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## Bone metastases

### Localised bone pain in established metastatic disease

#### Background

Bone metastases may be classified as uncomplicated (accounting for around two-thirds of cases) or complicated, defined by features suggestive of impending or actual fracture, associated soft-tissue mass or neurological deficits.<sup>1,2</sup>

#### Uncomplicated bone metastases

Local bone pain responds well with response rates of 70–80% after localised external beam treatment. Since response may take 4–6 weeks to achieve, it is recommended that consideration be given to the patient's prognosis before treatment. A number of large randomised controlled trials have been undertaken to explore the optimal dose, which have been subject to systematic review and meta-analyses. On the basis of this information, the recommended fractionation is a single dose of 8 Gray (Gy) (Level 1a).<sup>3–5</sup>

#### Recommendation

**For the initial treatment of pain from bone metastases:**

- 8 Gy single dose (Grade A)

*The types of evidence and the grading of recommendations used within this review are based on those proposed by the Oxford Centre for Evidence-Based Medicine.<sup>6</sup>*

### Bone metastases in oligometastatic disease

In the context of oligometastatic disease, stereotactic body radiotherapy (SBRT) can achieve local control rates of 80% and treatment has been shown to be well tolerated, with low rates of spinal myelopathy (see chapter on oligometastases).

#### Retreatment

Retreatment should be considered in patients still having clinically significant pain after 4–6 weeks despite optimal analgesic. After a single dose, around 25% of patients may need retreatment at some point.<sup>7</sup> Limited evidence suggests that response rates are similar

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to those after primary treatment.<sup>8</sup> There are no data to guide optimal dose fractionation for retreatment; a randomised trial compared 8 Gy single dose with 20 Gy in 5 fractions (8 fractions over the spinal cord) and showed no significant difference (Level 1b).<sup>6,9</sup> Both may be considered acceptable treatments for reirradiation.

## Complicated bone metastases

### Neuropathic pain

Bone metastases may give rise to pain with neuropathic features rather than simple bone pain. One randomised controlled trial specifically addressed this question, comparing single-dose 8 Gy with multifraction treatment, for most patients 20 Gy in 5 fractions.

No major advantage for the multifraction arm was identified, and the recommendation therefore is that these patients should also receive a single dose of 8 Gy.<sup>10</sup>

## Recommendations

### For the reirradiation of bone metastases:

- 8 Gy single dose (Grade B)
- 20 Gy in 5 daily fractions (or 8 fractions over the spinal cord) over 1 week (Grade B)

### For the treatment of neuropathic pain from bone metastases:

- 8 Gy single dose (Grade A)

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## Pathological fracture

### Prophylaxis

Bone metastases with high risk of pathological fracture can be identified from their radiological appearances. Suggested parameters include those with >50% cortical destruction, >3 cm maximum diameter, axial cortical involvement >3 cm and multifocal lytic disease.<sup>11</sup> Surgical fixation should be considered.

If radiotherapy is to be used, there is no consensus on the best fractionation in this setting. Higher-risk lesions were in general excluded from fractionation trials. Common practice would be for these patients to receive a fractionated regimen such as 20 Gy in 5 fractions or 8 Gy single dose (Level 5).

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## Recommendations

### To prevent pathological fracture:

- 8 Gy single dose (Grade C) or
- 20 Gy in 5 fractions over 1 week (Grade C)

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## Established fracture

Bones such as ribs, vertebrae and pelvic and shoulder girdle bones are not amenable to surgical fixation and can be treated with local radiotherapy. There is no consensus on optimal fractionation.

## Recommendations

### For inoperable pathological fractures:

- 8 Gy single dose (Grade D) or
- 20 Gy in 5 fractions over 1 week (Grade D)

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## Postoperative radiotherapy

After internal fixation of a fracture or prophylactic pinning of a high-risk lesion, postoperative radiotherapy is often recommended. There is limited literature to support its efficacy and no consensus on dose. Treatment should be considered for all patients with persisting bone pain after surgery. In cases where treatment is given with the aim of enabling bone healing and long-term rehabilitation, consideration should be given to performance status and predicted survival.

## Recommendations

### Postoperative radiotherapy after fixation of bone metastases:

- 8 Gy single dose (Grade D) or
- 20 Gy in 5 fractions over 1 week (Grade D)

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## References

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