contrast

4. Primary treatment for patients who are medically fit with adenocarcinomas
    a. Preoperative chemoradiation (category 1) (preferred)
        i. Response assessment
            A. FDG-PET/CT
            B. Chest/abdomen CT with oral and IV contrast (not required if FDG-PET/CT is done)
            C. Upper GI endoscopy and biopsy (optional if surgery is planned)
    b. Definitive chemoradiation or Neoadjuvant or perioperative ICI (immune checkpoint inhibitor) if tumor is MSI-H/dMMR
        i. Response assessment
            A. FDG-PET/CT
            B. Chest/abdomen CT with oral and IV contrast (not required if FDG-PET/CT is done)
            C. Upper GI endoscopy and biopsy
5. Follow-up/Surveillance for adenocarcinomas
    a. Imaging studies as clinically indicated
    b. Upper GI endoscopy and biopsy as clinically indicated
    c. Recurrence
        i. Locoregional recurrence: Prior esophagectomy, no prior chemoradiation
            A. Palliative management, Response assessment
                I. Chest/abdomen CT with contrast
        ii. Locoregional recurrence: Prior chemoradiation, no prior esophagectomy
            A. Palliative management, Response assessment
                I. Chest/abdomen CT with contrast
6. Principles of surveillance
    a. Tis or T1a with/without BE (Barrett esophagus)
        i. Type of therapy rendered: ER/ablation
        ii. Surveillance recommendations
            A. Once eradication of all neoplasia/high-risk preneoplasia has been achieved, endoscopic surveillance is recommended

B. EGD should be performed every 3 months for the first year, then every 6 months for the second year, and then annually indefinitely

C. Imaging studies as a surveillance tool are not recommended (ESOPH-I)

b. Tis, T1a, N0

i. Type of therapy rendered: Esophagectomy

ii. Surveillance recommendations

A. Although the goal of the resection would be to resect all areas of Tis or T1a and Barrett esophagus (BE), patients with incompletely resected BE should undergo ablation and then endoscopic surveillance as above (Tis/T1a ER/ablation). Otherwise, EGD as needed based on symptoms. Imaging studies as a surveillance tool are not recommended.

c. T1b (N0 on EUS)

i. Type of therapy rendered: ER/ablation

ii. Surveillance recommendations

A. Once eradication of all cancer/HGD has been achieved, endoscopic surveillance is recommended

B. EGD every 3 months for the first year, every 4–6 months for the second year, then annually indefinitely. EUS may be considered in conjunction with EGD. Further therapy will be determined if either BE, cancer, or malignant lymphadenopathy is diagnosed at surveillance

C. Imaging (CT chest/abdomen with oral and IV contrast unless contraindicated) may be considered every 6 months for the first 2 years and annually for up to 5 years

d. T1b or greater, Any N or T1a N+

i. Type of therapy rendered: Esophagectomy ± adjuvant therapy

ii. Surveillance recommendations

A. Imaging (CT chest/abdomen with oral and IV contrast unless contraindicated) should be considered every 6 months for the first 2 years and annually for up to 5 years

B. EGD as needed based on symptoms and radiographic findings

C. Although the goal of the resection would be to resect all areas of T1b and BE, patients with incompletely resected BE should undergo ablation and EGD should be performed every 3 months for the first year, then every 6 months for the second year, and then annually indefinitely

e. Any T, Any N

i. Type of therapy rendered: Neoadjuvant chemotherapy or Chemoradiotherapy followed by esophagectomy (± adjuvant treatment)

ii. Surveillance recommendations

A. Imaging studies (CT chest/abdomen with oral and IV contrast unless contraindicated) should be considered every 6 months for up to 2 years and then annually for up to 5 years

B. EGD as clinically indicated

f. Pretreatment Tumor Classification: T1b–T4, N0–N+,T4b

i. Type of therapy rendered: Definitive chemoradiation (without esophagectomy)

ii. Surveillance recommendations

A. Imaging studies (CT chest/abdomen with oral and IV contrast unless contraindicated) should be considered every 3–6 months for the 2 years and annually for up to 5 years

B. EGD every 3–6 months for the first 2 years then annually for 3 more years

Reference: https://www.nccn.org/professionals/physician_gls/pdf/esophageal.pdf

Mesothelioma: Pleural Surveillance

NCCN Mesothelioma: Pleural Version 1.2024

Mesothelioma: Pleural: No imaging surveillance suggested

Non-Small Cell Lung Cancer Surveillance v7.2024

Non-Small Cell Lung Cancer Diagnostic Imaging Guidelines 06/2024

1. Incidental finding of nodule suspicious for lung cancer

a. Risk assessment

i. Radiologic factors:

A. Fluorodeoxyglucose (FDG) avidity on FDG-Positron Emission Tomography (PET)/Computed Tomography (CT) imaging

I. Incidental finding: Solid nodules(s) on chest CT

1. Low risk: Follow-up

a. Less than 6 mm, No routine follow-up

b. 6–8 mm, CT at 6–12 months, Stable

i. Consider CT at 18–24 months

c. Greater than 8 mm

i. Consider CT at 3 months, FDG-PET/CT, or biopsy

2. High risk: Follow-up

a. Less than 6 mm, CT at 12 months (optional), Stable

i. No routine follow-up

b. 6-8 mm, CT at 6-12 months, Stable

i. Repeat CT at 18–24 months

c. Greater than 8 mm

i. Consider CT at 3 months, FDG-PET/CT, or biopsy

II. Incidental finding: subsolid nodule(s) on chest CT

1. Solitary pure ground-glass nodules: Follow-up

a. Less than 6 mm

i. No routine follow-up

b. Greater than **OR** equal to 6 mm

i. CT at 6–12 months to confirm no growth or development of a solid component, then CT every 2 years until 5 years

2. Solitary part-solid nodules: Follow-up

a. Less than 6 mm, No routine follow-up

b. Greater than **OR** equal to 6 mm

i. CT at 3–6 months to confirm no growth or change in solid component, then annual CT for 5 years

ii. If solid component Greater than **OR** equal to 6 mm, consider PET/CT or biopsy

3. Multiple subsolid nodules: Follow-up

a. Less than 6 mm, CT at 3–6 months

i. If stable, consider CT at 2 and 4 years

b. Greater than **OR** equal to 6 mm

i. CT at 3–6 months

ii. Subsequent management based on most suspicious nodule(s)

2. Lung nodules in asymptomatic, high-risk patients detected during lung cancer screening with Low Dose Computed Tomography (LDCT)

3. Pathologic diagnosis of NSCLC

a. Initial Evaluation

i. CT chest and upper abdomen with contrast, including adrenals

b. Clinical assessment

i. Stage IA (peripheral T1abc, N0), Pretreatment evaluation

A. FDG-PET/CT scan (if not previously done)

ii. Stage IB (peripheral T2a, N0), Stage I (central T1abc–T2a, N0), Stage II (T1abc–2ab, N1; T2b, N0), Stage IIB (T3, N0), Stage IIIA (T3, N1)

A. Pretreatment evaluation

I. FDG-PET/CT scan (if not previously done)

II. Brain MRI with contrast (Stage II, IIIA) (Stage IB [optional])

iii. Stage IIB (T3 invasion, N0), Stage IIIA (T4 extension, N0–1; T3, N1; T4, N0–1)

A. Pretreatment evaluation

I. Brain MRI with contrast

II. MRI with contrast of spine + thoracic inlet for superior sulcus lesions abutting the spine, subclavian vessels, or brachial plexus

III. FDG-PET/CT scan (if not previously done)

iv. Stage IIIA (T1–2, N2), Stage IIIB (T3, N2)

A. Pretreatment evaluation

I. FDG-PET/CT scan (if not previously done)

II. Brain MRI with contrast

v. Separate pulmonary nodule(s) (Stage IIB, IIIA, IV)

A. Pretreatment evaluation

I. Brain MRI with contrast

II. FDG-PET/CT scan (if not previously done)

B. Clinical presentation

I. Suspected multiple lung cancers (based on the presence of biopsy-proven synchronous lesions or history of lung cancer)

1. Chest CT with contrast
2. FDG-PET/CT scan (if not previously done)
3. Brain MRI with contrast

vi. Stage IIIB (T1–2, N3), Stage IIIC (T3, N3)

A. Pretreatment evaluation

I. FDG-PET/CT scan (if not previously done)

II. Brain MRI with contrast

vii. Stage IIIB (T4, N2), Stage IIIC (T4, N3)

A. Pretreatment evaluation

I. FDG-PET/CT scan (if not previously done)

II. Brain MRI with contrast

viii. Stage IVA, M1a: pleural or pericardial effusion

A. Pretreatment evaluation

I. FDG-PET/CT scan (if not previously done)

II. Brain MRI with contrast

ix. Stage IVA, M1b

A. Pretreatment evaluation

I. If not previously done

1. Brain MRI with contrast

2. FDG-PET/CT scan

c. Surveillance after completion of definitive therapy

i. No evidence of clinical/radiographic disease

A. Stage I–II (primary treatment included surgery ± chemotherapy)

I. History and Physical (H&P) and chest CT ± contrast every 6 months for 2–3 years, then H&P and a low-dose non–contrast-enhanced chest CT annually

B. Stage I–II (primary treatment included RT) or stage III or stage IV (oligometastatic with all sites treated with definitive intent)

I. H&P and chest CT ± contrast every 3–6 months for 3 years, then H&P and chest CT ± contrast every 6 months for 2 years, then H&P and a low-dose non–contrast-enhanced chest CT annually

1. Residual or new radiographic abnormalities may require more frequent imaging

C. FDG-PET/CT or brain MRI is not routinely indicated

ii. Recurrence

A. FDG-PET/CT

B. Brain MRI with contrast

iii. Recurrence Locoregional recurrence or symptomatic local disease, Therapy for recurrence and metastasis

A. Chest CT with contrast

B. Brain MRI with contrast

C. FDG-PET/CT

Reference: https://www.nccn.org/professionals/physician_gls/pdf/nscl.pdf

Occult Primary Cancer Surveillance

NCCN Occult Primary Cancer Version 2.2024

Occult primary cancer surveillance imaging for long-term surveillance includes diagnostic tests based on symptomatology

Small-Cell Lung Cancer Surveillance v3.2024

Small cell lung cancer Diagnostic imaging guidelines 06/2024

1. Diagnosis: Small cell lung cancer (SCLC) or combined SCLC/non-small cell lung cancer (NSCLC) on biopsy or cytology of primary or metastatic site
    a. Initial Evaluation
        i. Chest/abdomen/pelvis (C/A/P) CT with contrast
        ii. Brain MRI (preferred) or CT with contrast
        iii. FDG-PET/CT scan (skull base to mid-thigh), if needed to clarify extent of disease
    b. Limited stage
        i. Additional workup
            A. Bone imaging (radiographs or MRI) as appropriate if FDG-PET/CT equivocal (consider biopsy if bone imaging is equivocal)
    c. Extensive stage
        i. Primary treatment
            1. Response Assessment
                a. During systemic therapy
                    i. Response assessment by chest/abdomen/pelvis CT with contrast is recommended after every 2-3 cycles of systemic therapy and again at completion of therapy
                b. Brain MRI (preferred) or CT with contrast is recommended to be repeated after every 2 cycles of systemic therapy until brain RT is initiated or systemic therapy is completed, whichever is first (SCL-6). If brain metastases progress while on systemic therapy, it is recommended that brain RT is initiated before completion of systemic therapy.
    d. Response assessment following primary treatment

i. C/A/P CT with contrast
ii. Brain MRI (preferred) or CT with contrast

e. Adjuvant RT
   i. Complete response or partial response
      1. Limited stage
         a. Prophylactic cranial irradiation (PCI) or
         b. Consider MRI brain surveillance
      2. Extensive stage
         a. MRI brain surveillance
            i. Consider PCI
            ii. Consider thoracic RT

f. Primary treatment, Adjuvant RT Surveillance
   i. Complete response or partial response, stable disease
      A. Surveillance CT
      B. Brain MRI (preferred) or CT with contrast every 3–4 months during year 1, then every 6 months afterwards, then as clinically indicated (regardless of PCI status)
      C. FDG-PET/CT is not recommended for routine follow-up unless contrast CT C/A/P is contraindicated

g. Subsequent systemic therapy
   i. Response assessment by C/A/P CT with contrast is recommended after every 2–3 cycles of systemic therapy

Reference: https://www.nccn.org/professionals/physician_gls/pdf/nscl.pdf

Soft Tissue Sarcoma Surveillance

NCCN Soft Tissue Sarcoma Version 1.2024

Soft tissue sarcoma surveillance includes **ANY** of the following: ***NOTE**: *Contrasted imaging is preferred; for long term surveillance to minimize radiation exposure, X-rays or MRI may be substituted.*

1. Desmoid tumor (aggressive fibromatosis) imaging surveillance includes **ANY** of the following:
   a. CT or MRI every 3 to 6 months for 2 to 3 years, then every 6 to 12 months thereafter

b. Ultrasound may be considered for select locations (eg, abdominal wall) for long-term follow-up

2. Retroperitoneal/intra-abdominal, after resection imaging surveillance includes CT or MRI (consider PET/CT) every 3 to 6 months for 2 to 3 years, then every 6 months for the next 2 years, then annually.

3. Stage IA/IB tumor surveillance includes **ALL** of the following:

   a. Chest imaging with CT (+contrast) or MRI (± contrast) as clinically indicated

   b. Magnetic resonance imaging (MRI) at baseline and periodically (frequency based on estimated recurrence)

4. Stage II/III resectable with acceptable functional outcomes surveillance includes **ANY** of the following:

   a. Chest imaging with CT (+contrast) or MRI (± contrast) at end of treatment and periodic imaging of primary site (based on estimated risk of locoregional recurrence)

   b. Chest imaging and imaging of primary site with CT (+contrast) or MRI (± contrast) as clinically indicated

5. Stage II, III or select stage IV (any T, N1, M0), resectable with adverse functional outcomes **OR** unresectable primary disease surveillance imaging includes **ANY** of the following:

   a. Baseline and periodic imaging of primary site as clinically indicated

   b. Chest imaging with CT (+contrast) or MRI (± contrast) as clinically indicated

6. Stage IV synchronous disease imaging surveillance includes **ANY** of the following:

   a. Chest and other known metastatic sites imaging with CT (+contrast) or MRI (± contrast) as clinically indicated

   b. MRI (± contrast) (preferred) and/or CT (+ contrast) at baseline and periodically (frequency based on estimated recurrence)

CT Chest 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

CODE	DESCRIPTION
71271	Computed tomography, thorax, low dose for lung cancer screening, without contrast material(s)

CT Chest Summary of Changes

CT Chest guideline had the following version changes from 2023 to 2024:

- Added the following to keep in line with current evidence:
  - "Active treatment" under "Cancer is known"
  - "Chest wall" indication
  - "Chest X-ray is completed" under "Prior imaging demonstrates"
  - "Collagen vascular disease" under "Interstitial lung disease"
  - "Gestational trophoblastic disease"
  - "Initial detection" under "Thoracic aneurysm"
  - "Multiple endocrine neoplasia 1"
  - "Nodules are detected on non-chest CT" under "Pulmonary nodules"
  - "Nodules are detected on X-ray" under "Pulmonary nodules"
  - "Pulmonary hypertension"
  - "Weight loss is unintentional"
- Removed the following as current evidence does not support the indication:
  - "Age is under 35 years"
  - "Chest X-ray is non-diagnostic or indeterminate" under "Prior imaging demonstrates"
  - "Clinical status includes" under "Cancer is known"
  - "Covid is suspected" under Coronavirus disease"
  - "Failure to respond" under "Cough, chronic"
  - "History of primary cancer" under "Pulmonary nodules"
  - "Immunosuppression" under "Pulmonary nodules"
  - "Malignant pleural effussion" under "Cancer is known"
  - "Mediastinal or hilar mass"
  - "Nodule less than 6 mm
  - "Pneumonia is known"

- "Superior vena cava syndrome" under "Cancer is known"
- "Treatment evaluation" under "Cancer is known"
- "Tracheal/bronchial lesion"

CT Chest Definitions

Abscess is a swollen area within body tissue, containing an accumulation of pus.

American College of Radiology (ACR) Lung-RADS® Assessment Categories

Table 1. Lung-RADS® Assessment Categories Version 2022 [3]

CATEGORY DESCRIPTOR	Lung-RADS SCORE	FINDINGS	MANAGEMENT	MALIGNANCY RISK	POPULATION PREVALENCE (Est.)
Incomplete	0	• 1. Prior CT Chest being located for comparison • 2. Part/All of lungs cannot be evaluated • 3. Findings suggestive of an inflammatory or infectious process	• 1A. Comparison to prior chest CT • 2A. Additional lung cancer screening CT imaging needed • 3A. LDCT follow-up in 1 to 3 months	N/A	1%
Negative	1	• **NO** lung nodules • Nodule(s) with benign features such as complete, central, popcorn or concentric ring calcifications **OR** fat-containing.	Screening with LDCT in 12 months	less than 1%	39%

CATEGORY DESCRIPTOR	Lung-RADS SCORE	FINDINGS	MANAGEMENT	MALIGNANCY RISK	POPULATION PREVALENCE (Est.)
Benign Based on imaging features or indolent behavior	2	• **Airway nodule(s)**: subsegmental at baseline, new or stable • **Category 3 lesion** is stable or decreased in size at 6 month follow-up • **Category 4B lesion** proven to be benign in etiology following appropriate diagnostic workup • **Juxtapoleural nodule(s)**: less than 10 mm (524 mm^3) mean diameter at baseline or new **AND** Solid; smooth margins; and oval, lentiform, or triangular shape • **Non solid nodule(s) (GGN)**: Baseline less than 30 mm (less than 14137 mm^3) **OR** stable or slow growing greater than or equal to 30 mm (greater than or equal to 14137 mm^3) • **Part solid nodule(s)**: baseline less than 6 mm (less than 113 mm^3) • **Solid nodule(s)**: baseline less than 6 mm (less than 113 mm^3) **OR** new less than 4 mm (less than 34 mm^3)	Screening with LDCT in 12 months	less than 1%	45%

CATEGORY DESCRIPTOR	Lung-RADS SCORE	FINDINGS	MANAGEMENT	MALIGNANCY RISK	POPULATION PREVALENCE (Est.)
Probably Benign Based on imaging features or behavior	3	• **Atypical pulmonary cyst**: Growing cyst component (mean diameter) of a thick-walled cyst • **Category 4A lesion** is stable or decreased in size at 3-month follow-up CT (excluding airway nodules) • **Non solid nodule(s) (GGN)**; Baseline or new greater than or equal to 30 mm (greater than or equal to 14137 mm^3) • **Part solid nodule(s)**; Baseline greater than or equal to 6 mm total mean 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 mean diameter (less than 113 mm^3) • **Solid nodule(s)**: baseline greater or equal to 6 mm to less than 8 mm (greater than or equal to 113 mm^3 to less than 268 mm^3) **OR** new 4 mm to less than 6 mm (34 ^{3} mm to less than 113 mm^3)	6 month LDCT	1-2%	9%

CATEGORY DESCRIPTOR	Lung-RADS SCORE	FINDINGS	MANAGEMENT	MALIGNANCY RISK	POPULATION PREVALENCE (Est.)
Suspicious	4A	• **Airway nodule**: segmental or more proximal is stable or growing • **Atypical pulmonary cyst**: Thick-walled **OR** multilocular cyst at baseline **OR** Thin or thick-walled cyst that becomes multilocular • **Part solid nodule(s)**: Baseline greater than or equal to 6 mm (greater than or equal to 113 mm^3) total mean diameter with solid component greater than or equal to 6 mm to less than 8 mm (greater than or equal to 113 mm^3 to less than 268 mm^3) **OR** new or growing less than 4 mm (less than 34 mm^3) solid component • **Solid nodule(s)**: baseline greater than or equal to 8 mm to less than 15 mm (greater than or equal to 268 mm^3 to less than 1767 mm^3) **OR** growing less than 8 mm (less than 268 mm^3) **OR** new 6 mm to less than 8 mm (113 mm^3 to less than 268 mm^3)	• 3 month LDCT • PET/CT may be considered if there is a more than or equal to 8 mm (more than or equal to 268 mm^3) solid nodule or solid component	5-15%	4%

CATEGORY DESCRIPTOR	Lung-RADS SCORE	FINDINGS	MANAGEMENT	MALIGNANCY RISK	POPULATION PREVALENCE (Est.)
Very Suspicious	4B	• **Airway nodule**: segmental or more proximal is stable or growing • **Atypical pulmonary cyst**: Thick-walled cyst with growing wall thickness/nodularity **OR** Growing multilocular cyst (mean diameter) **OR** Multilocular cyst with increased loculation or new/increased opacity (nodular,ground glass, or consolidation) • **Part solid nodule(s)** baseline with a solid component greater than or equal to 8 mm (greater than or equal to 268 mm^3) **OR** new or growing greater than or equal to 4 mm (greater than or equal to 34 mm^3) solid component • **Slow growing solid or part solid nodule**: demonstrates growth over multiplescreening exams • **Solid nodule(s)** Baseline 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)	• Diagnostic chest CT with or without contrast • PET/CT may be considered if there is a less than or equal to 8 mm (less than or equal to 268 mm^3) solid nodule or solid component • Tissue sampling • Referral for furtrher clinical evaluation • Management depends on clinical evaluation, patient preference, and the probability of malignancy	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	Less than 1%
Significant or Potentially Significant	S	**Modifier**: May add to category 0-4 for clinically significant or potentially clinicallysignificant findings unrelated to lung cancer	As appropriate to the specific finding	N/A	10%

Aneurysm refers to weakness in an artery wall, allowing it to abnormally balloon out or widen.
Angiotensin-converting enzyme (ACE) inhibitors are medicines that help relax the veins and arteries to lower blood pressure.
Aortic root is where the aorta and the heart connect.
Asthma is a chronic lung disorder that is marked by recurring episodes of airway obstruction (as from bronchospasm) manifested by labored breathing accompanied especially by wheezing and coughing and by a sense of constriction in the chest, and that is triggered by hyperreactivity to various stimuli (such as allergens or rapid change in air temperature).
Bronchiectasis is a chronic condition where the walls of the bronchi are thickened from inflammation and infection.
Collagen vascular disease is a group of autoimmune conditions that cause chronic inflammation in connective tissues..
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 cross-sectional images or "slices."
Computed tomography angiography (CTA) is a medical test that combines a computed tomography (CT) scan with an injection of a special dye to produce pictures of blood vessels and tissues in a part of the body.
Congenital is a condition or trait present from birth.
COVID-19 is a mild to severe respiratory illness that is caused by a coronavirus, is transmitted chiefly by contact with infectious material (such as respiratory droplets), and is characterized especially by fever, cough, loss of taste or smell, and shortness of breath and may progress to pneumonia and respiratory failure.
Dissection is the abnormal and usually abrupt formation of a tear or separation of the layers inside the wall of an artery.
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.
Empyema is a collection of pus in the space between the lung and the inner surface of the chest wall (pleural space).
Endoscopy is a procedure that uses an endoscope to examine the inside of the body. An endoscope is a thin, tube-like instrument with a light and a lens for viewing. It may also have a tool to remove tissue to be checked under a microscope for signs of disease.
Fibrosis is thickening or scarring of the 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.[2]

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

NODULE SIZE/ TYPE	SIZE smaller than 6 mm (100 mm^3)	SIZE 6 mm (100 mm^3) to 8 mm (250 mm^3)	SIZE larger than 8 mm (250 mm^3)	COMMENTS
Single				
• 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				
• 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. (recommendation 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)

[2]MacMahon H, Naidich DP, Goo JM, Lee KS, Leung ANC, Mayo JR, Mehta AC, Ohno Y, Powell CA, Prokop M, Rubin GD, Schaefer-Prokop CM, Travis WD, Van Schil PE, Bankier AA. Guidelines for Management of Incidental Pulmonary Nodules Detected on CT Images: From the Fleischner Society 2017. Radiology. 2017 Jul;284(1):228-243.

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

NODULE SIZE/TYPE	SIZE smaller than 6 mm (100 mm^3)	SIZE larger than 6 mm (100 mm^3)	COMMENTS
Single			
• 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)

Gastroesophageal reflux disease (GERD) s a common condition in which the stomach contents move up into the esophagus. Reflux becomes a disease when it causes frequent or severe symptoms or injury. Reflux may damage the esophagus, pharynx or respiratory tract.

Gestational trophoblastic cancer is the name given to a group of tumors that form during abnormal pregnancies.

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 infectious process.

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

Hilar is relating to, affecting, or located near a hilum. A hilum is a wedge-shaped area in the middle of each lung. The hilar region is where the bronchi, arteries, veins, and nerves enter and exit the lungs.

Human chorionic gonadotropin (hCG) is a chemical created by trophoblast tissue, tissue typically found in early embryos and which will eventually be part of the placenta. Measuring hCG levels can be helpful in identifying a normal pregnancy, pathologic pregnancy, and can also be useful following an aborted pregnancy.

Immunosuppression refers to stopping the bodily response to an antigen that occurs when lymphocytes identify the antigenic molecule as foreign, then induce the formation of antibodies and lymphocytes capable of reacting, rendering it harmless.

Indeterminate findings 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.
Low dose computed tomography (LDCT) refers to a computerized X-ray imaging procedure in which a three-dimensional image of a body structure is revealed through a series of cross-sectional images or "slices" that uses 1/5 the radiation of a conventional CT. The scan uses a lower dose of radiation because it is designed to evaluate nodules in low-density lung tissue but is less effective in evaluating bones, organs or other tissues.
Lymphadenopathy refers to the swelling of lymph nodes which can be secondary to bacterial, viral, or fungal infections, autoimmune disease, and malignancy.
Marfan syndrome is a disorder of connective tissue inherited as a dominant trait, characterized by abnormal elongation of the long bones and often with ocular and circulatory defects.
Mediastinum is the area in the middle of the chest that separates the lungs.
Metastasis 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.
Multiple endocrine neoplasia type 1 (MEN1) is a rare endocrine tumor syndrome with high penetrance. This syndrome is also known as Wermer syndrome. It primarily causes neoplasia of the parathyroid glands, the anterior pituitary gland, and the neuroendocrine tissue of gastro-entero-pancreatic organ systems.
Myasthenia gravis is a disease that is characterized by progressive weakness and exhaustibility of voluntary muscles without atrophy and is caused by an autoimmune attack on muscle cell receptors which normally bind to acetylcholine released at nerve endings.
Non-diagnostic is a result that does not lead to a confirmed diagnosis.
Non-small cell lung cancer is a group of lung cancers named for the kinds of cells found in the cancer and how the cells look under a microscope. The three main types of non-small cell lung cancer are adenocarcinoma (most common), squamous cell carcinoma, and large cell carcinoma. Non-small cell lung cancer is the most common of the two main types of lung cancer (non-small cell lung cancer and small cell lung cancer).
Oxygen saturation is a measurement of how much oxygen is bound to hemoglobin in the blood. It's also a measure of how well the lungs are working.
Parenchymal the essential and distinctive tissue of an organ or an abnormal growth as distinguished from its supportive framework.
Pectus carinatum (PC) is a chest wall deformity that causes the breastbone and ribs to push outward. It's also known as "pigeon chest". PC occurs when the cartilage between the ribs and sternum overgrows, causing the middle of the chest to stick out. It's most common in adolescent males, and 90% of cases are diagnosed after children are 11 years old.
Pectus excavatum is a medical term that describes a congenital chest wall deformity. It is caused by an abnormal growth of the cartilage that connects the ribs to the breastbone. This

causes the ribs and breastbone to grow inward, forming a dent in the chest. The result is a caved-in or sunken appearance in the chest.

Pediatric approximate ages are defined by the US Department of Health (USDH), the Food and Drug Administration (FDA), and the American Academy of Pediatrics (AAP) as the following:

- Infancy, between birth and 2 years of age
- Childhood, from 2 to 12 years of age
- Adolescence, from 12 to 21 years of age, further defined by the AAP into:
    1. Early (ages 11–14 years)
    2. Middle (ages 15–17 years),
    3. Late (ages 18–21 years)
    4. Older ages may be appropriate for children with special healthcare needs.

Pleural effusion is an exudation 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 shows how well the lungs are working. The tests measure lung volume, capacity, rates of flow, and gas exchange.

Pulmonary hypertension describes when the pressure in the blood vessels leading from the heart to the lungs is too high.

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

Scoliosis is a sideways curvature of the spine that most often is diagnosed in adolescents.

Screening does not diagnose the illness. The goal is early detection and lifestyle changes or surveillance, to reduce the risk of disease, or to detect it early enough to treat it most effectively.

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

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 is a tumor of the thymous, an organ that is of the lymphatic system and is located in the chest, behind the chest bone.

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 characterized by inflammation of small blood vessels and granuloma formation, especially in the upper and lower respiratory tracts and kidneys, that typically has an onset during the ages of 40 to 65 years old.

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