

# Diagnostic Imaging Pathways - Multiple Myeloma

## Population Covered By The Guidance

This pathway provides guidance on the imaging of adult patients with suspected multiple myeloma.

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## Quick User Guide

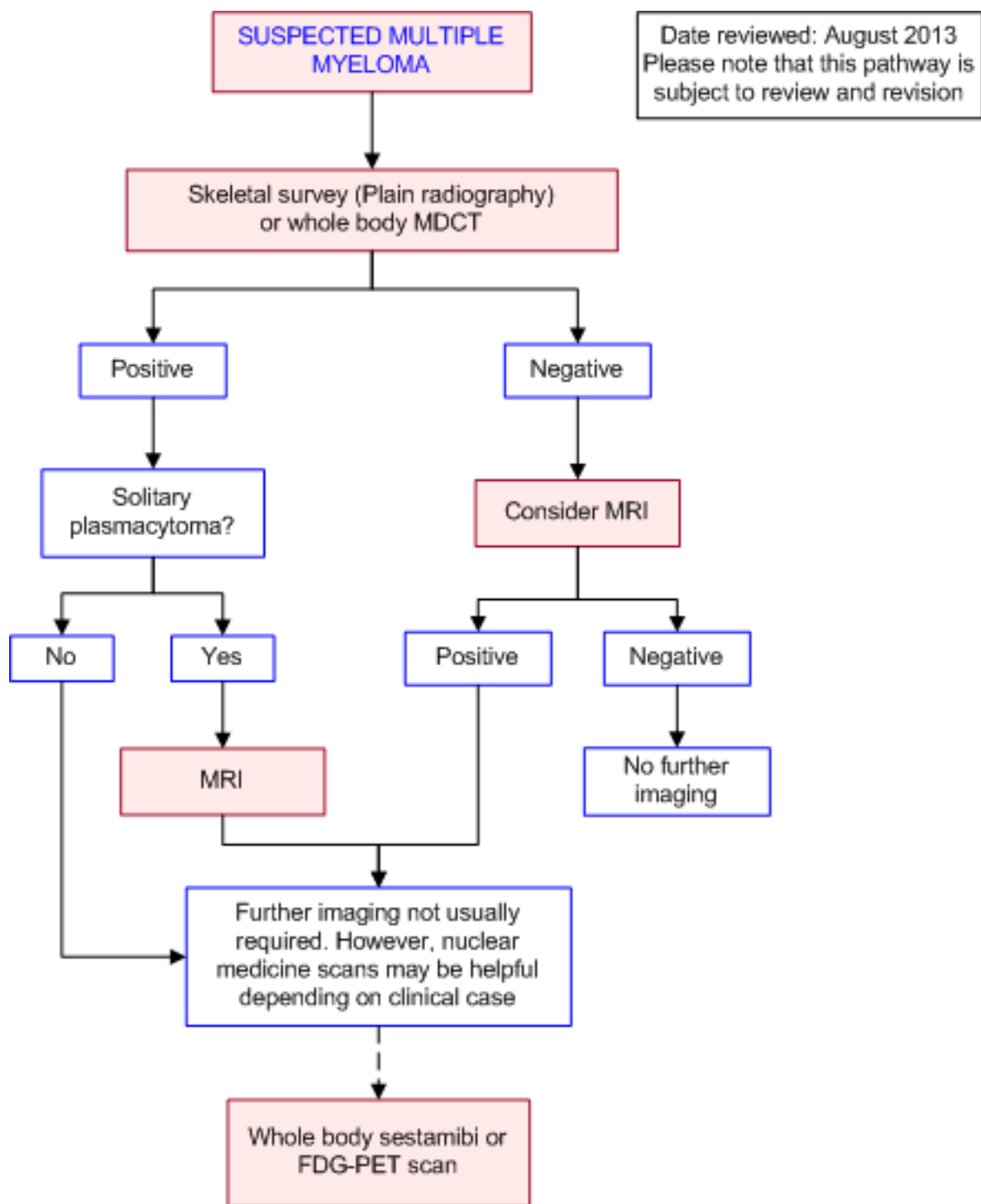
Move the mouse cursor over the **PINK** text boxes inside the flow chart to bring up a pop up box with salient points.

Clicking on the **PINK** text box will bring up the full text.

The relative radiation level (RRL) of each imaging investigation is displayed in the pop up box.

SYMBOL	RRL	EFFECTIVE DOSE RANGE
	None	0
	Minimal	< 1 millisieverts
	Low	1-5 mSv
	Medium	5-10 mSv
	High	>10 mSv

## Pathway Diagram



## Image Gallery

*Note: These images open in a new page*

1



### Multiple Myeloma of the Skull

Image 1 (Plain Radiograph): Lateral skull radiograph showing typical multiple small punched out lesions of multiple myeloma.

2

### Multiple Myeloma

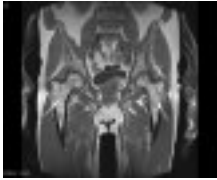
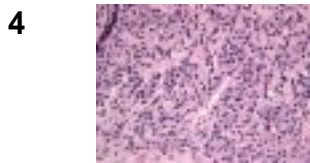


Image 2 (Magnetic Resonance Imaging): Coronal T1 image showing extensive focal areas of marrow replacement (arrows) in patient with known multiple myeloma.

**3a** **Multiple Myeloma of the Spine**



Image 3a and 3b (Magnetic Resonance Imaging): Sagittal T1 and STIR images showing extensive myelomatous infiltration of the lower thoracic and lumbar spine.



**Multiple Myeloma**

Image 4 (H&E, x10): Histological section showing sheets of atypical plasma cells with eccentrically placed nuclei, coarse (clock-face) chromatin and paranuclear hofs.

## Teaching Points

- A skeletal survey with plain radiographs is the initial imaging modality of choice
- Multidetector CT has the advantage of superior sensitivity for the detection of bone lesions and has a much more rapid acquisition time
- MRI is also highly sensitive but is generally reserved for symptomatic patients with negative skeletal surveys
- Current guidelines suggest that nuclear medicine scans such as Sestamibi and FDG PET should not be routinely used in diagnosis but may be useful to clarify previous imaging findings in selected cases

## Multidetector Computed Tomography (MDCT)

- MDCT allows for the detection of small osteolytic lesions with rapid acquisition times and three dimensional multiplanar reconstruction. This modality has replaced the conventional skeletal survey in some centres [9](#)
- Demonstrates superior sensitivity compared to plain radiography and able to better visualise areas such as the scapulae, ribs and sternum. [10,11](#) Also characterises trabecular anatomy in detail to differentiate benign and pathological compression fractures [9](#)
- May reveal unsuspected associated pathology such as soft tissue and visceral masses which may be more easily biopsied
- Provides estimation of fracture risk [8](#)
- Main limitation is the exposure to ionising radiation

## Magnetic Resonance Imaging

- Highly sensitive modality for the detection of myeloma-related bone lesions. Allows visualisation and assessment of the degree of malignant infiltration of the medullary cavity. It can effectively distinguish benign and malignant compression fractures [9](#)
- MRI is also the modality of choice for suspected cord compression [9](#)
- In comparison to the conventional skeletal survey and MDCT, MRI demonstrates higher sensitivity for the detection of bone lesions [13,17](#)
- According to current guidelines, MRI should be considered in symptomatic patients with a negative skeletal survey. [9](#) Whole body MRI is preferable, however, MRI of the spine and pelvis is also helpful if resources are limited
- In patients with apparent solitary plasmacytoma on skeletal survey, MRI of the spines should be performed to exclude occult lesions [9](#)

## Whole Body Sestamibi and FDG PET Scans

- <sup>99m</sup>Tc-sestamibi, <sup>18</sup>F-FDG-PET and PET/CT are all useful additional diagnostic tools for detecting occult myeloma-related lesions. Sestamibi scans correlate well with disease activity. [17](#) PET/CT is a relatively new modality which overcomes the problem of spatial resolution with PET alone by combining with CT. This fusion scan demonstrates a sensitivity of 85% for the detection of myeloma deposits [18](#)
- In comparison to MRI, both sestamibi and PET/CT scans show a lower sensitivity for the detection of bone lesions [19](#)
- Based on current guidelines, neither sestamibi or PET scans are recommended for routine use in the diagnosis and management of myeloma patients. [10](#) However, both modalities may be useful to clarify the findings on previous imaging in selected cases, although further studies are required to support this role
- Traditional technetium bone scintigraphy may detect up to 60% of lytic lesions in myeloma. However, it demonstrates a lower sensitivity and specificity compared to plain radiography which is due to osteoblastic dysfunction in myeloma. [10](#) Other modalities should be used in preference in the diagnosis and monitoring of patients

## Skeletal Survey (Plain Radiography)

- Primary method for evaluating skeletal involvement by multiple myeloma [1,2](#)
- Approximately 80% of patients with myeloma will have detectable lesions on skeletal survey, most commonly affecting the vertebrae, ribs and skull [9](#)
- Able to detect lytic lesions, fractures and osteoporosis [1](#)
- Limitations
  - Some areas not well visualised (eg, scapulae, ribs, sternum)
  - Limited sensitivity with up to 20% false-negatives [9](#)
  - Cannot distinguish myeloma-related osteoporosis from steroid-induced or postmenopausal osteoporosis
  - Lengthy study requiring multiple films with different patient positions

## Bone Scan (Multiple Myeloma)

- Adjunct to radiographs in cases with continued bone pain, unexplained by standard radiographs [1,2](#)
- Hot spots suggest more osteoblastic disease, pathological fracture or other pathology

- Useful in demonstrating pathological fractures, particularly in areas not seen well on standard radiographs, such as the ribs [1,2](#)
- Occasionally may detect areas of early myeloma involvement that are not yet evident on the radiographs [1,2](#)
- Limitations: poor sensitivity for detection of myeloma-related bone lesions and evaluating the extent of the disease. This is due to marrow rather than cortical involvement with myeloma. Should not be considered primary investigative tool for myeloma [1,2](#)

## References

References are graded from Level I to V according to the Oxford Centre for Evidence-Based Medicine, Levels of Evidence. [Download the document](#)

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