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# 2024 Magnetic Resonance Imaging (MRI) Chest

## *Diagnostic Imaging*

MRI-Chest-HH



**Last Review Date: 10/28/2024**
Previous Review Date: 06/26/2024
Guideline Initiated: 06/30/2019

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# Magnetic Resonance Imaging (MRI) Chest

**NCD 220.2**
*See also*, **NCD 220.2**: Magnetic Resonance Imaging at https://www.cms.gov/medicare-coverage-database/search.aspx *if applicable to individual's healthplan membership*.

## MRI General Contraindications

MRI may be contraindicated for **ANY** of the following:

- Safety, related to clinical status (body mass index exceeds MRI capability, intravascular stents within recent 6 weeks)
- Safety, related to implanted devices (aneurysm clips, cochlear implant, insulin pump, spinal cord stimulator)[1]

***References:*** [13] [4] [10]

## Preamble: Pediatric Diagnostic Imaging

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.

## MRI Chest Guideline

Magnetic resonance imaging (MRI) of the chest is considered medically appropriate when the documentation demonstrates **ANY** of the following:

1. Brachial plexus, mass or trauma, is suspected or known and **ANY** of the following: (*__NOTE__: *Chest MRI is preferred study, but neck and/or shoulder (upper extremity) MRI can be ordered depending on location of injury*.)
    a. Brachial plexus is suspected from electromyography/nerve conduction velocity studies.
    b. Electromyography/nerve conduction velocity studies are non-diagnostic or indeterminate.

[1]Some implanted devices that were once absolute contraindications to a MRI may now be accepted, including if the specific MRI is able to accommodate the device or the device itself is deemed safe for MRI.

c. Mechanism of injury is known.

***References:*** [19] [20]

2. Cancer in the chest is suspected or known, for staging evaluation **AND** CT is **contraindicated or unavailable**.
3. Chest wall evaluation including **ANY** of the following:
   a. Injuries are suspected (eg, costochondral cartilage, manubriosternal joint injuries, musculotendinous, sternoclavicular joint, pectoralis major), for treatment planning.
   b. Mass or lesion evaluation **AND** initial imaging is non-diagnostic or indeterminate.
   c. Pain in the chest area **AND AFTER** chest and/or rib films are completed.

   ***References:*** [1] [17]
4. Congenital malformation is known with **ANY** of the following:
   a. Congenital heart disease **AND** pulmonary hypertension
   b. Malformations are known and symptomatic (eg, chest pain, shortness of breath, wheezing), for treatment planning.
   c. Pulmonary sequestration **AND** CT is **contraindicated or unavailable**.
   d. Thoracic malformation is demonstrated on prior imaging (eg, chest X-ray, echocardiogram, gastrointestinal study **OR** CT is non-diagnostic or indeterminate.)

   ***References:*** [11] [3] [7]
5. Cystic fibrosis complication evaluation (eg, bronchiectasis, mucus plugging, perfusion abnormalities), for treatment planning. **AND** CT is **contraindicated or unavailable**.
   ***Reference:*** [8]
6. Mass (non-lung parenchymal) or lesion (eg, lymphadenopathy) is suspected or known and X-ray or ultrasound is non-diagnostic or indeterminate. (***NOTE**: Chest computed tomography (CT) is indicated for pulmonary nodules.*)
   ***Reference:*** [1]
7. Peri-procedural care to guide invasive chest procedure planning or post-procedural follow-up.
8. Prior MRI chest imaging 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.*)
9. Thymoma (Myasthenia Gravis) is suspected.
   ***References:*** [14] [18] [1]

10. Vascular disease is suspected or known, computed tomography angiography (CTA) **AND** magnetic resonance angiography (MRA) are **contraindicated or unavailable** and **ANY** of the following: (*__NOTE:__ *CTA or MRA is preferred.*)
    a. Aortic dissection is acute or chronic.
    b. Echocardiogram **OR** right heart catheterization is non-diagnostic or indeterminate for etiology of pulmonary hypertension.
    c. Subclavian steal syndrome evaluation when ultrasound is positive, non-diagnostic or indeterminate.
    d. Superior vena cava syndrome (SVC) evaluation
    e. Takayasu's arteritis evaluation
    f. Thoracic outlet syndrome evaluation

***References:*** [15] [16] [2] [9] [22]

## MRI Chest with Xenon XE 129 Gas Blend

Magnetic resonance imaging (MRI) for evaluation of the chest with Xenon XE 129 gas blend is considered medically appropriate for evaluation when the documentation demonstrates **ANY** of the following:

1. Obstructive lung disease (eg, asthma, bronchiolitis obliterans, chronic obstructive pulmonary disease [COPD], cystic fibrosis, interstitial lung disease or pulmonary hypertension) is suspected or known, to further characterize disease burden or to monitor treatment response.
2. Pulmonary embolus (PE) is suspected and breathing difficulties persist, when prior chest CT is negative, non-diagnostic or indeterminate **AND** spirometry is non-diagnostic or indeterminate.

**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*.

# Blood/Bone Marrow Cancers Surveillance section

## Acute Lymphoblastic Leukemia Surveillance

### NCCN Acute Lymphoblastic Leukemia Version 3.2024

Acute lymphoblastic leukemia: No imaging surveillance suggested.

## Acute Myeloid Leukemia Surveillance reuse

### NCCN Acute Myeloid Leukemia Version 2.2025

Blastic plasmacytoid dendritic cell neoplasm surveillance includes a repeat PET/CT for individuals with prior evidence of extramedullary disease.

## Chronic Lymphocytic Leukemia/Small Cell Lymphocytic Lymphoma Surveillance

### NCCN Chronic Lymphocytic Leukemia/Small Cell Lymphocytic Lymphoma Version 2.2025

Chronic lymphocytic leukemia/small cell lymphocytic lymphoma: No imaging surveillance suggested.

## Chronic Myeloid Leukemia Surveillance

### NCCN Chronic Myeloid Leukemia Version 3.2025

Chronic Myeloid Leukemia: No imaging surveillance suggested.

## Hairy Cell Leukemia Surveillance

### NCCN Hairy Cell Leukemia Version 1.2025

Hairy cell leukemia: No imaging surveillance suggested.

## Multiple Myeloma Surveillance

### NCCN Multiple Myeloma Version 1.2025

Multiple myeloma surveillance includes **ANY** of the following:

1. Multiple myeloma, surveillance imaging as clinically indicated with **ANY** of the following:
    a. CT scan, low dose
    b. FDG PET/CT
    c. MRI without contrast, whole-body
2. Smoldering myeloma, surveillance imaging annually (or more often as indicated) with **ANY** of the following:

a. CT scan, low dose

b. FDG PET/CT

c. MRI (without contrast, whole body

## Chest Surveillance section

## Bone Cancer Surveillance

### NCCN Bone Cancer Version 2.2025

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

1. Chondrosarcoma surveillance for **ANY** of the following:
    a. Atypical cartilaginous tumor surveillance with primary site X-rays and/or cross-sectional imaging (CT +contrast, MRI ± 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 (± contrast) or CT (+ 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 + 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 3 months
    b. Primary site imaging with MRI ± CT (both + 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

### NCCN Breast Cancer Version 3.2025

Breast cancer surveillance includes **ANY** of the following[2]: (*__NOTE__: *The waiting period to begin annual surveillance after breast-conserving therapy (BCT) is 6 to 12 months after completing RT.*)

1. Ductal carcinoma in situ includes a mammogram 6 to 12 months after breast conservation therapy (category 2B) or radiation therapy and annually thereafter.

2. Invasive breast cancer surveillance includes a mammogram every 12 months, beginning 6 months or more after completion of BCT. (*__NOTE__: *routine imaging of reconstructed breast is **NOT** indicated*.)

# Esophageal and Esophagogastric Junction Cancer Surveillance

### NCCN Esophageal or Esophagogastric Junction Cancers Version 2.2025

Esophageal and esophagogastric junction cancer surveillance includes **ANY** of the following[3]:

1. Adenocarcinoma, squamous cell carcinoma; imaging studies as clinically indicated

2. Tumor classification is Tis (tumor in situ) or T1a (- Barret's esophagus [BE]), after endoscopic resection or ablation, imaging surveillance includes **ALL** of the following[4]:

a. Upper gastrointestinal endoscopy (EGD) every 3 months for the first year

b. EGD every 6 months for the second year

[2]Routine imaging of reconstructed breast is not indicated.

[3]Routine esophageal/esophagogastic junction cancers are **NOT** recommended for cancer-specific surveillance, for more than 5 years after the end of treatment.

[4]Imaging studies for surveillance are **NOT** recommended.

c. EGD annually thereafter (indefinitely)

3. Tumor classification is Tis, T1a, N0, after esophagectomy, imaging surveillance includes **ALL** of the following[5]:
   a. Upper gastrointestinal endoscopy (EGD) every 3 months for the first year
   b. EGD every 6 months for the second year
   c. EGD annually thereafter (indefinitely)
4. Tumor classification T1b[a] (N0 on ultrasound) after endoscopic resection or ablation, imaging surveillance includes **ALL** of the following:
   a. Computed tomography (CT) chest/abdomen (+ contrast, unless **contraindicated**) may be considered every 6 months for the first 2 years and annually for up to 5 years
   b. EGD every 3 months for the first year, every 4 to 6 months for the second year, then annually thereafter (indefinitely)
5. Tumor classification T1b or greater, any N[a] or T1a N+, imaging surveillance includes esophagectomy performed with or **WITHOUT** adjuvant therapy then surveillance includes **ALL** of the following:
   a. Chest/abdomen CT (+ contrast, unless **contraindicated**) every 6 months for the first 2 years and annually for up to 5 years
   b. EGD as clinically indicated **OR** if **NOT** completely resected BE after ablation: EGD every 3 months for the first year, every 6 months for the second year, then annually indefinitely
6. Tumor classification any T and/or any N, with neoadjuvant chemotherapy **OR** chemoradiotherapy **AND** esophagectomy, with or **WITHOUT** adjuvant treatment, imaging surveillance includes chest/abdomen CT (+ contrast, unless **contraindicated**) every 6 months for up to 2 years, then annually for up to 5 years and EGD as clinically indicated.
7. Tumor classification (pretreatment) N0 to N+, T1b to T4, T4b, with definitive chemoradiation (without esophagectomy), surveillance imaging includes **ALL** of the following:
   a. Chest/abdomen CT (+ contrast unless **contraindicated**) every 3 to 6 months for the first 2 years and annually for up to 5 years
   b. EGD every 3 to 6 months for the first 2 years, then annually for 3 more years

[5]Imaging studies for surveillance are **NOT** recommended.

# Mesothelioma: Pleural Surveillance

### NCCN Mesothelioma: Pleural Version 2.2025

Mesothelioma: Pleural: No imaging surveillance suggested.

# Non-Small Cell Lung Cancer Surveillance

### NCCN Non-Small Cell Lung Cancer Version 3.2025

Non-small cell lung cancer imaging surveillance includes **ANY** of the following:

1. Stage I to stage II (primary treatment includes radiation therapy) **OR** stage III or stage IV (oligometastatic with all sites treated with definitive intent); follow-up with chest CT (± contrast) every 3 to 6 months for 3 years, followed by every 6 months for 2 years, then low-dose (- contrast) chest CT annually
2. Stage I to stage II (primary treatment includes surgery ± chemotherapy); follow-up with chest CT (± contrast) every 6 months for 2 to 3 years, then low-dose (- contrast) chest CT annually

# Occult Primary Cancer Surveillance

### NCCN Occult Primary Cancer Version 2.2025

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

# Small Cell Lung Cancer Surveillance

### NCCN Small Cell Lung Cancer Version 4.2025

Small cell lung cancer surveillance includes **ANY** of the following:

1. Brain MRI (preferred) or CT (+ contrast) every 3 to 4 months for 1 year, then every 6 months for year 2, then as clinically indicated (regardless of PCI status).
2. Chest CT (± abdomen/pelvis CT) every 2 to 6 months (more frequently in years 1 and 2, less frequently thereafter)
3. FDG PET/CT is **NOT** recommended for routine follow-up unless CT or MRI (+contrast) is **contraindicated or unavailable**.

# Soft Tissue Sarcoma Surveillance

### NCCN Soft Tissue Sarcoma Version 5.2024

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. Atypical lipomatous tumor and well-differentiated liposarcoma imaging surveillance includes the primary site, based on loation and estimated risk of locoregional recurrence.
2. 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
3. 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.
4. 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)
5. Stage II/III/IV resectable with acceptable functional outcomes surveillance includes **ANY** of the following:
    a. Chest imaging and imaging of primary site with CT (+contrast) or MRI (± contrast) as clinically indicated
    b. Imaging of primary site at end of treatment and periodic imaging of primary site (based on estimated risk of locoregional recurrence)
6. 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
7. 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)

## MRI Chest Procedure Codes

**Table 1. MRI Chest Associated Procedure Codes**

| CODE | DESCRIPTION |
|---|---|
| 71550 | Magnetic resonance (eg, proton) imaging, chest (eg, for evaluation of hilar and mediastinal lymphadenopathy); without contrast material(s) |
| 71551 | Magnetic resonance (eg, proton) imaging, chest (eg, for evaluation of hilar and mediastinal lymphadenopathy); with contrast material(s) |
| 71552 | Magnetic resonance (eg, proton) imaging, chest (eg, for evaluation of hilar and mediastinal lymphadenopathy); without contrast material(s), followed by contrast material(s) and further sequences |
| 0649T | Quantitative magnetic resonance for analysis of tissue composition (eg, fat, iron, water content), including multiparametric data acquisition, data preparation and transmission, interpretation and report, obtained with diagnostic MRI examination of the same anatomy (eg, organ, gland, tissue, target structure); single organ |
| C9791 | Magnetic resonance imaging with inhaled hyperpolarized xenon-129 contrast agent, chest, including preparation and administration of agent |

## MRI Chest Summary of Changes

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

- Added the following to keep in line with current evidence:
  - "Chest wall" indication
  - "Malformations" indication
  - "Prior imaging is non-diagnostic **OR** indeterminate" indication
  - "Thoracic malformation" indication
  - "Xenon gas" indications
- Removed the following as current research does not cover the indication:
  - Cancer recurrence **AND** metastasis, surveillance and screening indications
  - "Muscle **OR** tendon tear" indication
- Mid-cycle update: added Pediatric Preamble and pediatric indications

# MRI Chest Definitions

**Brachial plexus** is a network of nerves that connects the spinal cord to the shoulder, arm, and hand.

**Computed tomography (CT)** is an imaging test that uses X-rays to computer analysis to generate cross sectional images of the internal structures of the body that can be displayed in multiple planes.

**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.
**Cystic fibrosis** is a common hereditary disease in which exocrine (secretory) glands produce abnormally thick mucus. This mucus can cause problems in digestion, breathing and body cooling.
**Dissection** refers to the separation of the layers within the wall of an artery, most commonly the aorta, due to a tear in the intimal layer, leading to the formation of a false lumen.
**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.
**Electromyogram (EMG)** is a diagnostic test that measures the electrical activity of muscles at rest and during contraction using a needle electrode inserted into the muscle.
**Indeterminate** findings are inconclusive or insufficient for treatment planning.
**Lymphadenopathy** refers to the swelling of lymph nodes which can be secondary to bacterial, viral or fungal infections, autoimmune disease and malignancy.
**Magnetic resonance angiogram (MRA)** is a test that uses a magnetic field and pulses of radio wave energy to provide images of blood vessels inside the body, allowing for evaluation of blood flow and blood vessel wall condition. MRA is used to look for aneurysms, clots, tears in the aorta, arteriovenous malformations and stenosis caused by plaque in the carotid arteries (neck) or blood vessels leading to the lungs, kidneys or legs.
**Magnetic resonance imaging (MRI)** is a non-invasive diagnostic technique that produces computerized images of internal body tissues and is based on nuclear magnetic resonance of atoms within the body induced by the application of radio waves.
**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.
**Nerve conduction study (NCS)** is a test that measures how fast an electrical impulse moves through the nerve and can identify nerve damage.
**Non-diagnostic** is a result that does not lead to a confirmed diagnosis.
**Parenchymal** the essential and distinctive tissue of an organ or an abnormal growth as distinguished from its supportive framework.
**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.

**Pulmonary hypertension** is a chronic, progressive condition characterized by elevated pressure in the pulmonary arteries, defined as a mean pulmonary arterial pressure greater than 20 mm Hg at rest.

**Pulmonary sequestration vascular syndrome** is a condition in which a segment or lobe of dysplastic lung tissue exists with no communication with the rest of the tracheobronchial tree and receives an anomalous systemic vascular supply, separate from the rest of the lung. It is, therefore, a nonfunctional tissue.

**Screening** is the systematic application of a test or inquiry to identify individuals at sufficient risk of a specific disorder to warrant further investigation or direct preventive action, among persons who have not sought medical attention for symptoms of that disorder.

**Subclavian steal syndrome (Vertebral artery flow reversal)** is a phenomenon causing retrograde flow in an ipsilateral vertebral artery due to stenosis or occlusion of the subclavian artery, proximal to the origin of the vertebral artery.

**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.

**Takayasu's arteritis** is a chronic inflammatory disease especially of the aorta and its major branches (the brachiocephalic artery and left common carotid artery) that result in progressive stenosis, occlusion and aneurysm formation marked by diminution or loss of the pulse (as in the arm) and ischemic symptoms.

**Thoracic outlet syndrome** is a condition caused by the compression of neurovascular structures as they pass through the thoracic outlet, leading to symptoms such as pain, paresthesia, and weakness in the upper extremity.

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

**Ultrasound** is the diagnostic or therapeutic use of ultrasound and especially a noninvasive technique involving the formation of images used for the examination and measurement of internal body structures and the detection of bodily abnormalities.

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