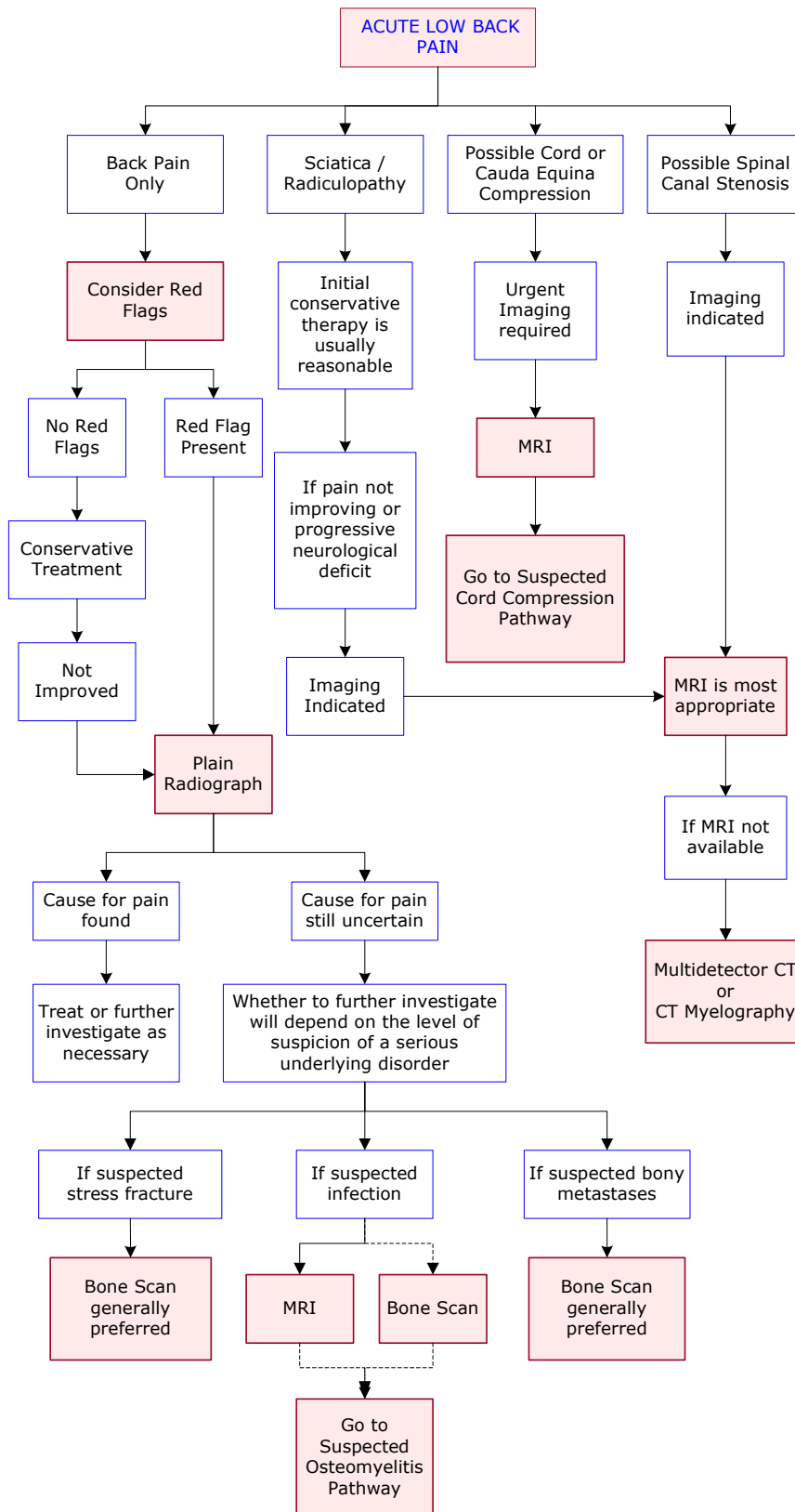




**DIAGNOSTIC IMAGING PATHWAYS**  
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Pathway last reviewed October 2010. Pathways will be reviewed periodically and updated as necessary.

## RED FLAGS

- These features on history and examination may help to increase the yield of lumbar radiography and have been adapted from criteria proposed by various guidelines. [20,21,26, 27, 28](#)
  - Age of onset less than 20 years or more than 55 years
  - Recent history of violent trauma
  - Constant progressive, non mechanical pain (no relief with bed rest)
  - Thoracic pain
  - Past medical history of malignant tumour
  - Prolonged use of corticosteroids
  - Drug abuse, immunosuppression, HIV
  - Systemically unwell
  - Unexplained weight loss
  - Widespread neurological symptoms (including cauda equina syndrome)
  - Structural deformity
  - Fever
- There is no convincing evidence that the absence of these red flags is sufficient to exclude serious underlying disease but they may help to reduce unnecessary use of plain radiography.

## PLAIN RADIOGRAPHY

- Frequently but often inappropriately used for the investigation of low back pain.
- The majority of patients with low back pain have either normal lumbar radiographs or age related degenerative changes that do not necessarily correlate with the presence or severity of pain. [1-3,19](#)
- Plain radiographs are probably not necessary in patients with low back pain unless there are significant risk factors or red flags for serious underlying disease or symptoms have persisted for greater than 6 weeks. [4](#)
- Lumbar radiography exposes the patient to high doses of ionising radiation with the female gonadal exposure of two standard lumbar spine views being approximately equivalent to the radiation of daily chest radiographs for several years. The radiation associated with oblique views is even higher. [5-7](#)

## MAGNETIC RESONANCE IMAGING

- In general has some advantages over CT including. [4](#)
  - Better soft tissue contrast
  - Can distinguish different parts of the disc from each other eg nucleus pulposus and annulus fibrosus.

- Offers better visualization of the vertebral marrow and the spinal canal including spinal cord and intrathecal nerve roots
- Uses no ionising radiation
- Multiplanar imaging
- Some disadvantages compared to CT include:
  - Cannot directly visualise cortical bone.
  - Limited availability
  - Expense
  - Has a number of contraindications including pacemaker, cochlea implant, ocular foreign bodies etc
- Two studies have shown MRI to be more sensitive than bone scan for the detection of bone metastases. [10,11](#)
- MRI is useful for investigation of spinal infections. In one study it had a sensitivity of 96% and a specificity of 92% for the detection of spinal infections, more accurate than both plain radiograph and bone scan. [12](#)
- In one study, MRI had a sensitivity of 89-100% but a specificity of only 43-57% for the detection of herniated discs, which was not significantly different to the findings with CT. [8](#)
- The ability to distinguish between extrusions and protrusions, both subtypes of disc herniations is important. Disc extrusions have a 'neck' and are rare in asymptomatic patients where as protrusions are broad based and commonly occur in asymptomatic people.
- MRI is able to detect annular tears, which are areas of focal high signal on T2-images in the posterior annulus fibrosus and represent tears in the disc. The clinical importance of these tears is uncertain with some studies [13,14](#) showing a high concordance between the tears and the findings on discography but others finding no relationship. [15-17](#)

## COMPUTED TOMOGRAPHY

- Single slice helical CT has a similar accuracy to that of MRI in detecting herniated discs. In one study, CT had a sensitivity of 88-94% and a specificity of 57-64% for herniated discs, similar to that of MRI. [8](#)
- As with other imaging tests, many abnormalities found with CT, including herniated discs are found in asymptomatic people and this reduces the specificity of the test.
- CT can give better images of cortical bone and it may be more reliable than MRI for detecting facet joint degenerative changes. [9](#)
- There is no good information on the accuracy of CT for metastases, osteomyelitis, compression fractures or ankylosing spondylitis. [4](#)
- In general some advantages of CT over MRI include:
  - Provides superior bony detail of the spine, particularly the facet joints and the posterior elements
  - Less sensitive to patient movements

- Less expensive
- More widely available
- Less claustrophobic
- Multidetector CT allows rapid scanning at a higher resolution compared to single slice CT. The quality of 2D and 3D reformatted images from multidetector CT is a significant improvement over single slice CT which is important for understanding spatial relationships and may visualise abnormalities not present on axial images. [24](#)

## CT MYELOGRAPHY

- CT myelography is an invasive procedure that involves injecting the thecal sac with iodinated contrast material. This allows the nerve root sleeves to be visualised and a lack of filling, displacement, or swelling of a nerve root may indicate adjacent pathology. [8,22](#)
- MRI is the preferred first line investigation of suspected radiculopathy or spinal stenosis due to its excellent soft tissue definition and non-invasiveness. Currently, the main role of CT myelography is as an alternative method of investigation if MRI is unavailable or contraindicated. [8,23](#)
- For detecting a herniated disc, CT myelography has a sensitivity of 73-95% and a specificity of 57-88%. This is similar to that of non-invasive helical CT [8,25](#)
- Limitations
  - Invasive procedure.
  - Associated small risk of exacerbating the neurological deficit.

## BONE SCAN

- Mainly used for the detection of occult fractures, infections or metastases and to distinguish them from degenerative disease. [4](#)
- One study showed bone scanning to have a sensitivity of 90% and a specificity of 78% for infection. [18](#)
- Useful for determining the acuity of a compression fracture. Old fractures are generally metabolically cold while recent fractures tend to be metabolically hot. [11](#)

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