American College of Radiology
ACR Appropriateness Criteria®

Clinical Condition: **Screening for Pulmonary Metastases**

Variant 1: **Primary malignancy: bone and soft-tissue sarcoma.**

Radiologic Procedure	Rating	Comments	RRL*
CT chest without IV contrast	9	Perform this procedure for an initial evaluation or surveillance.	☢ ☢ ☢
X-ray chest	9	This procedure is appropriate if performed as a baseline.	☢
CT chest with IV contrast	5		☢ ☢ ☢
FDG-PET/CT whole body	5		☢ ☢ ☢ ☢
CT chest without and with IV contrast	2		☢ ☢ ☢
MRI chest without IV contrast	2		O
MRI chest without and with IV contrast	1		O
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Variant 2: **Primary malignancy: renal cell carcinoma.**

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	8		☢
CT chest with IV contrast	8		☢ ☢ ☢
CT chest without IV contrast	7	Use of this procedure depends on the stage of the disease.	☢ ☢ ☢
MRI chest without and with IV contrast	5	Use of this procedure depends on the soft-tissue involvement.	O
MRI chest without IV contrast	3	Use of this procedure depends on the soft-tissue involvement.	O
CT chest without and with IV contrast	1		☢ ☢ ☢
FDG-PET/CT whole body	1		☢ ☢ ☢ ☢
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			*Relative Radiation Level

Clinical Condition: **Screening for Pulmonary Metastases**

Variant 3: **Primary malignancy: testicular cancer.**

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	8		☢
CT chest without IV contrast	7	This procedure is recommended if abdominal disease is present.	☢ ☢ ☢
CT chest with IV contrast	3		☢ ☢ ☢
FDG-PET/CT whole body	3		☢ ☢ ☢ ☢
MRI chest without IV contrast	2		O
MRI chest without and with IV contrast	2		O
CT chest without and with IV contrast	1		☢ ☢ ☢
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			***Relative Radiation Level**

Variant 4: **Primary malignancy: melanoma.**

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	9	This procedure is appropriate if performed as a baseline.	☢
CT chest without IV contrast	8	Perform this procedure for an initial evaluation or surveillance.	☢ ☢ ☢
CT chest with IV contrast	5		☢ ☢ ☢
MRI chest without and with IV contrast	5	Perform this procedure if there is a concern for soft tissue or chest wall invasion.	O
FDG-PET/CT whole body	5		☢ ☢ ☢ ☢
MRI chest without IV contrast	2		O
CT chest without and with IV contrast	1		☢ ☢ ☢
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			***Relative Radiation Level**

Variant 5: **Primary malignancy: head and neck carcinoma.**

Radiologic Procedure	Rating	Comments	RRL*
X-ray chest	9	This procedure is appropriate if performed as a baseline.	☢
CT chest without IV contrast	9	Perform this procedure for an initial evaluation or surveillance.	☢ ☢ ☢
CT chest with IV contrast	6		☢ ☢ ☢
FDG-PET/CT whole body	5		☢ ☢ ☢ ☢
MRI chest without and with IV contrast	5	Perform this procedure if there is a concern for soft tissue or chest wall invasion.	O
CT chest without and with IV contrast	2		☢ ☢ ☢
MRI chest without IV contrast	2		O
Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			***Relative Radiation Level**

SCREENING FOR PULMONARY METASTASES

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Summary of Literature Review

Introduction/Background

The incidence of pulmonary metastatic disease in patients who have died of an extrathoracic malignancy (ETM) ranges from 20% to 54% [1,2]. The indications for chest radiography (CXR), computed tomography (CT), magnetic resonance imaging (MRI), scintigraphic imaging, and positron emission tomography/computed tomography (PET/CT) have been discussed in the literature. There have been improvements in CT imaging quality and scan time as well as advances in nuclear medicine and MRI. In particular, there has been increased use of PET/CT for evaluating patients with metastatic pulmonary disease, particularly in those with colorectal, melanoma, and primary head and neck tumors.

In determining the specific imaging modality to use, authors have concluded that several factors should be considered: 1) the biological behavior of the tumor, 2) the sensitivity and specificity of the imaging modality, 3) the radiation dose, and 4) cost-effectiveness. The relative indications for CXR, CT, MRI, and scintigraphy have been evaluated for various primary malignancies. Detection of pulmonary nodules, lymphangitic spread, endobronchial lesions, intravascular metastatic pulmonary disease, nodal disease, and chest wall lesions have all been discussed in the literature.

Chest Radiography

It is generally accepted that CXR, with posteroanterior and lateral views, should be the initial imaging evaluation for patients who have no known or suspected thoracic metastatic disease [1-3]. If CXR demonstrates obvious multiple pulmonary nodules, further imaging beyond follow-up CXR may not be indicated, unless a biopsy is planned or unless precise quantification of the disease is required in the preoperative evaluation for metastasectomy or assessment of the response to systemic radiation therapy or chemotherapy.

Some authors have questioned the role of routine CXRs. In one study, a review of routine CXRs performed to evaluate patients with breast cancer revealed that <0.93% of these radiographs demonstrated previously undiagnosed pulmonary metastases [4]. This conclusion was corroborated in a more recent, prospective, randomized trial performed on 1,235 patients who had melanoma and were followed for an average of 74 months following the initial surgical treatment. Although nearly 17% of patients in the study had recurrent disease, CXRs showed no disease recurrence in 88% of the trial patients. Approximately 88% of CXRs were performed when patients were free of thoracic recurrence, and approximately 12% were obtained when pulmonary metastases were present. CXR detected only 38 of 438 (8%) of these metastases, equivalent to a true-positive rate of 0.9% for the entire set of radiographs. Among these 38 true-positive results, only 3 CXRs (0.07%) of 4,218 were associated with isolated pulmonary metastases that were amenable to pulmonary resection [5]. In another study, 876 asymptomatic patients with localized cutaneous (stage I or intermediate-thickness stage II) melanoma had initial staging CXRs; 130 (15%) had "suspicious" findings, but on further follow-up only 1 (0.1%) patient had a true-positive study for pulmonary metastasis [6]. Another study analyzed the overall cost-effectiveness of CXRs in the life-long screening of patients with intermediate-thickness cutaneous melanoma. It was concluded that significant cost savings are possible by decreasing the frequency of screening in the first 2 years and limiting screening to the

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first 5–10 years after diagnosis [7]. Yet another study involving 23 patients with untreated primary head and neck tumors demonstrated that CXR alone had a lower sensitivity for detecting pulmonary metastatic disease (67%) compared to PET/CT (100%) [8]. Patients with a higher probability of pulmonary metastatic disease should be screened more frequently or with a more sensitive imaging modality, such as CT. Additionally, it has been argued that the high rate of false-positive findings from CXR alone can cause increased anxiety in patients who have no known metastasis [9].

Computed Tomography

Compared with CXR, CT is much more sensitive for detecting pulmonary nodules because of its spatial resolution and lack of superimposition [1-3]. Other abnormalities, such as lymphadenopathy, pleural involvement, chest wall lesions, endobronchial lesions, intravascular pulmonary involvement, or incidental findings in the upper abdomen, can also be revealed or better demonstrated with CT. In patients with known ETM, chest CT is recommended if the initial CXR reveals an apparent solitary pulmonary nodule or an equivocal finding. If the CXR is negative, CT is recommended if the underlying ETM has a high propensity for dissemination to the lungs, such as breast, melanoma, renal cell, colon, and bladder carcinoma. As noted in the preceding section, discovering multiple pulmonary nodules based on CXR warrants further evaluation with CT, especially if biopsy, ablative therapy, or definitive treatment by metastasectomy or systemic therapy is planned [10].

It is now well known that helical CT scanning is more sensitive than conventional CT and can detect a significantly larger number of nodules as well as a larger number of small nodules <5 mm in diameter [11]. With further advances in technology, it is likely that the sensitivity of CT scanning will continue to improve, as its radiation dose continues to be lowered. Nevertheless, a few studies that correlated CT findings with surgical or pathologic findings offer some sobering results. In a retrospective review, McCormack et al [12] found that CT underestimated the surgical pathologic findings in 25% of cases. More thorough detection of metastatic nodules is possible at thoracotomy by manual palpation of the entire collapsed lung [13,14].

It has been suggested that CT's greater sensitivity for detecting pulmonary nodules, as compared with CXR, is associated with diminished specificity [2]. Nevertheless, there is increased recognition that even small pulmonary nodules can represent malignant lesions. In a series of patients undergoing video-assisted thoracoscopic resection of small (≤1 cm) pulmonary nodules, 28 malignant lesions were diagnosed in 27 patients who had a history of previous malignancy; 23 lesions (84%) were malignant, including 15 metastases (54%) and 8 new lung carcinomas (29%), and 5 nodules (18%) were benign [15]. The specificity of CT in any given series depends on several variables: 1) the propensity of the underlying ETM to disseminate to the lungs, 2) the stage of the ETM, 3) selection factors for the study population, and 4) patient age, smoking history, history of prior treatment for the ETM, and the likelihood of prior granulomatous disease. In addition, it has been reported that intraoperative palpation of the lungs is still warranted for detecting metastatic lesions that were not detected any by spiral CT. In 1 study, 22% (9 of 41) more malignant nodules were found intraoperatively than those detected by helical CT [16].

Originating from applications for mammography, computer-aided detection (CAD) for pulmonary metastatic disease has been adapted to chest CT. Although these programs are in their developmental phases, it has been suggested that CAD can be used as a second look after the radiologist has completed reviewing the study [17]. Nevertheless, these applications require more development and can only be used when there is limited breathing artifact and stable lung expansion. A recent study demonstrated that CAD detected 82.4% of known pulmonary nodules under ideal conditions [17]. CAD is still in the investigative phase and has limited use in evaluating patients with pulmonary metastatic disease.

The use of CT for evaluating intravascular pulmonary metastatic disease has also been described. Hepatic, renal, gastric, breast as well as sarcomas, have been reported to embolize to the pulmonary vasculature [18]. Differentiation between metastatic disease and thromboembolic disease can be difficult. Ting et al [18] described morphological features, such as tubular and beaded appearance, to help distinguish between the two. With advances in CT resolution, such intravascular metastatic disease will be more readily detectable [19].

More recently, it has been suggested that attenuation measurements of pulmonary nodules can help determine whether a nodule represents a metastasis or a primary lung carcinoma. Jung et al [20] evaluated 39 pulmonary nodules in 36 patients who had pulmonary metastases from renal cell carcinoma (RCC) and 30 pulmonary nodules in 42 patients who had primary lung adenocarcinoma. They discovered that the mean attenuation value of metastatic pulmonary nodules from RCC was greater than that for primary lung carcinoma nodules. Thus,

attenuation measurements in patients with untreated disease can help the radiologist determine the origin of a nodule in patients who have more than 1 primary cancer. Nevertheless, biopsy remains the gold standard.

CT can be used not only to detect pulmonary metastatic disease but also to determine the response to therapy. Patients can be evaluated by follow-up CT to determine if the nodule size is decreasing or if there are any new pulmonary metastases [21]. CT volumetry has been discussed in the literature and could prove to be a more accurate method for determining the response to therapy, especially when there are small changes in tumor size [22].

Recommendations for using CT to detect pulmonary metastases must be tailored for each ETM. Even for an individual ETM, however, it may still be difficult to arrive at a consensus for the optimal application of CT. Some guidelines for chest CT surveillance of a few common primary tumors are summarized as follows, based on a review of the recent literature.

Bone and Soft-Tissue Sarcomas

Despite multiagent chemotherapy regimens and radical resection of the primary tumor, a large number of patients with bone and soft-tissue sarcomas will have a relapse, manifested by dissemination of the disease to the lungs as the first site of metastasis [23]. One review of the published literature for osteosarcoma recommended aggressive surgical resection of synchronous and metachronous pulmonary metastases, even when multiple thoracotomies were required [24]. The authors identified CT as the preferred screening method for such metastases, although up to twice as many lesions could be found at thoracotomy.

A more recent study on pediatric bone and soft-tissue sarcomas discussed the importance of recognizing that imaging features with CT are important for determining the presence of metastatic disease. In this review of 210 patients, 41.7% who underwent biopsy or resection of a pulmonary nodule had metastasis. Those with 3 or more nodules, bilateral distribution of the disease, and/or large nodule size were more likely to have metastasis [25]. This study, performed at St. Jude Children's Research Hospital, stressed the importance of low-dose chest CT as the initial screening modality for children with bone and soft-tissue sarcomas because of its high sensitivity for detecting pulmonary nodules, the size and distribution of which are associated with outcome [25].

The presence of nodules, regardless of their size, has an impact on long-term survival in patients with soft-tissue sarcomas. In a recent study, 331 sarcoma patients were followed. Of these, 71 had small, indeterminate nodules detected by CT, and 28% developed pulmonary metastatic disease, most (90%) in the area of the original indeterminate nodule [26].

In a study of the 5-year survival rate after pulmonary metastasectomy for a soft-tissue sarcoma, other authors used multivariate analysis to determine that the number of nodules detected by preoperative CT has prognostic value. They recommended routine use of CT [27]. Another study of patients who had high-grade soft-tissue sarcomas and were undergoing metastasectomy described a specific protocol for follow-up: routine CXRs and chest CT for the first 5 years, with a radiograph obtained at each visit, and chest CT performed every 3 months for the first year, every 4 months for the second year, every 6 months for the third year, and once yearly thereafter [28].

Renal Cell Carcinoma

Pulmonary metastases from RCC are seen in 25%–30% of patients at the time of the initial diagnosis and in 30%–50% of patients at a later time [29]. In RCC patients with metastases to the lungs, surgical resection may provide the only effective treatment, in light of the fact that the 5-year survival rate is <5% for stage IV disease [30]. Based on personal experience and a literature review, Lim and Carter [30] recommended posteroanterior and lateral CXRs as an initial test. In patients with low-stage (T1) disease and a normal CXR, CT is not necessary; if the CXR demonstrates multiple nodules, CT is not necessary, unless it is required as part of the protocol for systemic therapy. The authors proposed that indications for chest CT should include: 1) a solitary pulmonary nodule on the CXR, 2) symptoms suggestive of endobronchial metastasis, 3) extensive regional disease, and 4) the presence of other extrathoracic metastases that might be amenable to resection. Other authors have advocated a more aggressive approach, using biannual CXRs and chest CT examinations. They recommended that such surveillance be life-long, in view of the possibility of delayed, recurrent pulmonary metastases [29].

Testicular Cancer

See and Hoxie [31] suggested that the risk of intrathoracic metastases correlates with abnormal findings from an abdominal CT. In their study, 74 of 155 patients with seminomatous or nonseminomatous testicular germ cell tumors had CXRs and chest CT scans concurrently at the time of initial staging. Their findings were compared

with those of patients who had negative or abnormal abdominal CT scans. For the group of 42 patients with negative abdominal CT scans, chest CT results did not increase the yield for diagnosing metastases, as compared with the CXR; a 2.3% chest CT false-positive rate in the patients' workup was cited as a potential source of morbidity. For the group of 32 patients with abnormal abdominal CT, however, chest CT detected pulmonary metastases that were not seen with CXR in 12.5% of cases. Therefore, for the initial staging workup, the authors recommended CXRs for patients with a negative abdominal CT and a chest CT for patients with an abnormal abdominal CT.

Melanoma

Recommendations for chest CT scanning in melanoma appear to be largely determined by the stage of the primary tumor. Buzaid et al [32] retrospectively assessed the role of CT (neck, chest, abdomen, and pelvis) in detecting occult distant metastases in 89 asymptomatic patients with local-regional melanoma who had normal CXRs and serum lactate dehydrogenase levels. In only 1 case did chest CT detect evidence of disease that was not seen with CXR. The authors concluded that chest CT may not be indicated. A large retrospective study assessing the role of CT (head, chest, abdomen, pelvis) in asymptomatic patients with stage III melanoma suggested that chest CT should be used selectively in patients with cervical adenopathy [33]. In a review of the role of surgical resection for melanoma metastatic to the lung, Ollila and Morton [34] emphasized that metastasectomy may be the only potentially curative treatment modality in stage IV disease. Although they noted that metastasectomy is believed to improve survival in patients who have 1 or 2 pulmonary nodules, they cautioned that the number of lesions should not be an absolute contraindication to surgery. They recommended that a preoperative evaluation of patients for pulmonary metastasectomy should include not only chest CT to determine the number of nodules but also whole-body imaging to detect or exclude other extrapulmonary stage IV disease.

Head and Neck Carcinoma

Although the lungs are the most common site of distant metastases in squamous cell carcinoma (SCC) of the head and neck, there is no clear consensus as to the optimal imaging modality for surveillance [35]. An issue of particular importance in this population is the known increased incidence (15%–30%) of second primary malignancies, including neck, lung, and esophageal cancers [36]. In 1 retrospective study, only 2 of 57 patients with head and neck SCC (stage not specified) had malignancy in the form of synchronous tumors identified by a routine chest CT; these lesions were also evident on CXRs [37]. Other authors, however, have observed that chest CT demonstrates a high number of malignancies, including both pulmonary metastases and additional thoracic malignancies, in patients with advanced SCC [36]. Among 93 patients who underwent chest CT at the time of initial presentation, a routine follow-up or local-regional neck recurrence, revealed that 24 (25.8%) had thoracic malignancy, including 14 (15%) with pulmonary metastases, 5 (5.4%) with lung carcinoma, and 1 (1.1%) with esophageal carcinoma. Except for 2 patients with initial stage I or II disease and local-regional neck recurrence, all had stage III or IV disease.

Nevertheless, a more recent retrospective study performed in Austria demonstrated distant metastatic disease in 9 of 163 (5.52%) patients with known head and neck SCC. All patients had a screening chest CT that demonstrated pulmonary metastatic disease. Many had metastases to other organs as well. The authors concluded that chest CT was the most important screening examination for evaluating metastatic disease in these patients [38].

Magnetic Resonance Imaging

MRI has long been considered an alternative to CT for detecting pulmonary metastases, primarily because it avoids exposure to ionizing radiation, an issue of particular concern with pediatric patients undergoing serial surveillance examinations. Nevertheless, it is generally accepted that MRI does not currently have a role in screening patients for pulmonary metastases [3,39]. Motion-related artifacts, a lower spatial resolution than CT, and an inability to detect calcification within lesions are limitations of MRI [39]. A study comparing turbo-spin echo MRI with spiral CT as a gold standard demonstrated MRI's lower sensitivity in detecting pulmonary metastases. For 340 metastases identified by CT, MRI overall sensitivity was 84%, but for nodules <5 mm in diameter, its sensitivity was only 36% [39]. A more recent study comparing the nodule detection accuracy of various MRI sequences supported these results. The optimal sequence (triggered short-time inversion recovery) had a 72% sensitivity for nodule detection. These nodules were all previously identified by CT and were >5 mm in diameter [40].

Scintigraphy

The use of scintigraphy in conjunction with tumor-marking agents could offer significant incremental information, enhancing the specificity of diagnosis, as compared with conventional morphologic imaging techniques. There are preliminary reports of results for a variety of scintigraphic techniques being applied to a number of different malignancies, but the ultimate role of such imaging has yet to be established.

Imaging with fluorine-18-2-fluoro-2-deoxy-D-glucose positron emission tomography (FDG-PET) is being used increasingly in staging patients with bronchogenic carcinoma to detect any nodal involvement and check for possible distant metastases. Its role in detecting pulmonary metastases from known ETM is well established. One study demonstrated the use of FDG-PET in detecting occult extrapulmonary disease in patients who had pulmonary metastatic melanoma [41]. In particular, it was determined to be useful in excluding extrapulmonary metastatic melanoma prior to surgery; the authors concluded that PET imaging should be performed prior to metastasectomy in patients with pulmonary metastatic melanoma [41]. Use of FDG-PET in staging a melanoma has also been investigated, but it is acknowledged that this technique has limited sensitivity for small pulmonary nodules and that false-positive results can occur because of inflammatory processes [42]. The role of FDG-PET in staging head and neck tumors has also been discussed. FDG-PET is helpful at times in detecting pulmonary metastasis; however, in a study of 86 patients, thoracic malignancy was suspected in 23 patients (27%), based on uptake criteria. Of these suspicious lesions, 83% were found to be benign [43]. The use of FDG-PET alone does not negate the need for helical CT in evaluating pulmonary metastatic disease. A negative FDG-PET examination cannot exclude metastatic disease [44]. This is thought to be due to small metastatic nodules.

FDG-PET/CT, which has largely replaced FDG-PET, versus CT alone for evaluating pulmonary metastatic disease has been discussed in the literature. PET/CT is increasingly used for evaluating patients with primary head and neck tumors. In a study of 24 consecutive patients, there was no statistically significant difference between PET/CT and CT alone [45]. However, this study was limited in that it only looked at nodules >1 cm in diameter. Currently, helical CT is more sensitive in evaluating pulmonary metastasis than PET/CT, especially for metastases <1 cm in diameter [45]. A more recent study evaluated the cost-effectiveness of using PET/CT to guide management of patients with a suspected pulmonary metastatic disease from melanoma. This Belgian study concluded that PET/CT was cost effective and could potentially avoid 20% of futile surgeries performed on patients who were thought to be free of metastasis [46]. One should keep in mind that this study was limited, because it was based on a hypothetical model that relied on data published from other studies. Currently, PET/CT is considered to be helpful in specific cases but not as a screening tool for pulmonary metastasis [47,48].

Historically, other radiopharmaceuticals have also been used. In an older study, encouraging results were reported for the use of ^{99m}Tc-methoxyisobutylisonitrile scintigraphy in 81 patients who had a history of previously excised melanoma [49]. Such whole-body scanning correctly detected 92% of 74 metastatic lesions at various sites, including 8 lung lesions ranging from 1.2 to 6.0 cm in size, 2 of which had not been previously diagnosed. Use of an indium-111-labeled monoclonal antibody for detecting colorectal metastases at various sites, including lung lesions as small as 1 cm, has been reported [50]. Bone scintigraphy with single photon emission tomography can be useful in patients with osteosarcoma metastasis [51]. Additionally, a 2009 study evaluated a new synthetic peptide, fluorobenzamide, which, when coupled to FDG, demonstrated uptake in melanin-producing tumors in animal models [52].

Summary

- CXR should be performed as a baseline in patients with primary neoplasms known to metastasize to the pulmonary system.
- In many cases, a chest CT without contrast should be performed.
- A chest CT should be performed as an initial evaluation for patients with bone and soft-tissue sarcoma, melanoma, and head and neck carcinoma.
- In patients with primary renal cell or testicular carcinoma, chest CT should be performed based on the presence of metastatic disease elsewhere.

Relative Radiation Level Information

Potential adverse health effects associated with radiation exposure are an important factor to consider when selecting the appropriate imaging procedure. Because there is a wide range of radiation exposures associated with different diagnostic procedures, a relative radiation level (RRL) indication has been included for each imaging

examination. The RRLs are based on effective dose, which is a radiation dose quantity that is used to estimate population total radiation risk associated with an imaging procedure. Patients in the pediatric age group are at inherently higher risk from exposure, both because of organ sensitivity and longer life expectancy (relevant to the long latency that appears to accompany radiation exposure). For these reasons, the RRL dose estimate ranges for pediatric examinations are lower as compared to those specified for adults (see Table below). Additional information regarding radiation dose assessment for imaging examinations can be found in the ACR Appropriateness Criteria® Radiation Dose Assessment Introduction document.

Relative Radiation Level Designations		
Relative Radiation Level*	**Adult Effective Dose Estimate Range**	**Pediatric Effective Dose Estimate Range**
O	0 mSv	0 mSv
☢	<0.1 mSv	<0.03 mSv
☢ ☢	0.1-1 mSv	0.03-0.3 mSv
☢ ☢ ☢	1-10 mSv	0.3-3 mSv
☢ ☢ ☢ ☢	10-30 mSv	3-10 mSv
☢ ☢ ☢ ☢ ☢	30-100 mSv	10-30 mSv
*RRL assignments for some of the examinations cannot be made, because the actual patient doses in these procedures vary as a function of a number of factors (eg, region of the body exposed to ionizing radiation, the imaging guidance that is used). The RRLs for these examinations are designated as "Varies".		

Supporting Documents

For additional information on the Appropriateness Criteria methodology and other supporting documents go to www.acr.org/ac.

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