Bone Metastases and Osteoporosis
Bone Metastases

- **Version 2002:**
  Dall / Fersis / Friedrich

- **Version 2003–2009:**
  Bischoff / Böhme / Brunnert / Diel / Friedrichs / Maas / Oberhoff / Schaller / Seegenschmiedt / Solomayer / Souchon

- **Version 2010:**
  Solomayer / Schaller
Bisphosphonates in Breast Cancer

- **Hypercalcemia**
  - 1a A ++

- **Reduction skeletal events (complications)**
  - 1a A ++

- **Treatment beyond progression of bone met‘s**
  - 5 D ++

- **Prevention of bone metastases**
  - **Primary breast cancer**
    - 1b B +*
  - **Advanced breast cancer**
    - 2b C +/-

- **Tumor Therapy-Induced Osteoporosis**
  - **Prevention**
    - 1b B ++
  - **Therapy**
    - 1b B ++
  - **Prevention and Therapy of Tumor Therapy-Induced Bone Loss**
    - 1b B +

* Study participation recommended
Skeletal Metastasis
Treatment with Radionuclids

- Tumor progression after standard treatment of multiple / disseminated metastases and intolerable bone pain
  - $^{186}$Rhenium-hydroxyethylidenediphosphonat (z.B. $^{186}$Re-HEDP)
  - $^{153}$Samarium
  - $^{89}$Strontium (z.B. Sr$^{89}$)

Cave: Myelosuppression with risks of pancytopenia has to balance potential benefits.
Bone Metastases
Acute Spinal Cord Compression / Paraplegia

- Decompression surgery, reduction of tumor volume, stabilisation surgery (< 24 h) and irradiation of the spine (RT) 2b C ++
- Irradiation of the spine (< 24 h) +/- steroids 3b C ++
- Immediate start of treatment 1c D ++

Clinical trials have included patients with different tumor entities!
Prognostic Factors – Outcome of Spinal Cord Compression

Oxford LoE: 2b       GR: B

- Mobility before therapy
- Time interval from onset of neurological symptoms and start of therapy

Metastatic Bone Disease of the Spine

Indications for surgery

Oxford LoE: 2b          GR: C          AGO: ++

- Spinal cord compression
  - With progressive neurological symptoms
  - With pathological fractures
- Instability of the spine
- Lesions in pre-irradiated parts of the spine
Surgery for Bone Metastases

Spine and limbs

Oxford LoE: 3b  GR: C  AGO: ++

- Marrow splints
- Osteosynthesis
- Bone replacement by PMMA or titanspacer
- Endoprothesis
- Vertebroplasty / Kyphoplasty
- Resection of involved bone in oligometastatic disease (sternum, ribs, vertebral bodies)
Metastatic Bone Disease: Radiotherapy

Bone metastases

- With fracture risk
- With functional impairment
- With bone pain
  - Single RT = fractionated RT
- With neuropathic bone pain
- Asymptomatic isolated bone metastases

Only few studies included breast cancer patients!
Metastatic Bone Disease
Recurrent Bone Pain

Recurrent bone pain in pre-irradiated parts of the skeleton

- Single RT (1 x 8 gy)  
  3b C ++
- Fractionated RT (6 x 4 gy) !
  3b C +
- Radionuclid therapy
  3b C +
Prevention and Therapy of Tumor Therapy-Induced Bone Loss

- Regular BMD-measurement recommended
- Bisphosphonates
- RANK-ligand antibody
- HRT (independent from ER-status of BC)

Some data derived from steroid induced bone loss*:
- Physical activity
- Calcium and vitamin D suppl.
- Avoiding BMI < 18

Oxford / AGO LoE / GR

- 2b B +
- 1b B +
- 2b B +
- 5 D -
- 4 C ++
- 4 C ++
- 3b C ++

Prevention of Tumor Therapy-Induced Osteoporosis

- Regular BMD-measurement recommended 2b B +
- Bisphosphonates 1b B ++
- HRT (independent from ER-status of BC) 5 D -

Oxford / AGO LoE / GR
Therapy of Tumor Therapy-induced Osteoporosis

- Bisphosphonates
  - Oxford / AGO LoE / GR: 1b B ++
- HRT (independent from ER-status of BC)
  - Oxford / AGO LoE / GR: 5 D -

Some data derived from steroid induced bone loss*:
- Physical activity
  - Oxford / AGO LoE / GR: 4 C ++
- Calcium and vitamine D suppl.
  - Oxford / AGO LoE / GR: 4 C ++
- Avoiding BMI < 18
  - Oxford / AGO LoE / GR: 3b C ++

Bisphosphonates For Therapy of Bone Metastases

- Clodronate PO 1600 mg daily  
  Oxford / AGO LoE / GR: 2b B ++
- Clodronate IV 1500 mg q3w / q4w  
  Oxford / AGO LoE / GR: 2b B ++
- Pamidronate IV 90 mg q3w / q4w  
  Oxford / AGO LoE / GR: 2b B ++
- Ibandronate IV 6 mg q3w / q4w  
  Oxford / AGO LoE / GR: 2b B ++
- Ibandronate PO 50 mg daily  
  Oxford / AGO LoE / GR: 2b B ++
- Zoledronate IV 4 mg q4w  
  Oxford / AGO LoE / GR: 2b B ++
- Other doses or schedules, e.g. derived from studies of adjuvant therapy or therapy of osteoporosis  
  Oxford / AGO LoE / GR: 5 D --