Role of Radiotherapy in Painful Bone metastases

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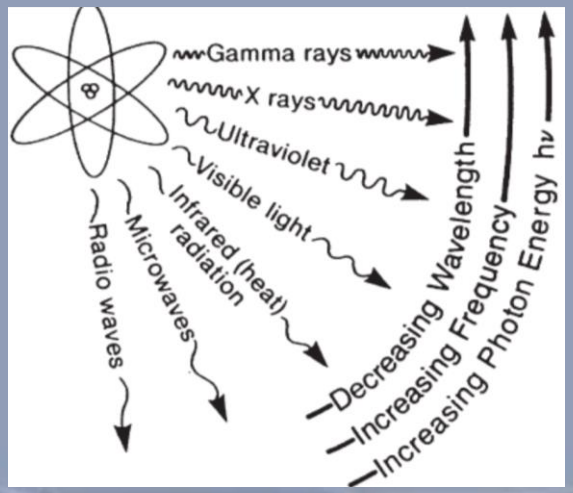
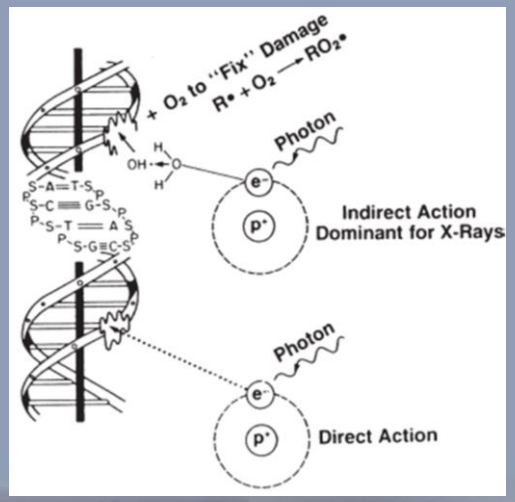
What is Radiotherapy?



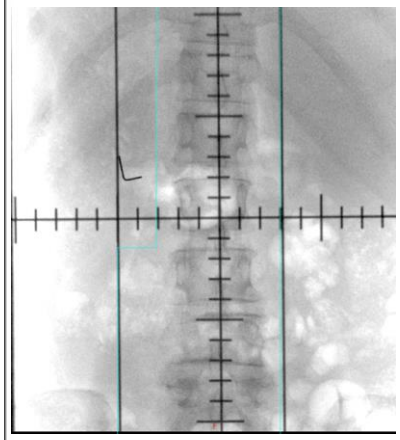


Goals of palliative treatment of bone metastases

- Pain relief
- Preservation of function
- Stabilized involved bone
- Decrease progressive bone loss
- Decrease or eliminate tumor proliferation

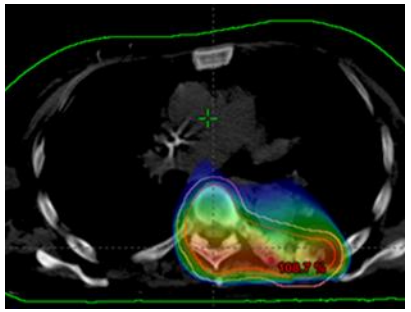
Radiotherapy in painful bone metastases

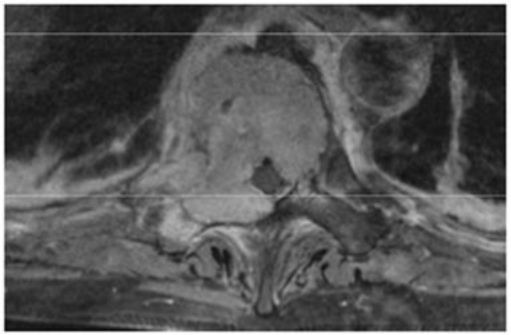
Conventional radiotherapy for spinal metastases

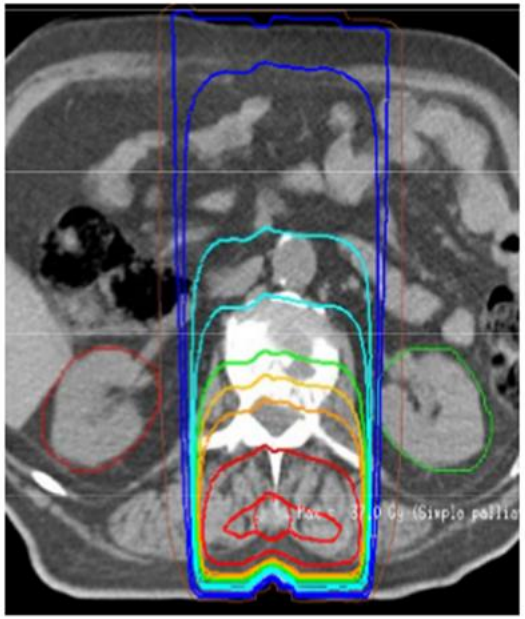


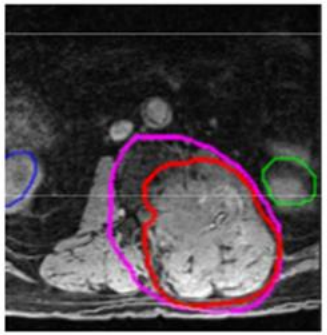
Conventional radiotherapy techniques for treatment of spine metastases

Single posterior field
1 x 8Gy 10 x 3Gy









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Radiotherapy in painful bone metastases

- Localized bone pain, radiotherapy is considered the standard treatment modality

Response of radiotherapy

- Overall pain relief with a 60–80% response was reported within 3 to 4 weeks
- Some patients the onset of pain relief is rapid, within days
- 40% of patients a temporary pain flare occurs
  - two-point increase of the worst pain score

Meta-analysis: multiple vs single fraction

- 30 Gy in 10 fractions (3Gy/F)
- 24 Gy in 6 fractions (4Gy/F)
- 20 Gy in 5 fractions (4Gy/F)
- 8 Gy in 1 fraction

	Single Fraction	Multiple Fractions	P Value
Overall Response	58%	59%	0.60
Complete Response	23%	24%	0.51
Pathologic Fracture*	3.2%	2.8%	0.75
Cord Compression*	2.8%	1.9%	0.13
Retreatment	20%	8%	<0.00001

Radiotherapy in painful bone metastases

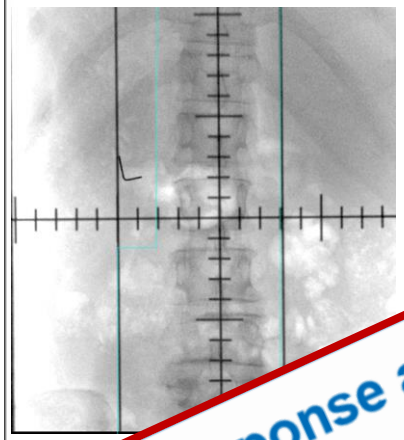
Conventional radiotherapy for spinal metasta

Conventional radiothera

for treatment o

~70%

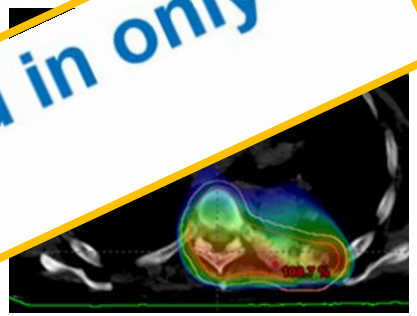
~35%

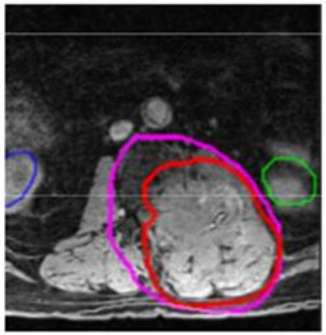


• Pain response after conventional RT:

• HOWEVER, pain control after 3 – 6 months:

Complete pain response is achieved in only 25 – 40% of the patients





Stereotactic Body RadioTherapy (SBRT)

Stereotactic ABlative Radiotherapy (SABR)

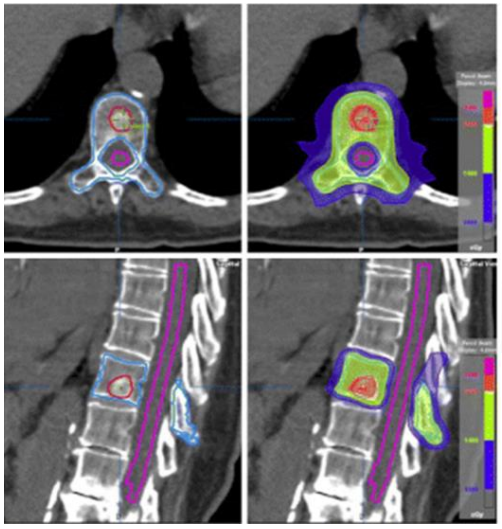
= high dose radiation per day (≥ 7-10 Gy)

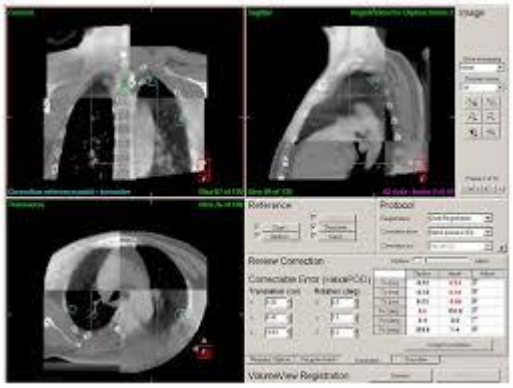
= small number of fraction (≤ 10 fractions)

Advanced Radiation Technique

- Immobilization

- Planning system & Radiotherapy Machine & IGRT





ASTRO guideline for SBRT-spine

Table 3. Suggested inclusion and exclusion criteria for patients enrolled in trials to evaluate stereotactic body radiotherapy for spinal bone metastases

Characteristic	Inclusion	Exclusion
Radiographic	1) Spinal or paraspinal metastasis by MRI (50, 51) 2) No more than 2 consecutive or 3 noncontiguous spine segments involved (50–53)	1) Spinal MRI cannot be completed for any reason (50, 51) 2) Epidural compression of spinal cord or cauda equina 3) Spinal canal compromise >25% (58) 4) Unstable spine requiring surgical stabilization (50, 51, 54, 57) 5) Tumor location within 5 mm of spinal cord or cauda equina (50, 51) (relative*)
Patient	1) Age ≥18 y (50, 54) 2) KPS of ≥40–50 (50, 51, 54, 55) 3) Medically inoperable (or patient refused surgery) (50, 51)	1) Active connective tissue disease (50) 2) Worsening or progressive neurologic deficit (50–52, 57) 3) Inability to lie flat on table for SBRT (50–52) 4) Patient in hospice or with <3-month life expectancy
Tumor	1) Histologic proof of malignancy (50, 51, 56) 2) Biopsy of spine lesion if first suspected metastasis 3) Oligometastatic or bone only metastatic disease (50)	1) Radiosensitive histology such as MM[50-52] 2) Extraspinal disease not eligible for further treatment[51]
Previous treatment	Any of the following: 1) Previous EBRT <45-Gy total dose 2) Failure of previous surgery to that spinal level (50–52) 3) Presence of gross residual disease after surgery	1) Previous SBRT to same level 2) Systemic radionuclide delivery within 30 days before SBRT (50–52) 3) EBRT within 90 days before SBRT (50–52) 4) Chemotherapy within 30 days of SBRT (50–53)

Clinical outcome: SBRT

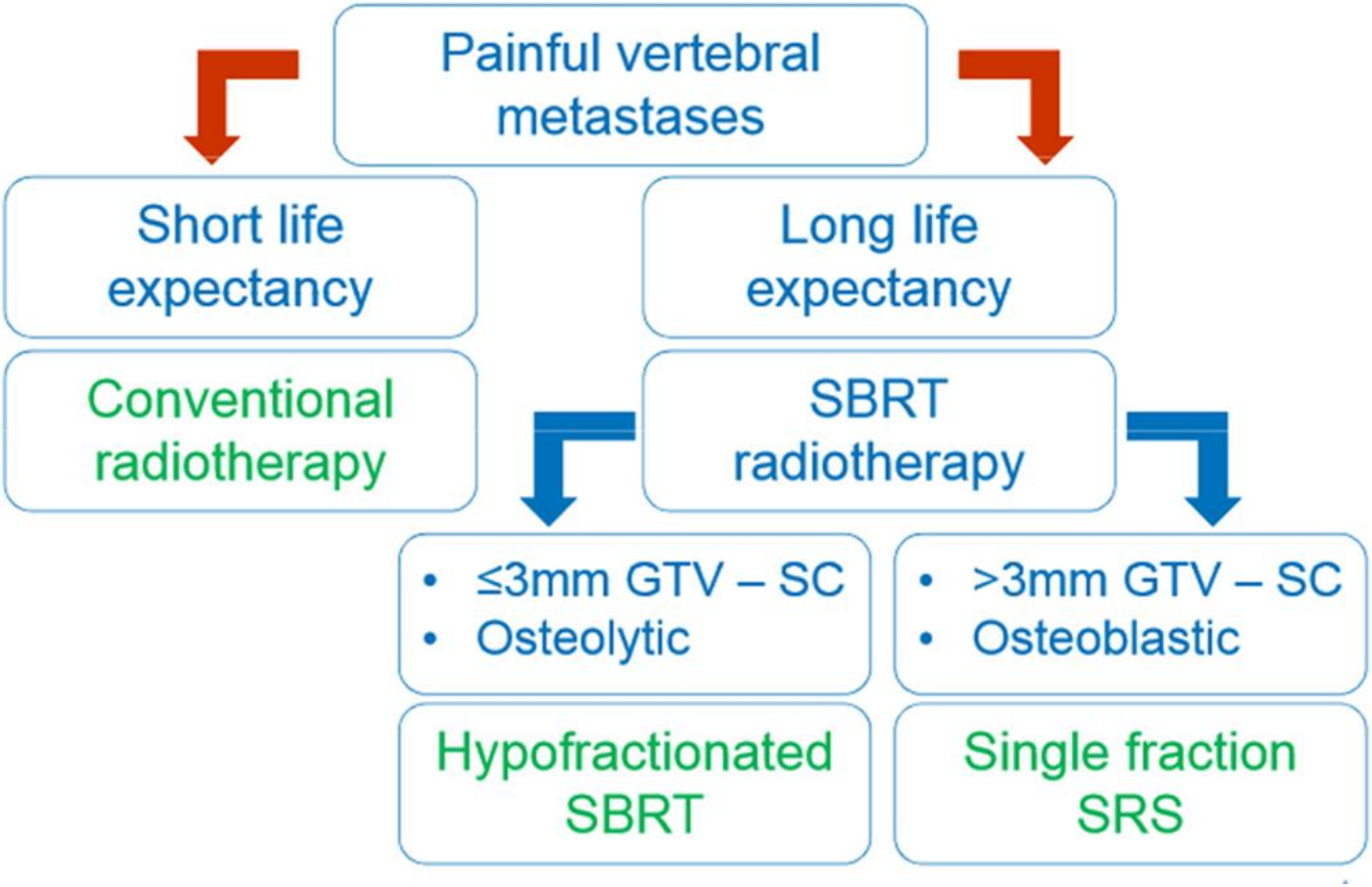
6. Clinical Outcome after spine SBRT

Spine SBRT as primary treatment

Study	# Pat / Tx	FU (months)	SBRT Dose	Local control
Ryu 2004 Henry Ford Hospital	49 / 61	6 – 24	1 x 10-16Gy	84% @ 1a
Gerszten 2007 Pittsburgh	49 / 65	Median 21	1 x 12.5 - 25Gy	90%
Chang 2007 M. D. Anderson	38 / -	Median 21	6 x 5Gy, 3 x 9Gy	84% @ 1a
Yamada 2008 MSKCC	93 / 103	Median 15	1 x 18 – 24Gy	90% @ 2a
Guckenberger 2009 Würzburg	14 / 16	Median 17	20 x 3Gy	89% @ 2a
Sahgal 2009 PMH / Stanford	14 / 23	Median 9	3 x 8Gy	78%

Promising local control rates between 80 – 90%

Working hypothesis for a spinal SBRT program



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Thank you for your attention