

Possibilities of radiotherapy in cancer pain management

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Indication for palliative radiotherapy

- Pain control
- Bone metastasis
- Nerve compression
- Syndroma vena cave superior
- Compresion of medula spinalis
- Bleeding

Bone metastasis

- Breast, prostate and lung cancer account for 50-80% of bone metastasis
- The next most common are kidney and thyroid cancers
- Hematological malignancies can lead to bone destruction -lymphoma, myeloma
- 70% axial skeletal knee, ribs, skull
- 75% of patients with bone metastases have pain

Pain-Diagnostic

- Bone metastasis are the most common cause of pain in cancer patients
- Compression of nerve endings, periosteal stretching or growth in the nerves and the surrounding tissue
- Pain can be intermittent or constant; related to activity; can get worse during the day
- RTG can be visualized in the form of lytic lesions or fractures
- On scintigraphy can be visualised sclerotic or blast lesions
- MR examination of the bones contributes to a better evaluation of bone metastasis Gold Standard

Lytic and blastic metastasis

Primary bone response to some tumors

Predominantly osteoblastic

Prostate

Carcinoid

Gastrinoma

Small cell lung cancer

Hodgkin's disease

Medulloblastoma

Predominantly osteolytic

Renal cell cancer

Melanoma

Squamous cell cancers of the aerodigestive tract

Multiple myeloma

Non-small cell lung cancer

Thyroid cancer

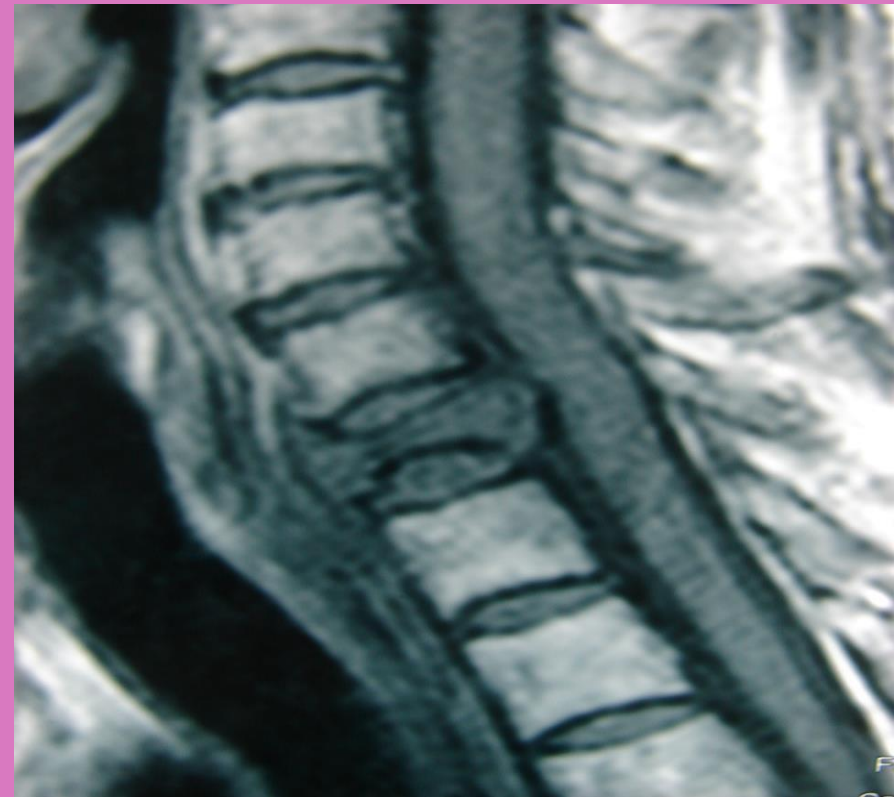
Non Hodgkins lymphoma

Mixed osteoblastic and osteolytic

Breast cancer

Gastrointestinal cancers

Squamous cancers at most primary sites

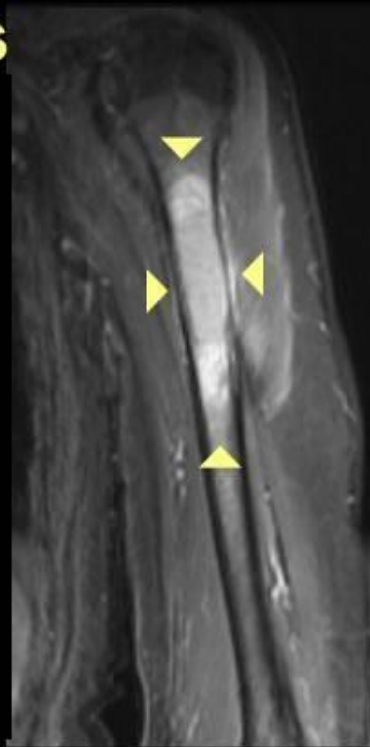


An MRI may show a bone met better than a regular X-ray

Bone Metastases



plain xray interpreted as a normal film



MRI shows extensive cancer in humerus

PET scans very clearly visualize the bone metastasis



- TH-L -70%
- L-S-20%
- C-10%

Biopsy of metastasis



Palliative therapy of bone metastasis

A) LOCAL /REGIONAL:

- Radiotherapy
- Surgery

B)

SYSTEMIC THERAPY:

Chemotherapy
Hormone Therapy
Bisphosphonates

C)

SUPPORTIVE THERAPY

Analgesics

Psychosocial Care



Indications for palliative RT bone metastases

- RT bone metastases due to:
 - 1) pain relief;
 - 2) to prevent threatening fractures
 - 3) to prevent neurological compression of the roots
nerves
cauda equina
spinal cord

Compression spinal cord-emergency condition requiring immediate radiation therapy

The mechanism of pain release after RT

- Irradiation reduces tumor mass thus leading to cell death-mitotic or via apoptotic
- Radiotherapy killing of inflammatory cells through apoptosis by reducing the release of a mediators of cytokines
- Early release of pain:
 - reduction in the release of cytokines
 - by damaging the osteoclasts
 - by damage caused by radiation of nerve endings
-

Effective fractionation regimes

- 8 Gy / 1 fraction Single shoot

16 Gy / 4 fractions

20 Gy / 8 fractions

30Gy / 10 fractions

performance status of the patient will determine what size fractions.

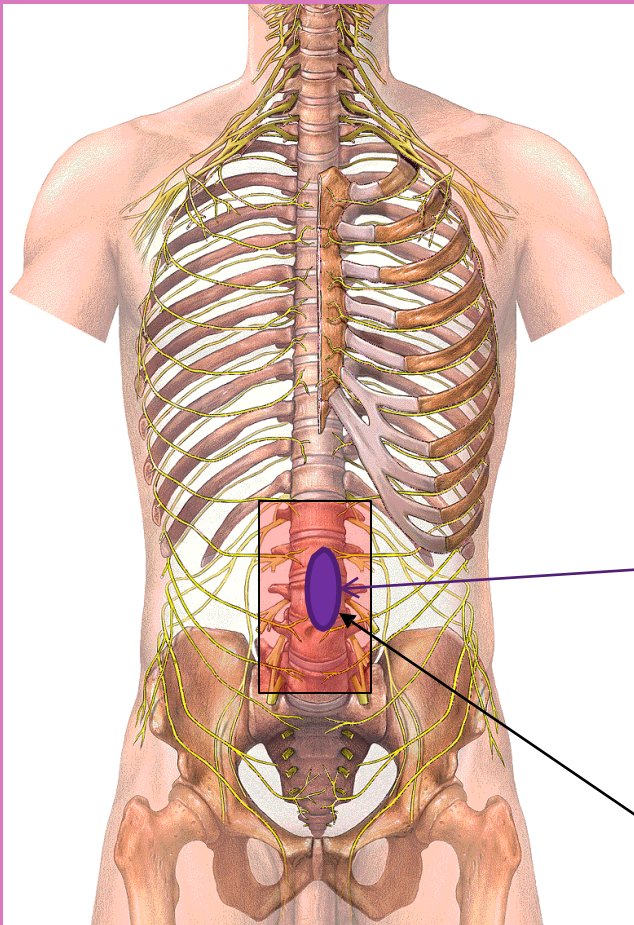
30 Gy provides a longer control of pain in patients with long life expectancy

In many surveys have shown that there is no difference between the modes of fractionating

Conventional simulator



Radiation field

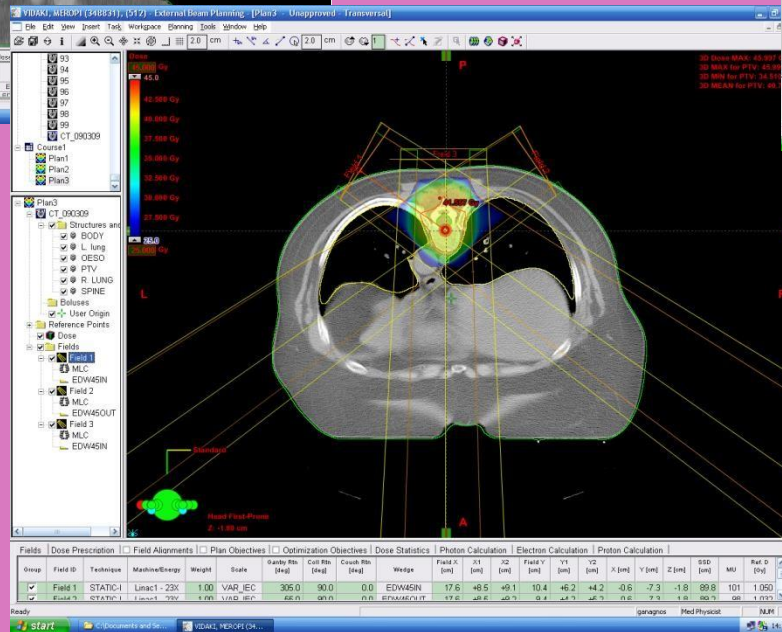
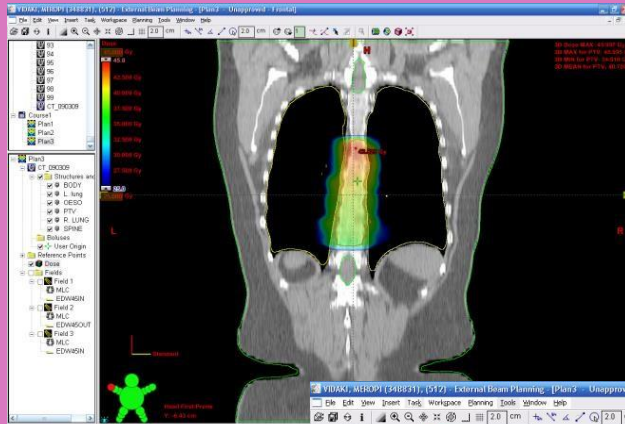


- most often in pronation position, arms next to the body
- radiation field involves vertebrae above and below the lesion
- direct field X-rays at a certain depth

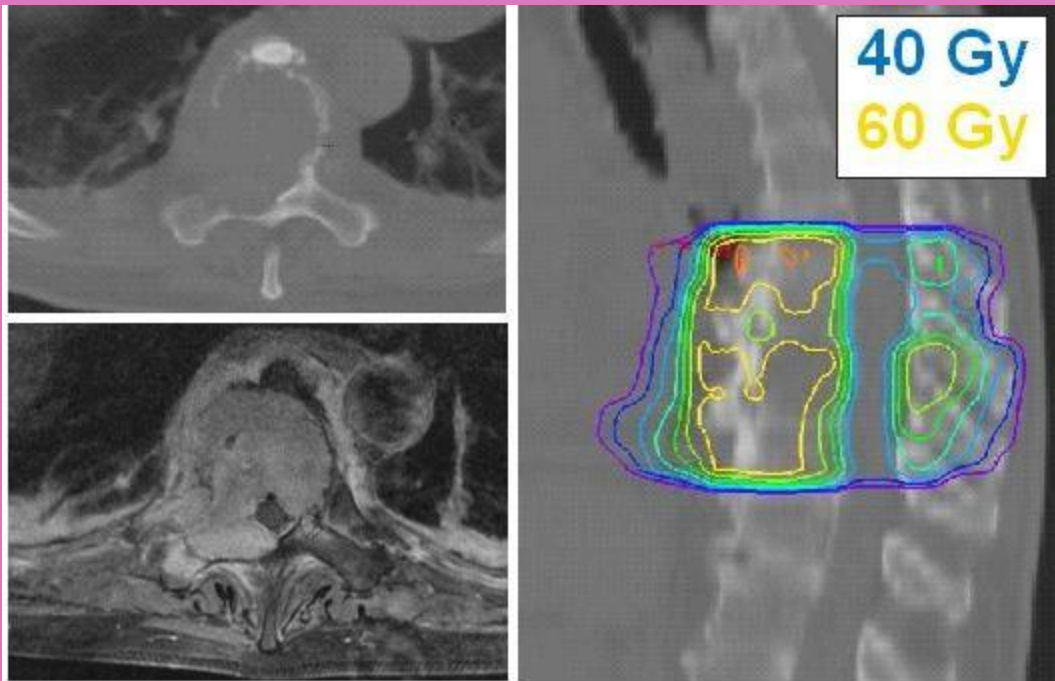
L2, L3

Radiation field

3D conformal radiotherapy

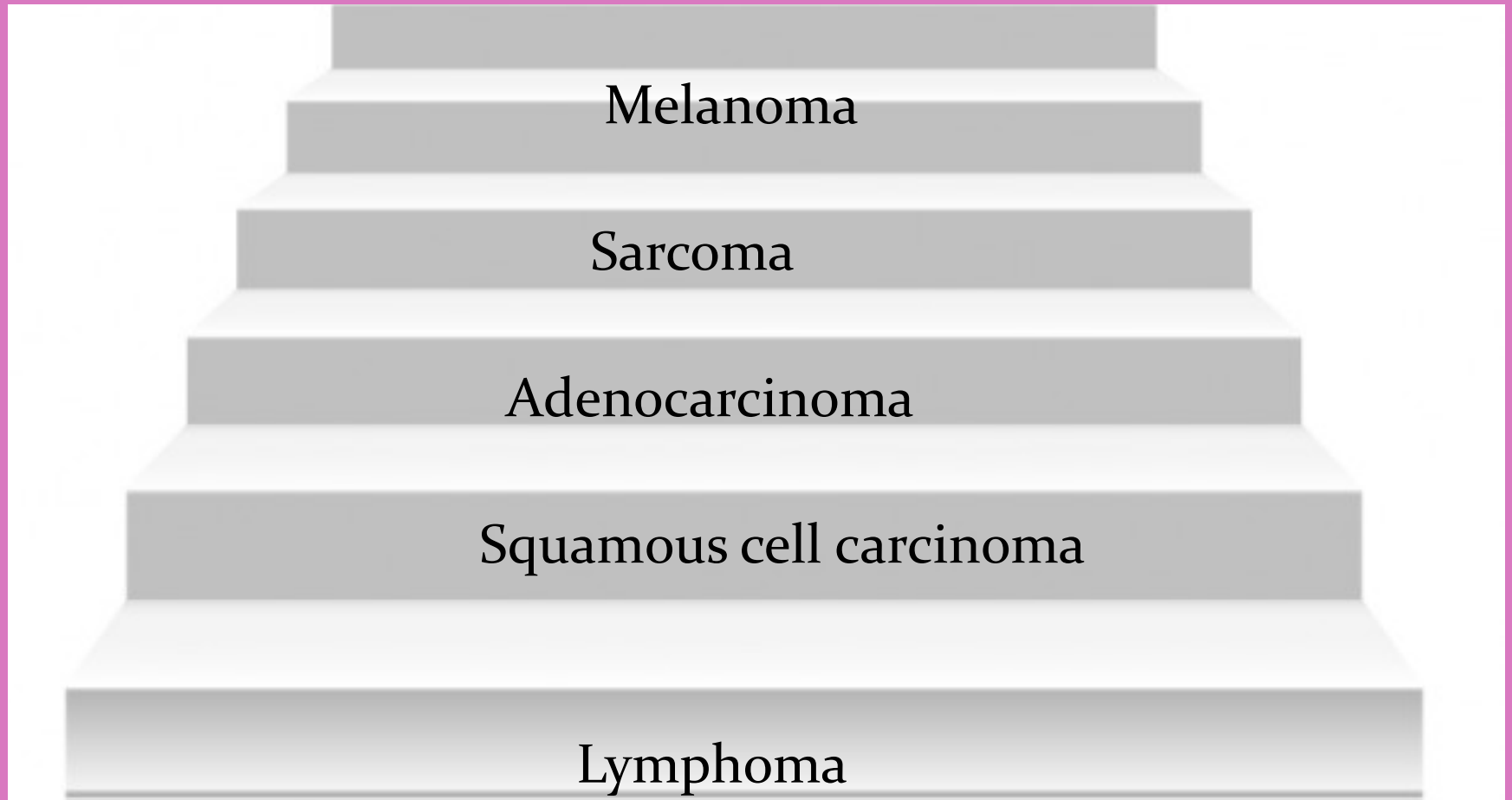


Intensity Modulated Radiotherapy



- Intensity Modulated Radiotherapy (IMRT)

Radiosensitivity



Linear accelerator



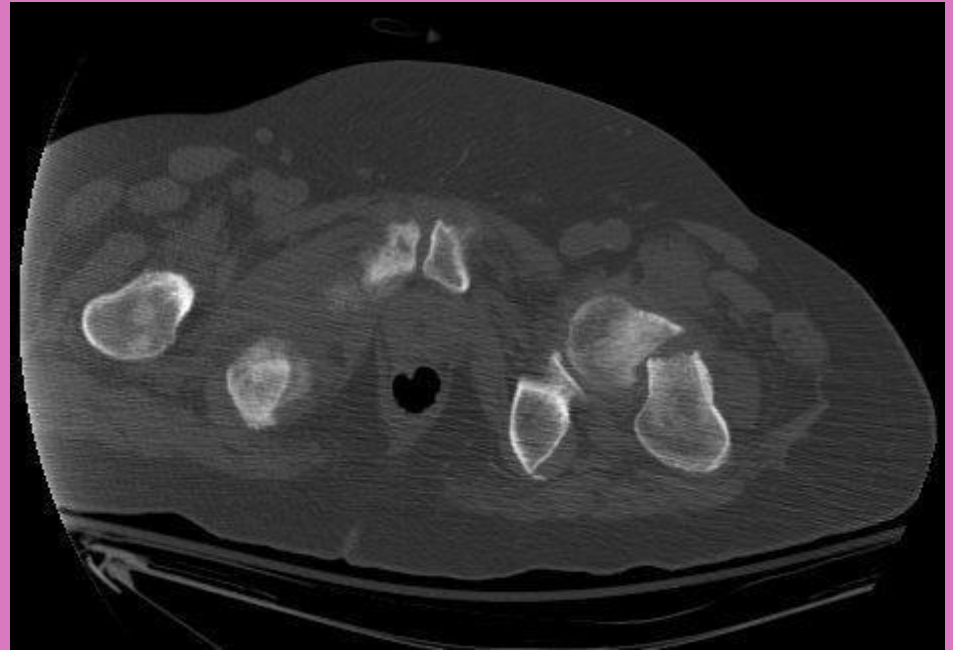
RT bone metastasis: 8 Gy x 1 vs. 30 Gy x 10 –RTOG 9714

- Pain and using of analgesics are same after 30Gy in 10 fractions and after 8Gy in 1 fraction
- Pathologic fracture as consequence in 5% after 8 Gy x 1 s vs. 4% 3 Gy x 10s
- Retreatment is statistically significant higher after 8 Gy x 1: 18% vs. 9% (p<.001) –decision for retreatment
“left to discretion of treating physician”.

8 Gy in 1 fraction-new standard?

- Probably for most metastasis
- When the target of treatment the pain relief treatment in 1 Gy fr corresponding to the volume is recommended regimen for the treatment of the symptomatic and uncomplicated bone metastases, Wu et al BMC Cancer⁴ (2004) p.1-7
- Complicated skeletal metastases: previous location of RT, pathological fractures, spinal cord compression or cauda equina

Pathologic fracture – prostate cancer



Compression of cauda equina: Limfoma



Surgical decompression

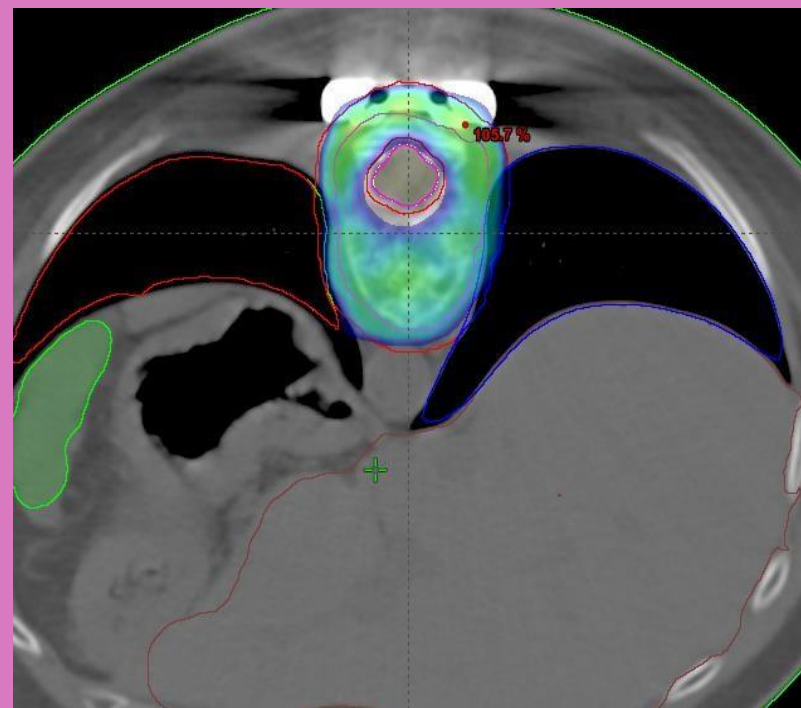
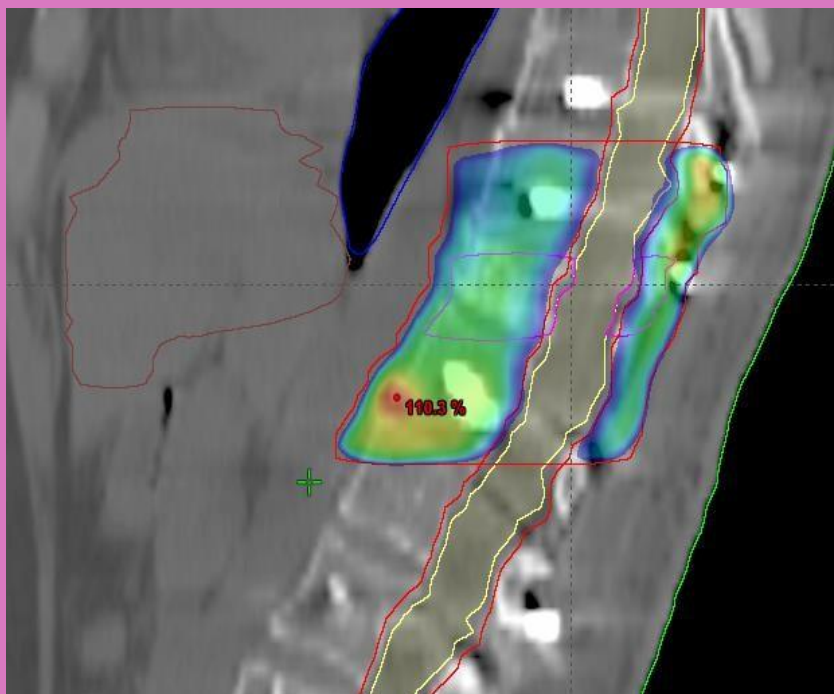
- Slow progression of neurologic symptoms,
 - Ambulation that is maintained or has only been lost in the previous 48 hours,
- A single level of compression,
- The absence of visceral or brain metastases,
- An estimated survival of at least three months,
 - A lengthy interval between the initial diagnosis and spinal cord compression,
- Age less than 65 years,
- Spine instability, and
- Tumors that arise in the prostate, breast, or Kidney

Surgery and EBRT

- Surgery does not obviate the need for post op RT
- The choice for surgical decompression should be made by an interdisciplinary team

The optimal dose not defined, but longer schedules, like 30 Gy in 10 fractions recommended

Postoperative RT-IMRT



- Protection of the spinal cord
- Option for retreatment

Bisphosphonates and EBRT

Concurrent delivery - successfully palliates bone pain and promotes re-ossification of the damaged bone

Decrease bone pain scores and reduces skeletal related events

Drawbacks to the delivery of bisphosphonates -- renal impairment and osteonecrosis of the jaw

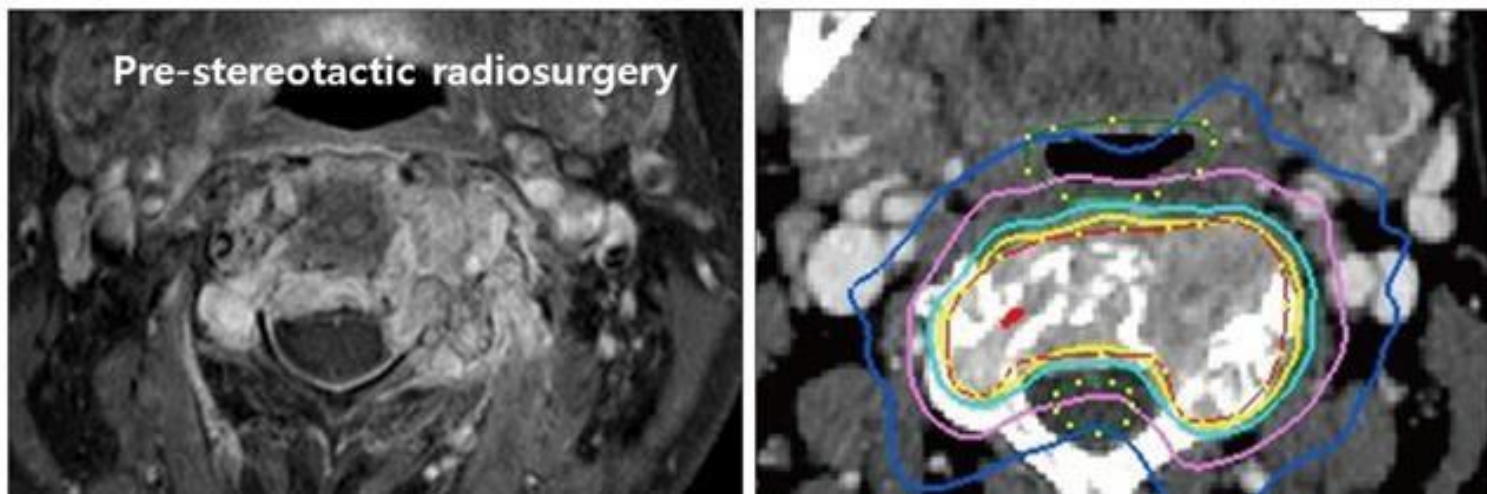
Bisphosphonates and EBRT

Bisphosphonates are internalized by osteoclasts, causing a decrease in both their activity and viability.

Radiotherapy is also thought to influence the activity of osteoclasts by reducing tumor produced osteoclast activating factors (OAF's), act synergistically

Could not find data to recommend one bisphosphonate or fractionation scheme combination as having greater efficacy than another.

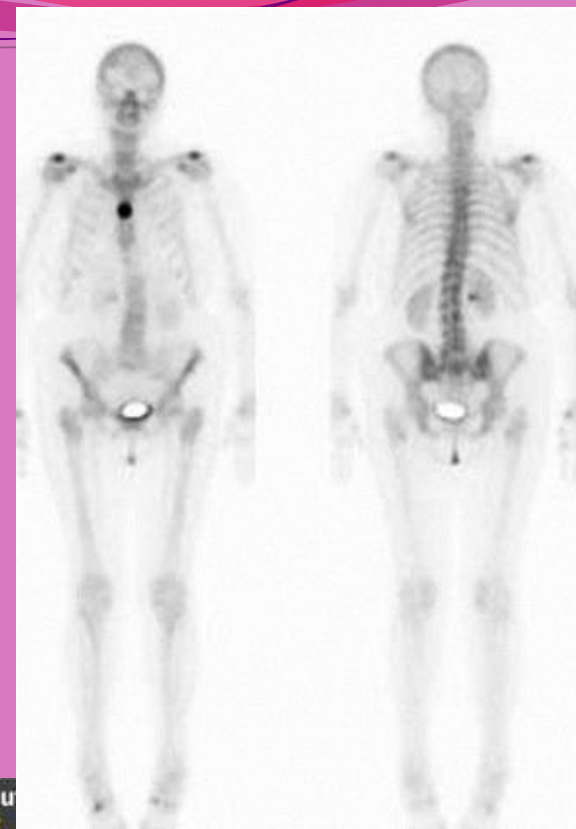
Stereotactic body radiotherapy



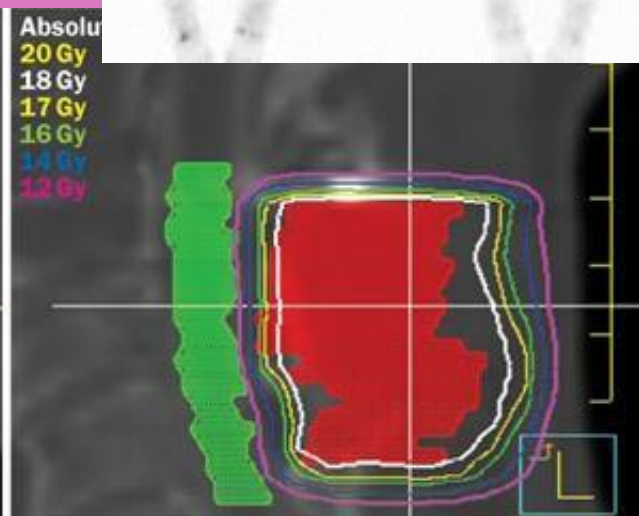
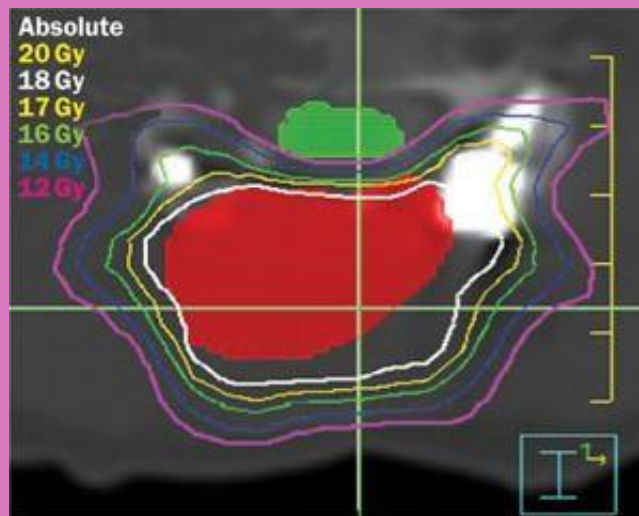
- **Extracranial Body Radiotherapy (SBRT)**

Indication for IMRT or SBRT

Oligometastaze

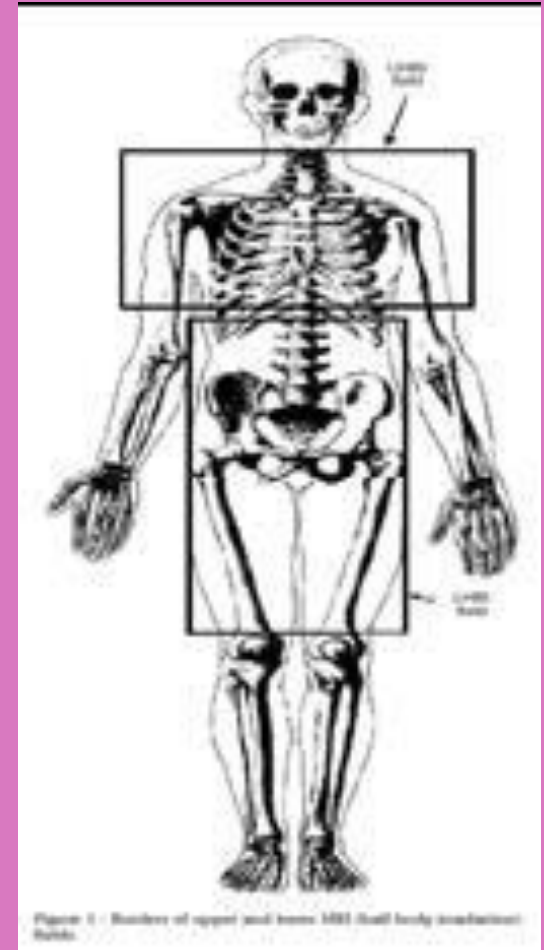


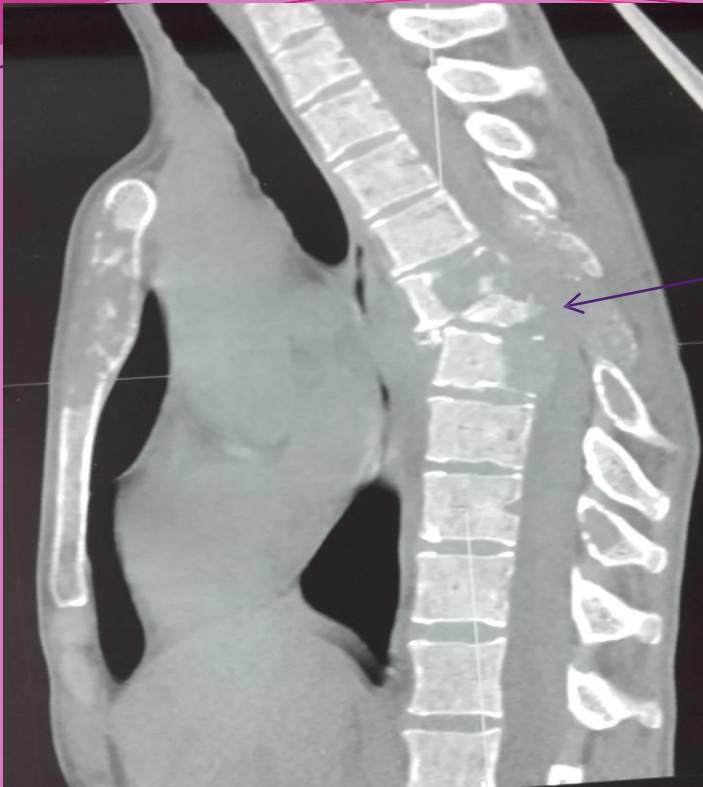
Retretman



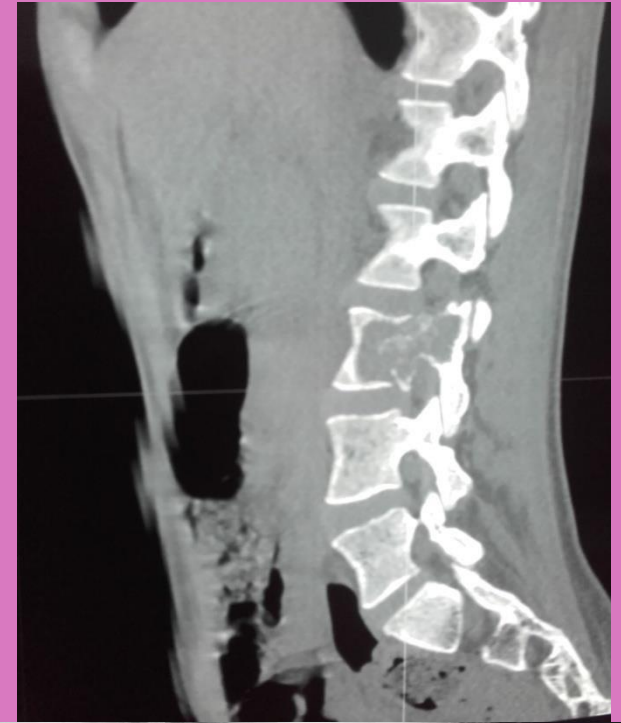
HBI paliative RT

- HBI be used for patients with multiple bone metastases, especially in patients with prostate cancer
- HBI extending the time to appearance of new lesions
- REDUCE the number of patients requiring retreatment within one year

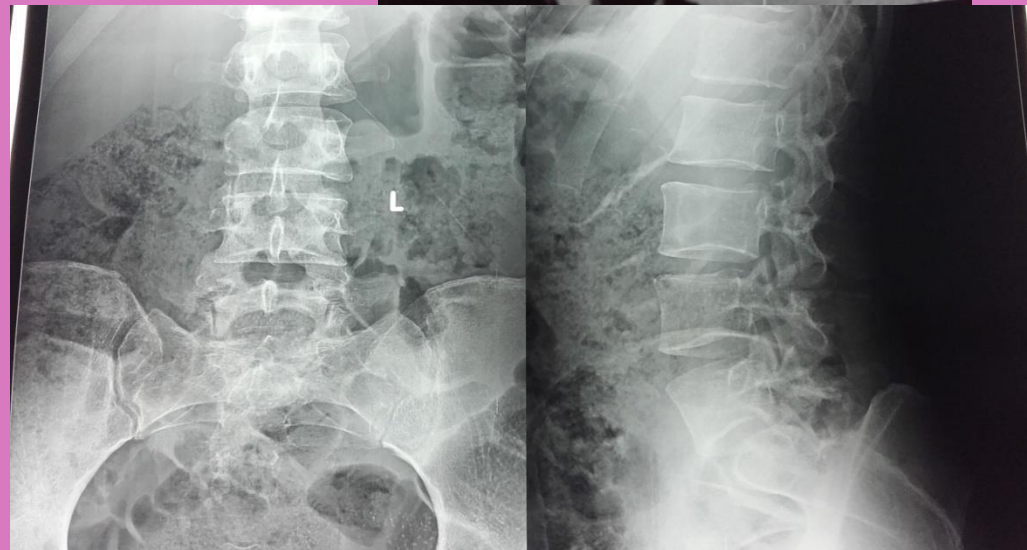




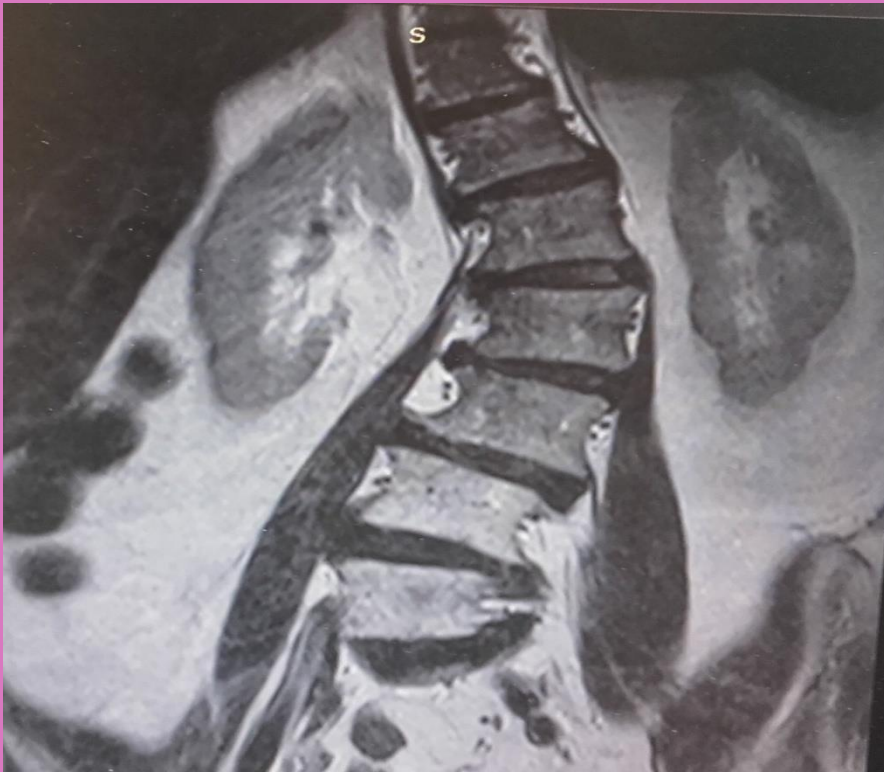
TH 6, 7, 8



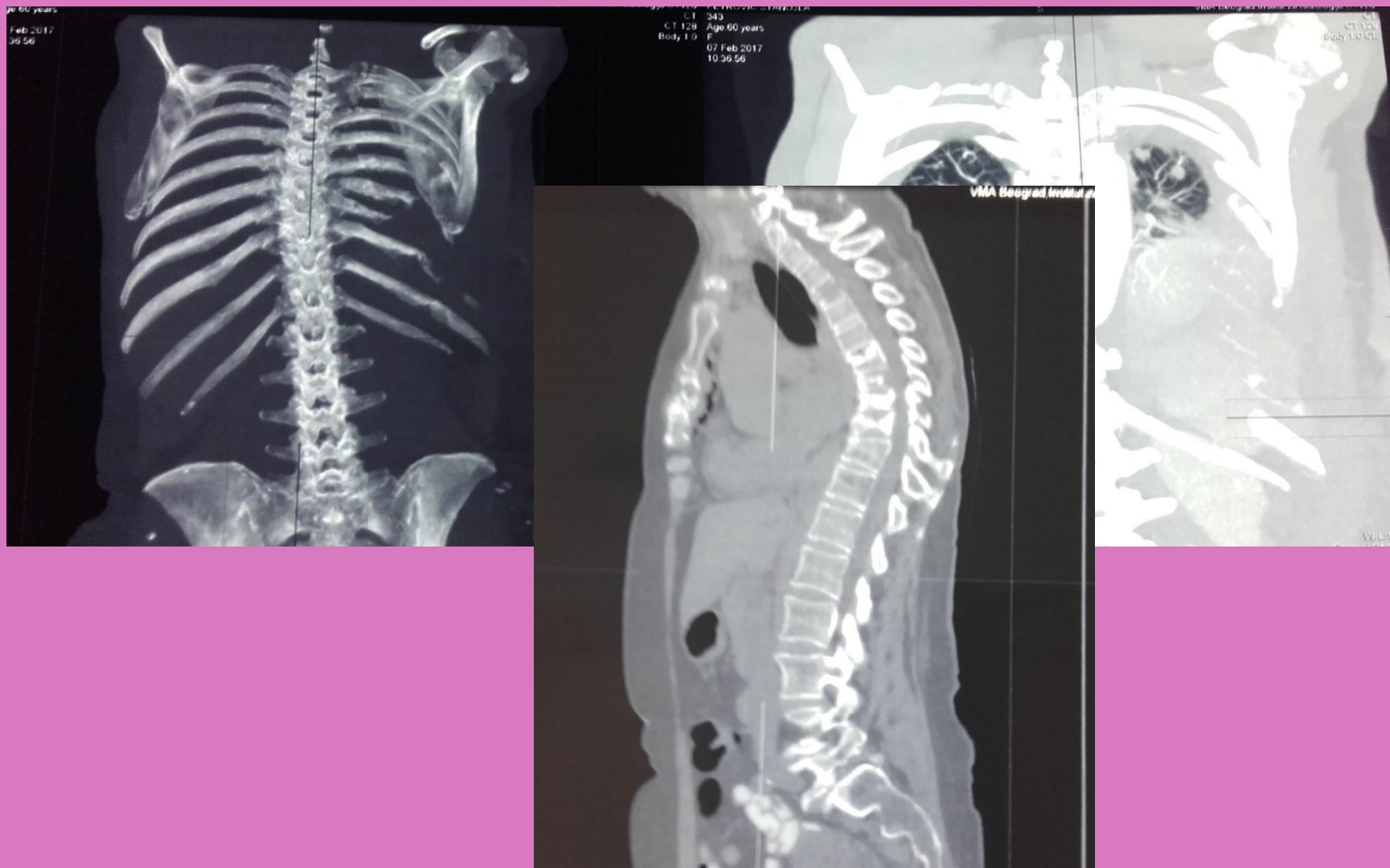
F32 , meta in ossibus,
Compression of spinal cord,
Operative stabilisation, biopsy show CDI
, postoperative paliative RT 30Gy in 10s
ER/PR+ HER2 2+

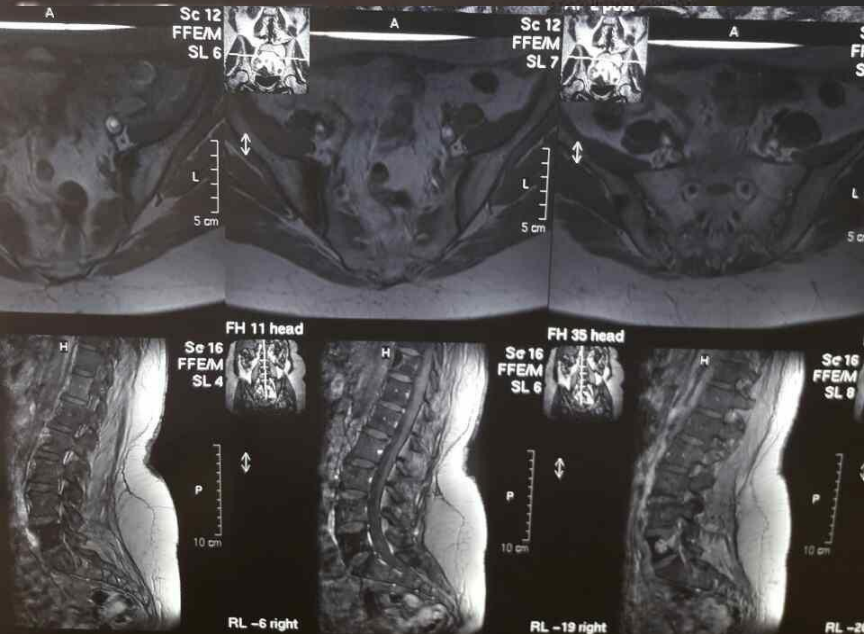


F 68, CDI ER/PR +, relaps after 6 years of disease free survival T2N0M0,
Meta in hepate et ossibus: osteolytic metastasis
immovable



F 53 god, Lung cancer destruct the ribs and thoracic vertebra,
and compress on the spinal cord





F 58 CLI , ER/PR+,
 Disease free survival of 15
 years
 metastasis in L5 et Th12,
 Blastic metastasis with pain
 syndroma

Conclusion

- EBRT has been and continues to be the mainstay for the treatment of painful, uncomplicated bone metastases
- Either 8 Gy in one fraction, 16 Gy in 4 fractions, 20 Gy in 8 fractions, or 30 Gy in 10 fractions can provide excellent pain control and minimal side effects.
- Re-irradiation with EBRT may be safe, effective, and less commonly necessary in patients with a short life expectancy.
- Bisphosphonates do not obviate the need for EBRT for painful sites of metastases and may indeed act effectively in combination with EBRT.
- Surgical decompression and stabilization plus post-operative radiotherapy should be considered for selected patients with single level spinal cord compression or spinal instability

Thank you for attention!