Myeloma: Solitary & Disseminated

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CURATIVE RADIOTHERAPY FOR SOLITARY PLASMACYTOMA

INTRODUCTION

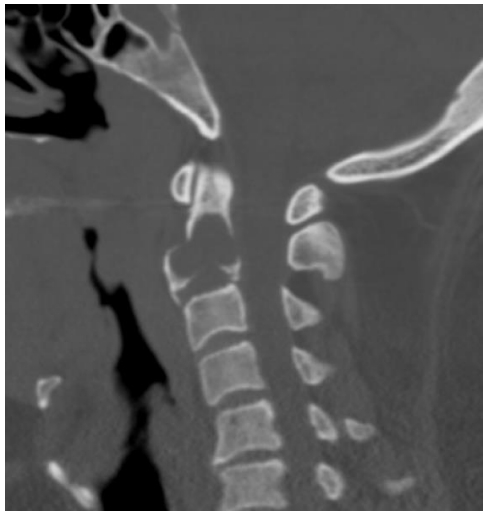
- **Solitary plasmacytoma** (**SP**) is a plasma cell disorder characterized by localized accumulation of neoplastic monoclonal plasma cells in bone, or in soft tissues, without any evidence of systemic involvement.

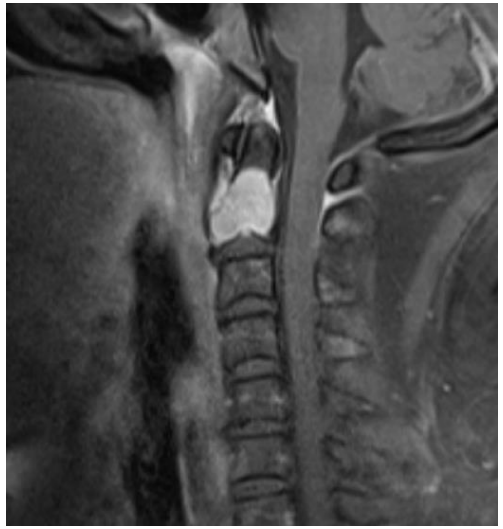
- **Subclinical bone marrow involvement** detected by sensitive tests such as flow cytometry predicts a **high rate of progression to MM** (56% to 70%) over a short period of time (2 to 3 years).

- **Rarely** a SP may be associated with **POEMS** syndrome (polyneuropathy, organomegaly, endocrinopathy, monoclonal plasma cell disorder, and skin abnormalities). Definitive RT can result in long-term local control of the plasmacytoma, with improvement of the symptoms of POEMS syndrome in up to 50% of the patients

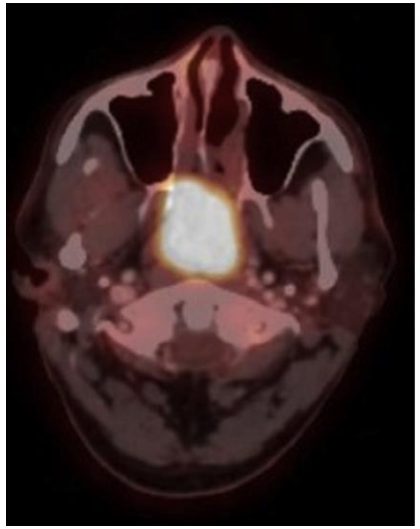
❑ Solitary Plasmacytomas have been classified into 2 groups:

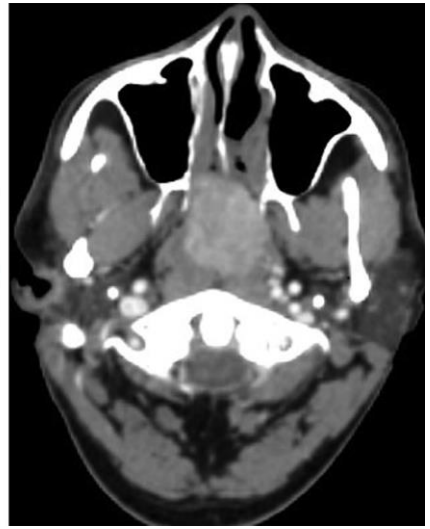
A) solitary bone plasmacytoma (SBP)
frequently occurs in the axial skeleton. Has a high risk of progression to MM, (65-84% @10 years).





B) solitary extramedullary plasmacytoma (SEP)
(20% to 30% of plasmacytomas), occurring mostly in the head and neck region. SEPs are often localized tumors, and RT achieves long-term control with a higher cure rate than SBP (MM progression of 10-30% @10 years).





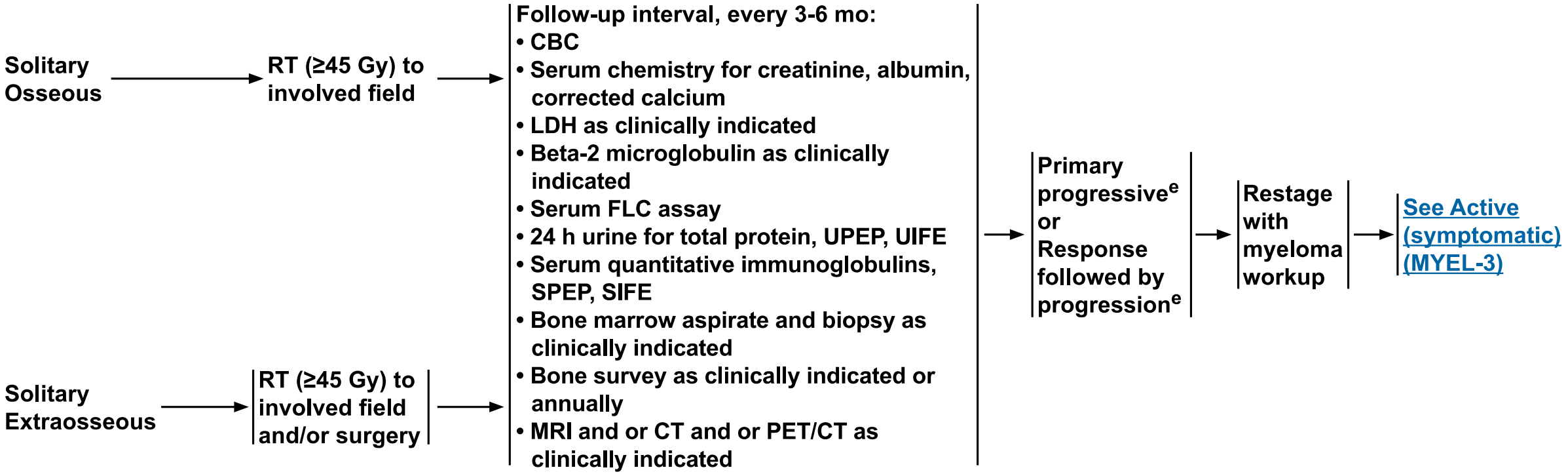
Staging of Solitary Plasmacytoma

Table 1 Diagnostic criteria for solitary plasmacytoma, as recommended by the International Myeloma Working Group (1). The diagnosis of solitary plasmacytomas is based on the exclusion of systemic plasma cell disorders.

Plasma cell disorder	Diagnostic criteria
Solitary bone plasmacytoma, or solitary extramedullary plasmacytoma	• Biopsy-proven solitary destructive lesion of bone or soft tissue mass of clonal plasma cells. • Absence of clonal plasma cells in bone marrow biopsy and aspirate. • Normal skeletal survey and magnetic resonance imaging (or computed tomography) of spine and pelvis (except for the primary solitary lesion) • If available positron emission tomography/computed tomography showing solitary lesion (2) • Absence of end-organ damage such as hypercalcemia, renal insufficiency, anemia, or bone lesions (CRAB) attributed to a plasma cell proliferative disorder
Solitary plasmacytoma with minimal marrow involvement	• As above but: • Clonal bone marrow plasma cells are detected but quantified to be <10%

Tsang RW, et al. ILROG guidelines, IJROBP 2018

Solitary Plasmacytoma



PROGNOSTIC FACTORS and CLINICAL EVOLUTION

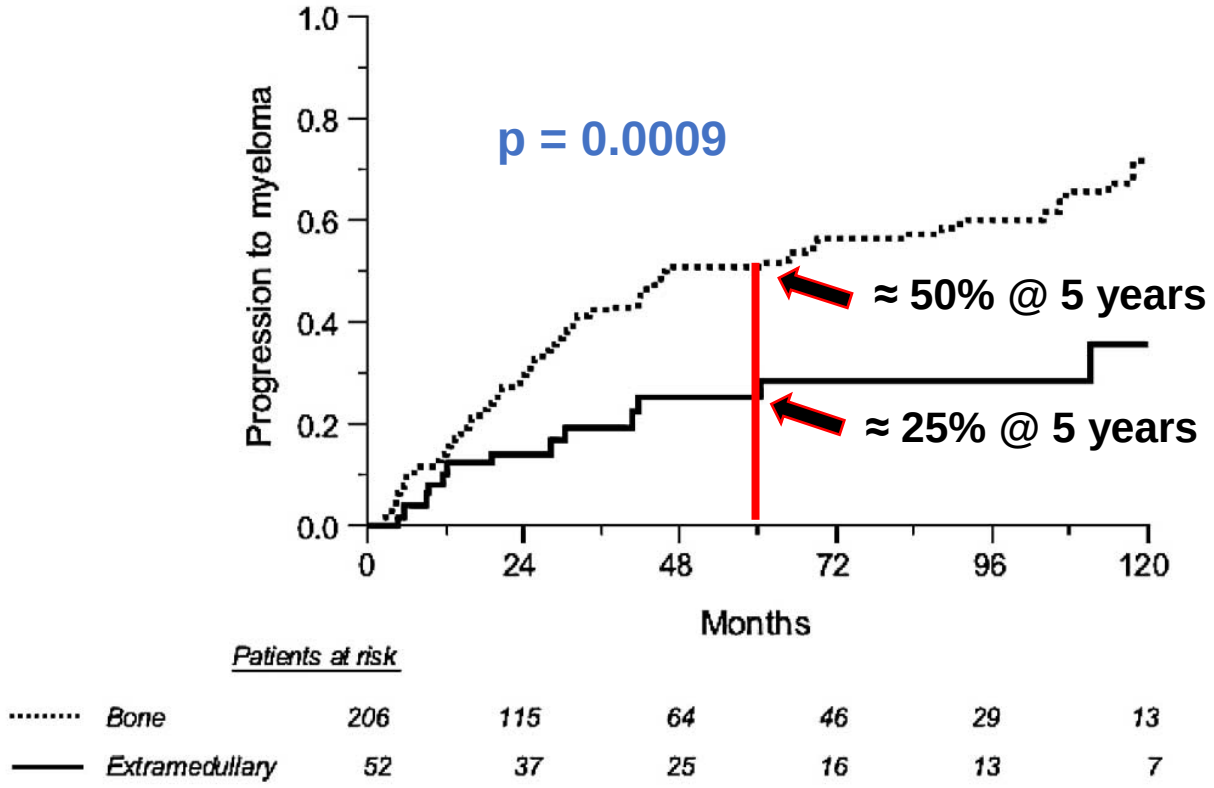
- **Microscopic disease extension**
  Sensitive tests (BM flow citometry, cytogenetics, MRI, PET-CT) encouraged to detect small tumor burden

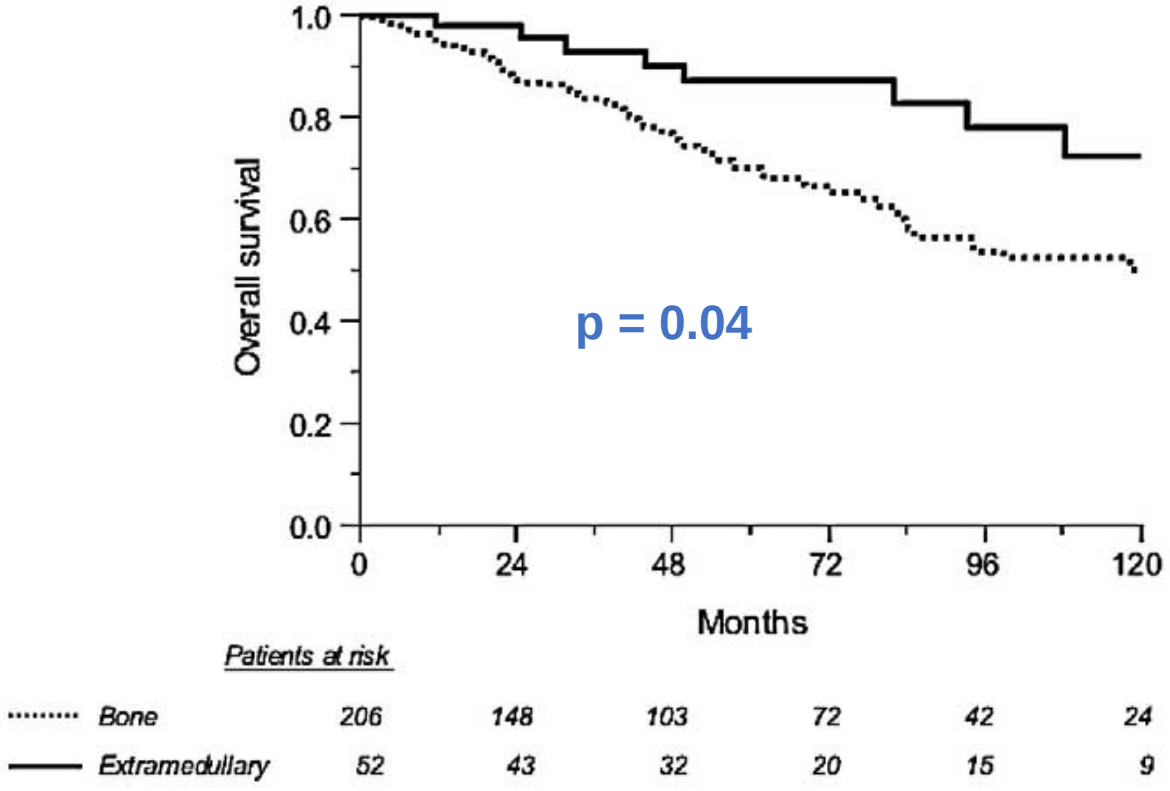
- **Identification of ≥2 separate plasmacytomas**
  presence of tumor burden (even small) away from SP suggests a high risk of evolution to MM in 2-3 years

- **Progression rate to MM following RT is more rapid in the first 3 years** (14% per year) than in the subsequent 7 years (3% to 4% per year), reaching a **10-year rate of 65%**. This suggests that **subclinical disease most likely existed in up to 40%** of these patients with SBP at the time of definitive RT.

Site of Disease

OUTCOMES AND PATTERNS OF FAILURE IN SOLITARY PLASMACYTOMA: A MULTICENTER RARE CANCER NETWORK STUDY OF 258 PATIENTS





Ozsahin M, et al. IJROBP 2006

RT dose

- Optimal dose of radiation for SP is not well established
  *(**poor methodology** due to small numbers and retrospective design)*
- Common practice: 40-50 Gy
- Sporadic local relapses for doses >50 Gy
- Lack of dose-response relationship for doses >35 Gy, particularly for lesions <5 cm

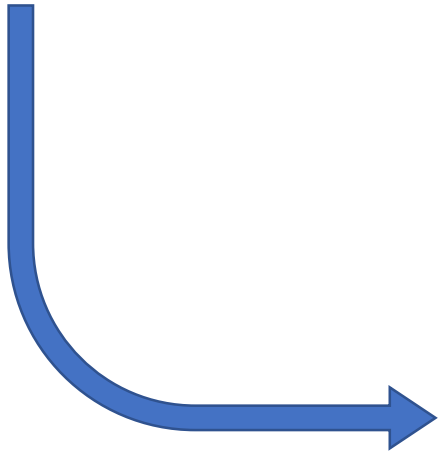


Table 2. Radiation therapy dose

	≤30 Gy	35 Gy	40–50 Gy
Osseous	5 (16%)	15 (47%)	12 (37%)
Soft tissue	2 (14%)	12 (86%)	0

Tsang RW, et al. IJROBP 2001

Combined Chemo/Radiation

- ***"High risk"*** patients (subclinical systemic disease at diagnosis) ***may benefit from systemic therapy*** upfront, with or without RT depending on the clinical situation.

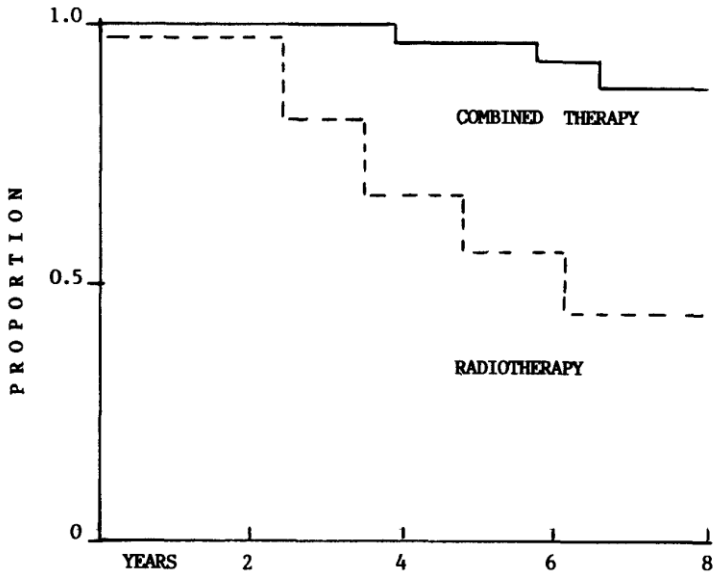
- Yet **some argue** that MM with **minimal disease** burden and absence of symptoms **remains incurable**; therefore the **SP should still be treated with definitive RT** with deferred systemic therapy until symptomatic progression to MM.

- In practice, the **decision to give systemic therapy** is made by the attending hematologist and should be **individualized** based on considering other important factors which may indicate a biologically aggressive or clinically unfavorable disease, such as:
  - age
  - performance status
  - size and location of the SP
  - monoclonal protein level, and molecular or cytogenetic characterization (if available)

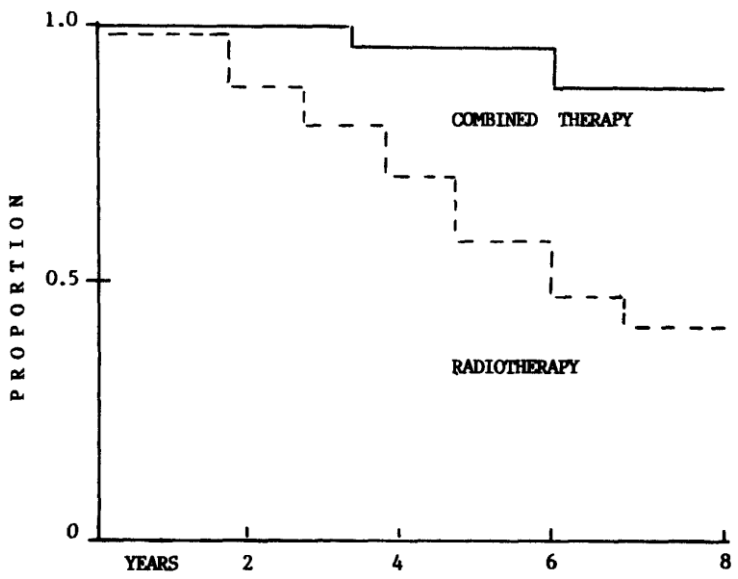
Combined Chemo/Radiation

IMPROVED OUTCOME IN SOLITARY BONE PLASMACYTOMATA WITH COMBINED THERAPY

Progression Free Survival



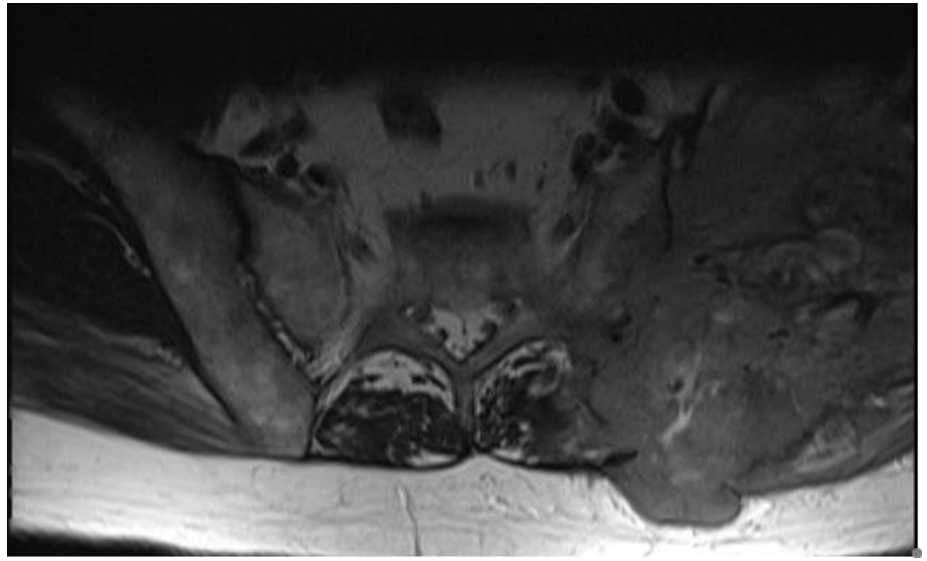
OverallSurvival

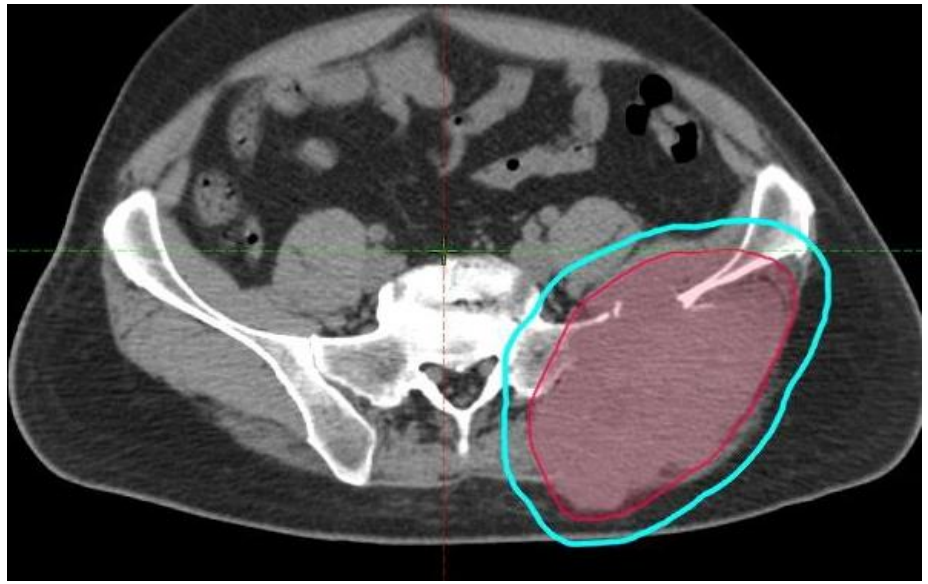


- Randomized Controlled Trial
- 53 patients affected with SBP
- **RT (40-50 Gy) +/- adjuvant melphalan (every 6 weeks for 3 years)**
- The use of adjuvant chemotherapy after RT improved duration of remission and survival without severe side effects.
- The group was **too small to draw definitive conclusion** and more trials are necessary to confirm the role of systemic therapies in this setting.

Aviles A, et al. Hematol Oncol 1996

Radiation Volumes



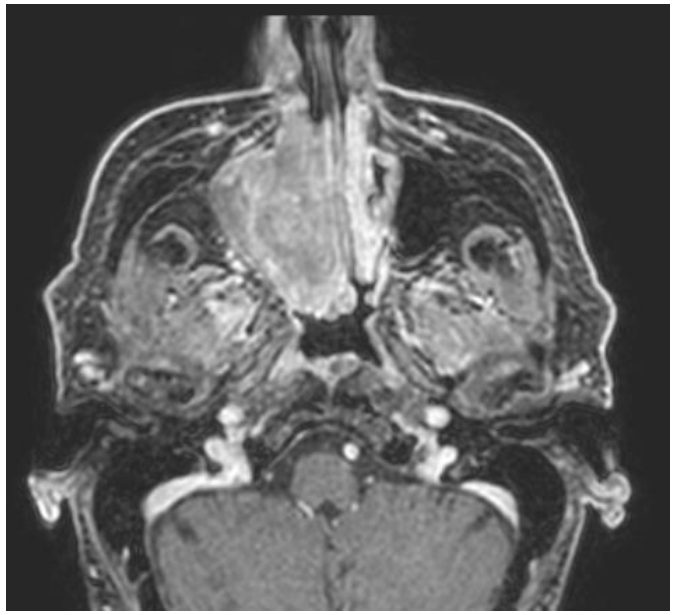


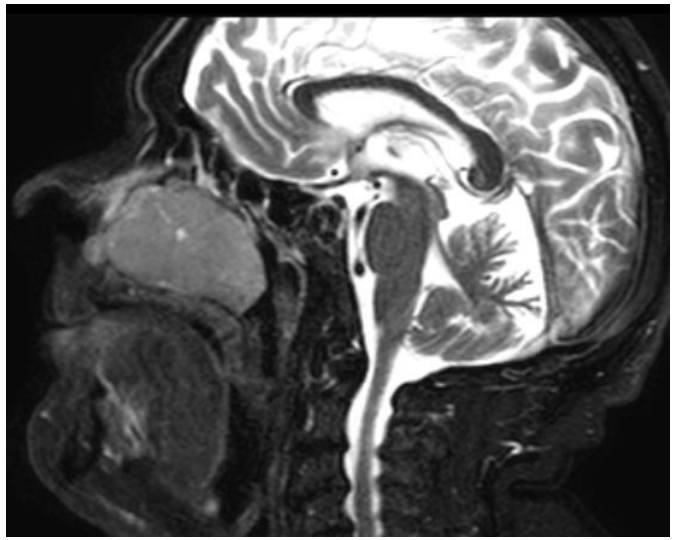
- Current recommendations favor radiation fields encompassing **only the primary lesions**, with generous margins (1.5-2cm) to cover both the osseous and soft tissue extensions of the tumor (other than the entire involved bone)

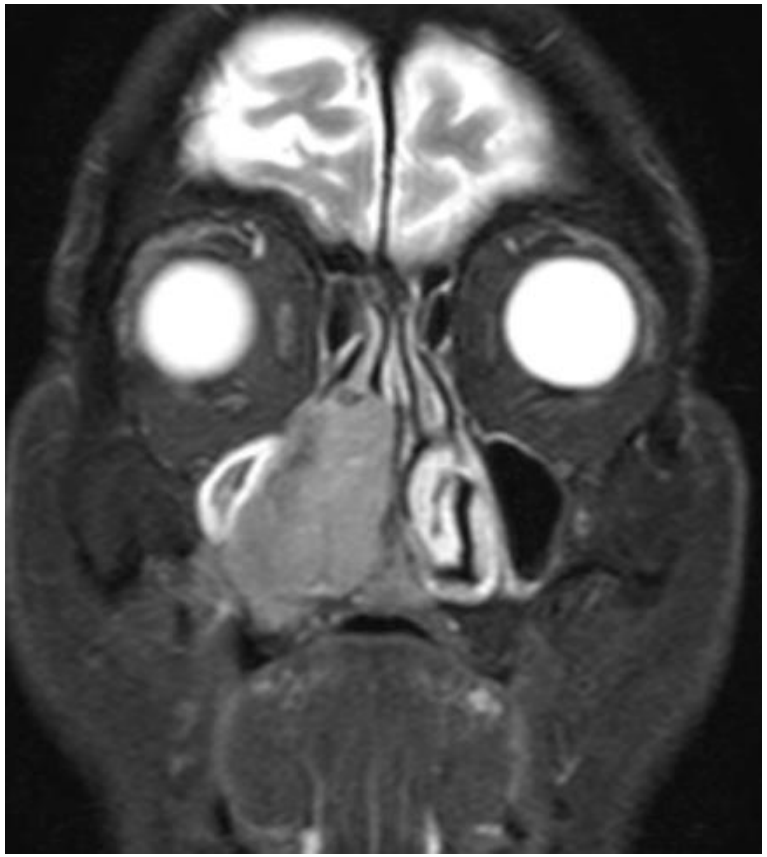
- **Prophylactic regional nodes irradiation is not necessary** in SBP, as isolated regional node failure is low after local RT without intentional coverage of adjacent nodes

- **Elective nodal irradiation is not routinely indicated** in EMP patients, unless regional nodes are clinically involved or considered at high risk

Solitary Extraosseus Plasmacytoma

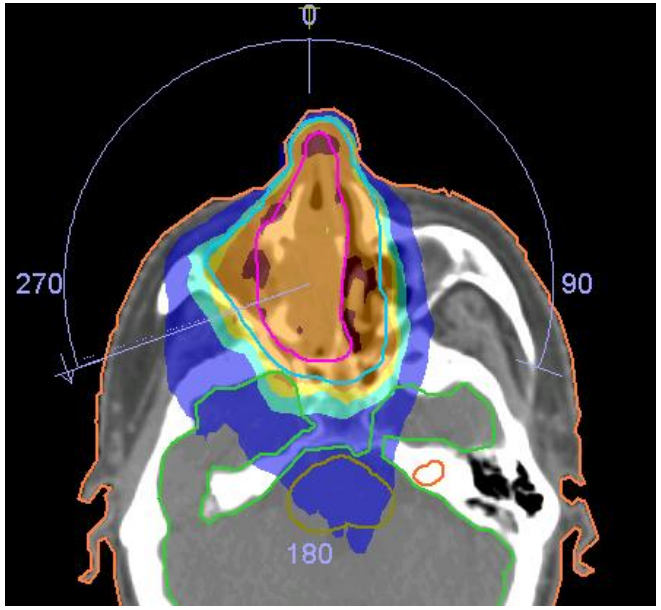


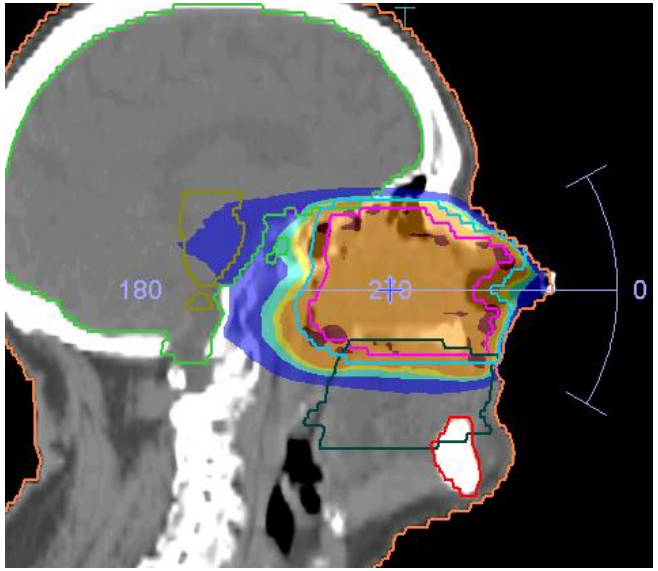


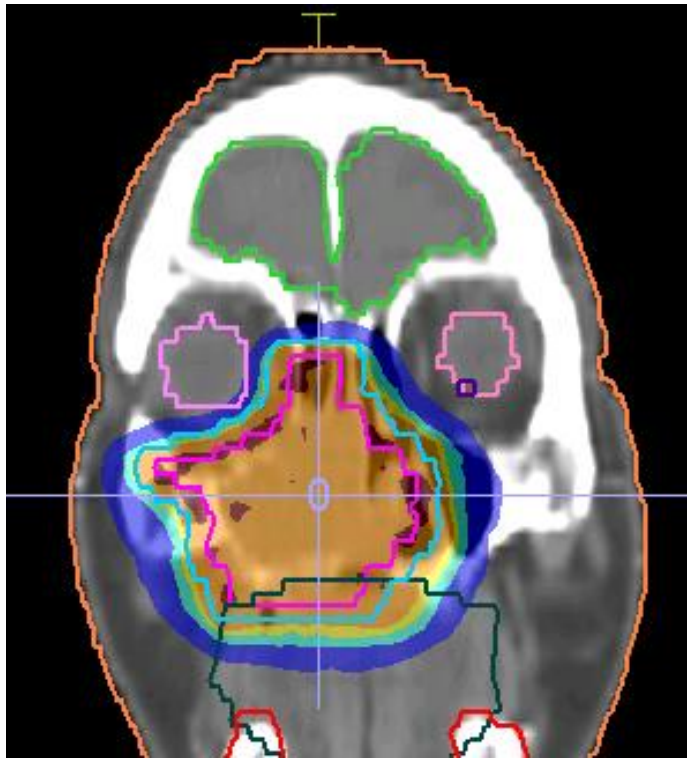


- 79 years old patient
- Nasal plasmacytoma
- Isolated lesion
- BCC in range
- BOM negative

Solitary Extraosseus Plasmacytoma







- ❑ **Treatment: Exclusive RT**
- ❑ **Prescribed dose: 44 Gy/22 fractions**
- ❑ **IMRT/VMAT**

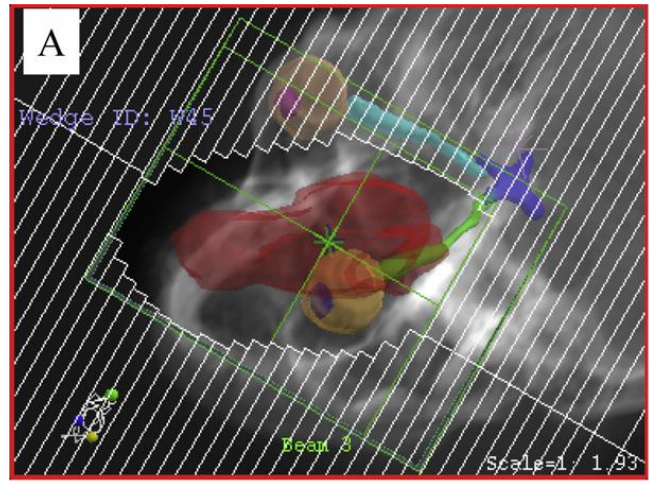
MULTI-INSTITUTIONAL ANALYSIS OF SOLITARY EXTRAMEDULLARY PLASMACYTOMA OF THE HEAD AND NECK TREATED WITH CURATIVE RADIOTHERAPY

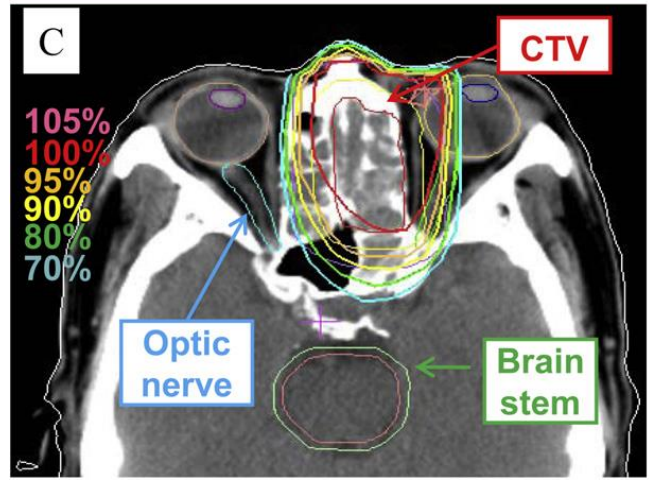
- 67 patients
- 1983-2008
- Japanese cohort
- Median RT dose 50 Gy

Table 1. Patients and tumor characteristics

	Number	Percentage (%)
Age	12–83 (64)*	
Gender (M/F)	43/24	
ECOG performance status (0/1/2/unknown)	46/18/1/2	
Tumor size	1–10 cm (3.5)*	
Sites		
Nasal/paranasal	36	54
Oropharynx	9	13
Nasopharynx	7	10
Orbita	6	9
Larynx	3	5
Salivary glands	2	3
Lymph nodes	2	3
Middle ear	1	1.5
Thyroid	1	1.5
Positive for M protein	15/59	22
Positive for Bence-Jones proteins	2/56	4
Concomitant disease		
Amyloidosis	2/67	3

* median age, median tumor size.





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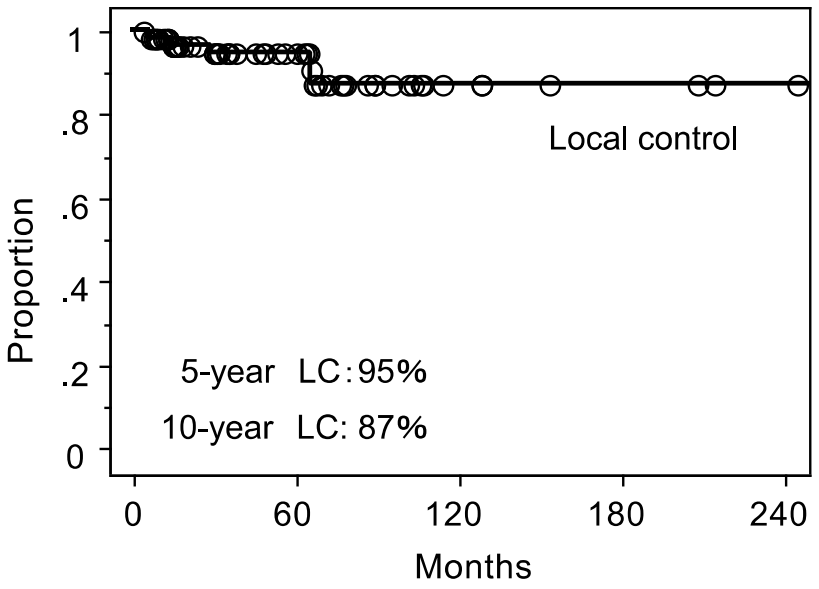
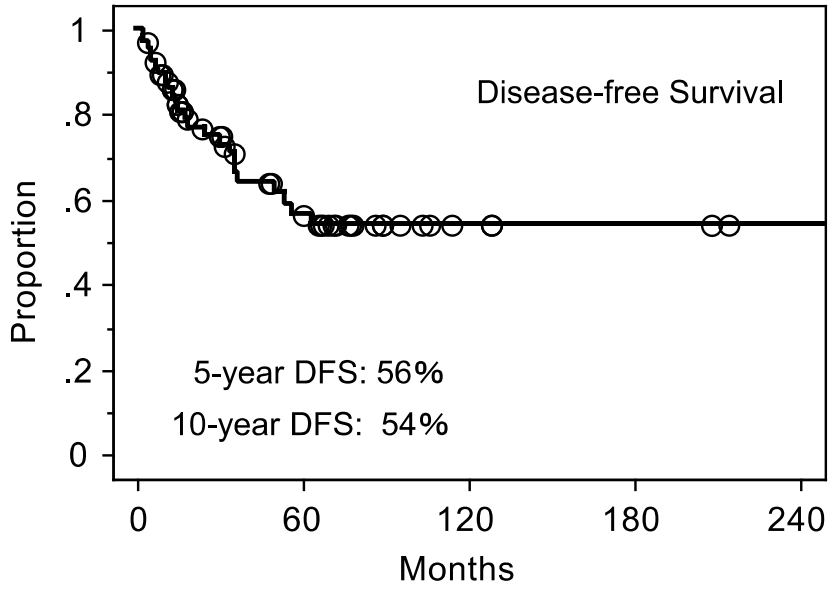
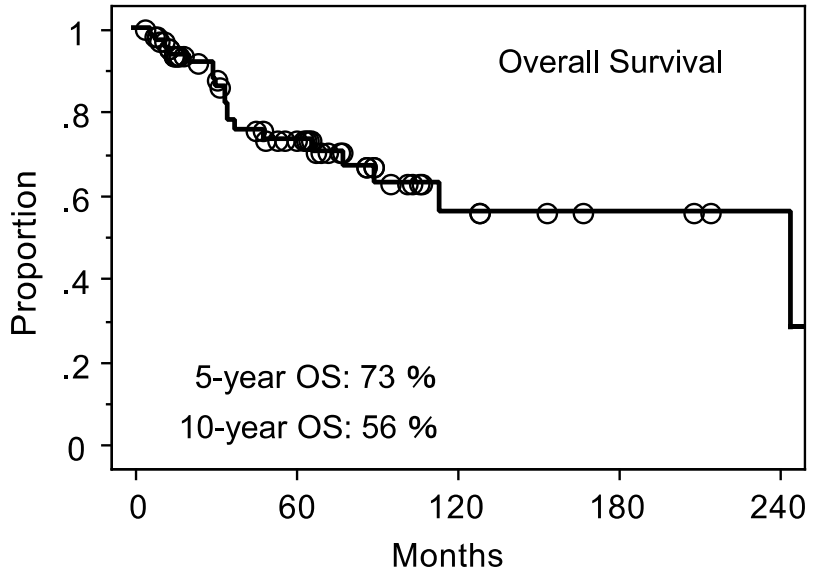






Sasaky et al. IJROBP 2012;82(2):626-634

MULTI-INSTITUTIONAL ANALYSIS OF SOLITARY EXTRAMEDULLARY PLASMACYTOMA OF THE HEAD AND NECK TREATED WITH CURATIVE RADIOTHERAPY

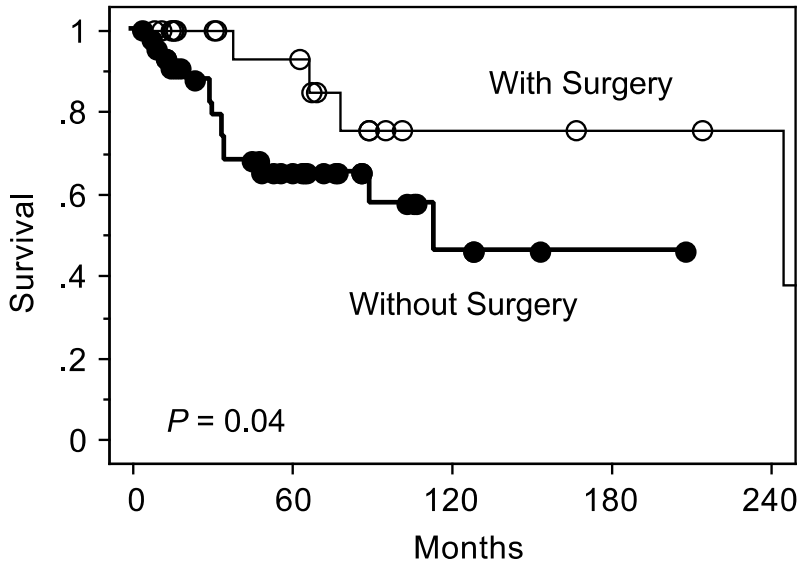


Table 6. Adverse effects after the radiotherapy according to CTCAE ver. 3.0

	Grade					
	0	1	2	3	4	5
Dermatitis	9	27	8	0	0	0
Mucositis	10	20	13	1	0	0

Table 5. Prognostic factors for overall survival

Prognostic factors	*p* value
Tumor size	
≤5 cm (*n* = 45) vs. >5 cm (*n* = 13)	0.59
Age	
≤50 (*n* = 15) vs. >51 (*n* = 52)	0.3
Gender	
Male (*n* = 43) vs. female (*n* = 24)	0.95
Radiation dose	
≤40 Gy (*n* = 13) vs. >40.1 Gy (*n* = 54)	0.82
≤45 Gy (*n* = 17) vs. >45.1 Gy (*n* = 50)	0.73
≤50 Gy (*n* = 56) vs. >50.1 Gy (*n* = 11)	0.72
Surgery	
With surgery (*n* = 23) vs. without surgery (*n* = 44)	0.04
Chemotherapy	
With chemotherapy (*n* = 9) vs. without chemotherapy (*n* = 58)	0.75

Sasaky et al. IJROBP 2012;82(2):626-634

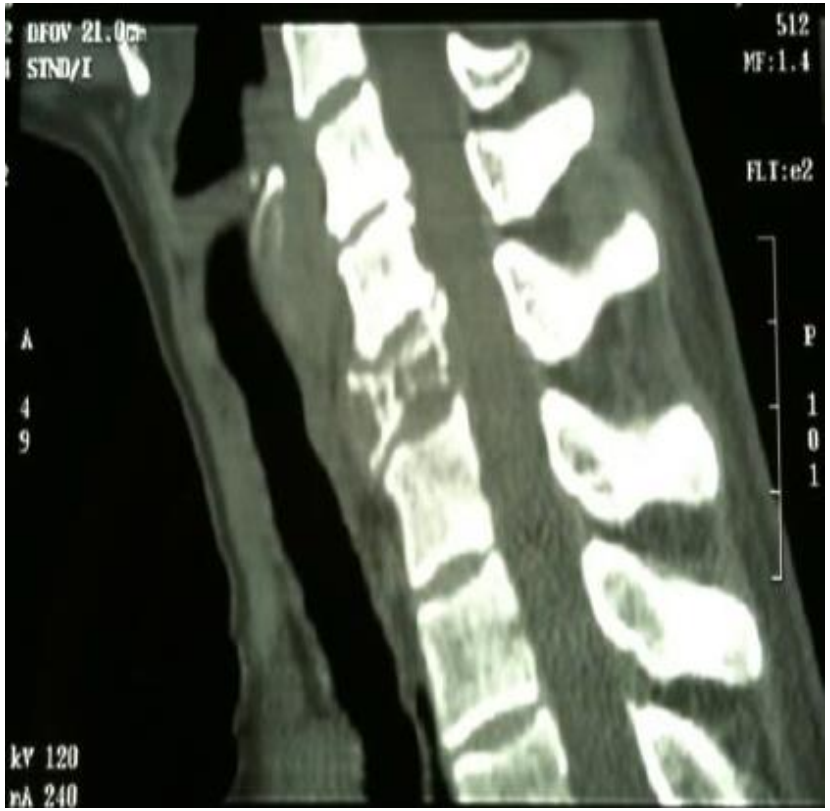
MULTI-INSTITUTIONAL ANALYSIS OF SOLITARY EXTRAMEDULLARY PLASMACYTOMA OF THE HEAD AND NECK TREATED WITH CURATIVE RADIOTHERAPY

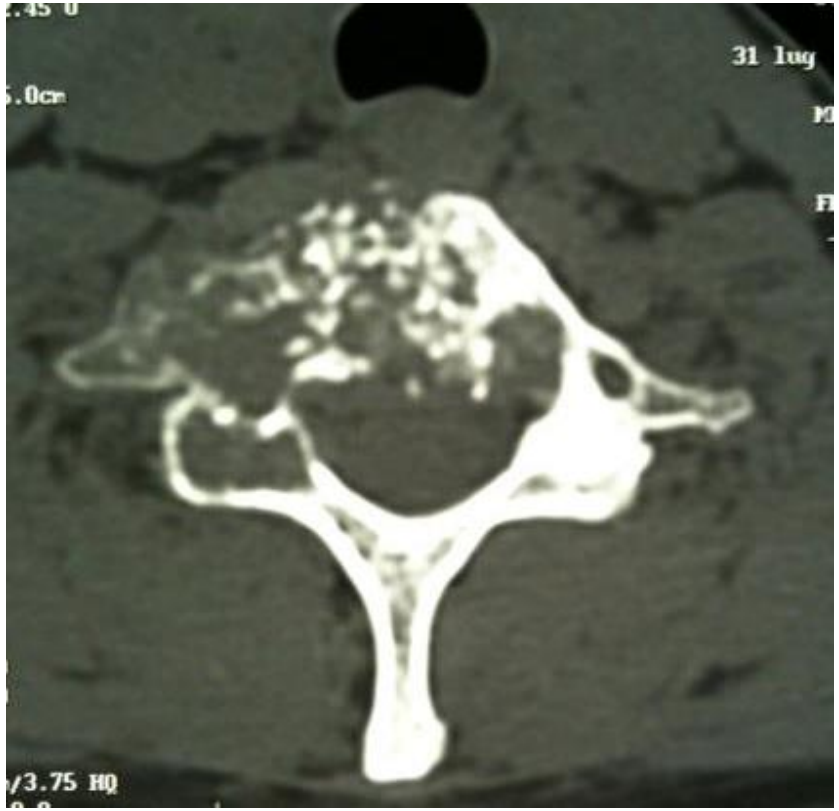
Table 7. Comparison and reviews of literatures for plasmacytoma of the head and neck

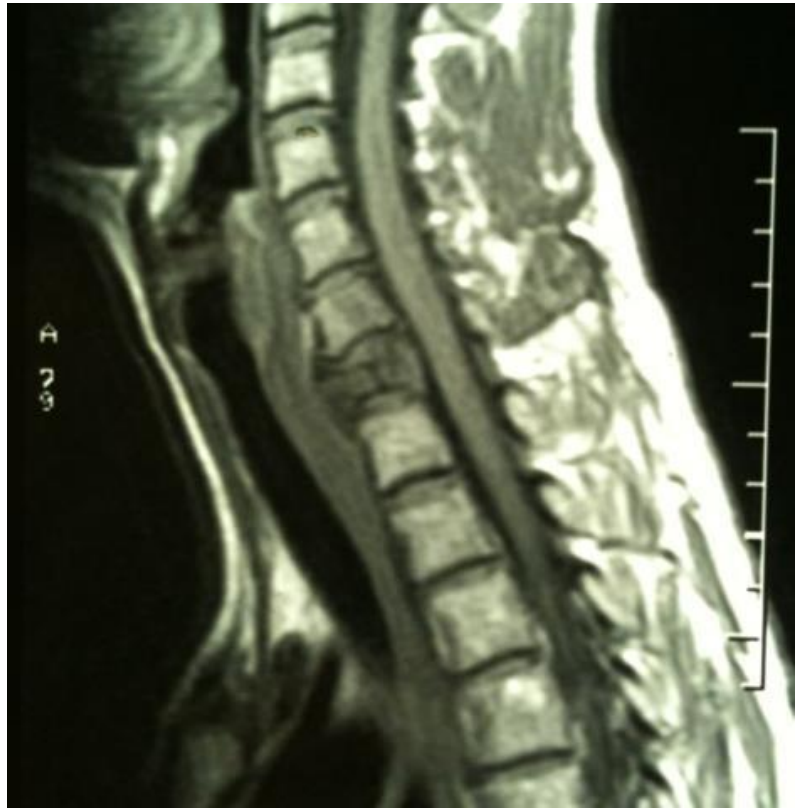
Series (ref.)	Year	Institution	Numbers of patients	Follow-up (m)	Dose (median)	OS (%)		LCR (%)		DFS (%)	
						5-y	10-y	5-y	10-y	5-y	10-y
Liebross (4)	1999	Single	22	44	40–60 (50)	73	50	95	95	56	NA
Chao (37)	2005	Single	16	66	40–50.4 (45)	85	54	100	100	75	75
Tournier-Rangeard (32)	2006	Single	17	80	40–65 (52.6)	82	63	88	73	64	54
Bachar (41)	2008	Single	68	96	10–50 (35)	76	56	91	88	NA	NA
Creach (34)	2009	Single	18	82	34–56 (50.4)	80	54	NA	NA	74	53
Present study	2010	Multiple	67	63	30–60 (50)	73	56	95	87	56	54

Abbreviations: DFS = disease-free survival; LCR = local control rate; OS = overall survival.

Solitary Osseus Plasmacytoma







BMC Cancer

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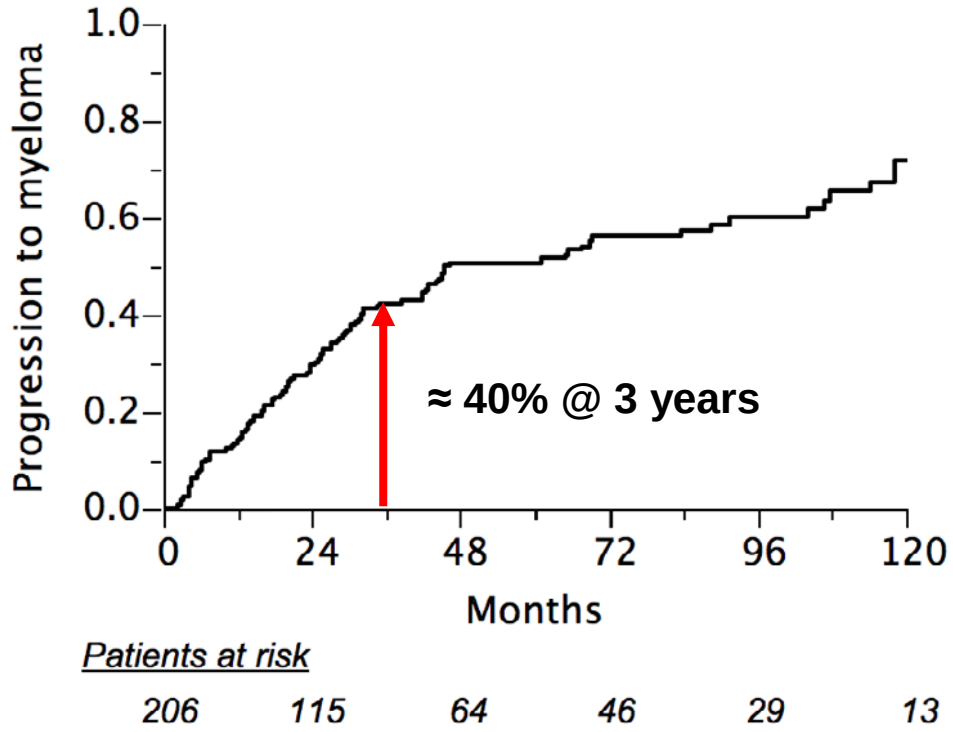
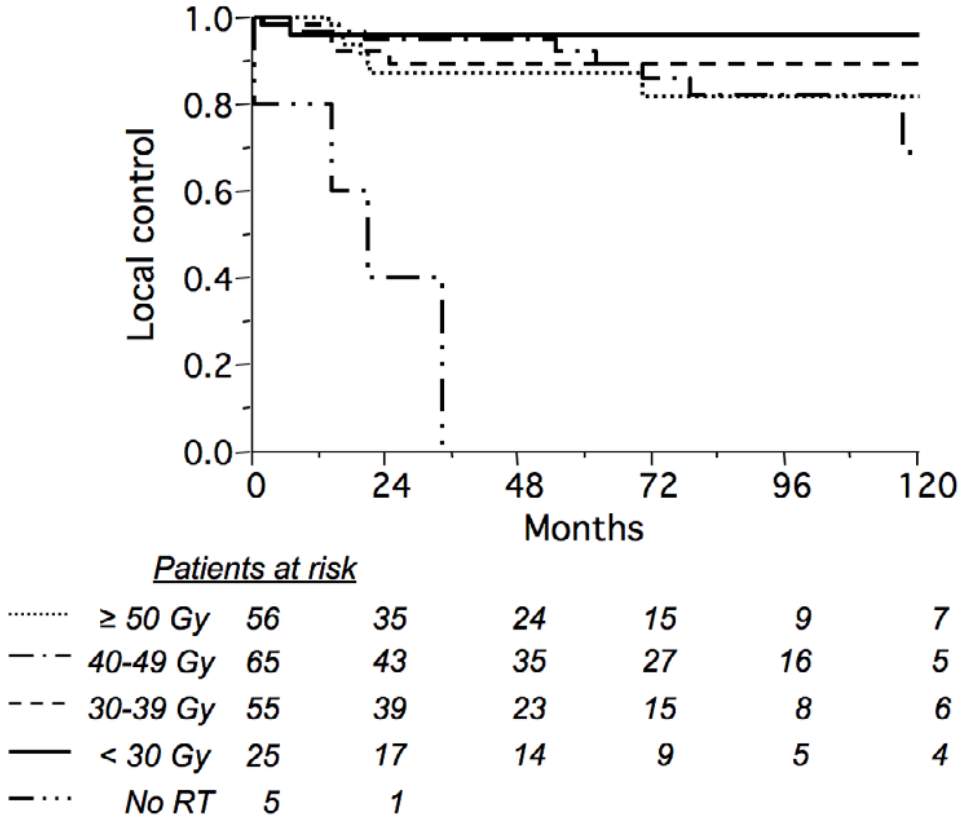
Prognostic factors in solitary plasmacytoma of the bone: a multicenter Rare Cancer Network study

❑206 patients





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Prognostic Factors

Research article

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Prognostic factors in solitary plasmacytoma of the bone: a multicenter Rare Cancer Network study

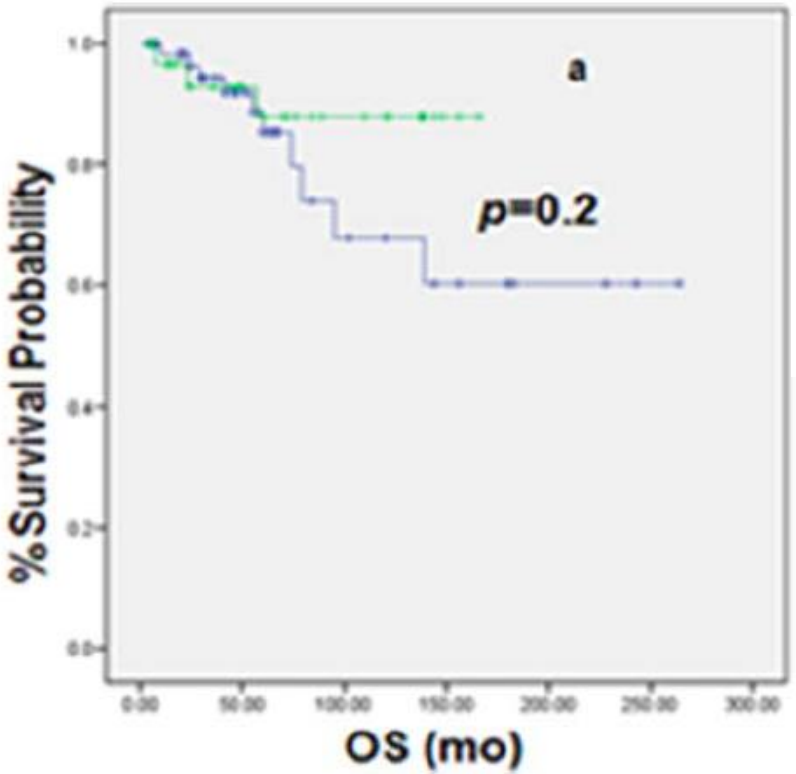
Table 4: Multivariate analysis* (Cox model) in 201 irradiated patients

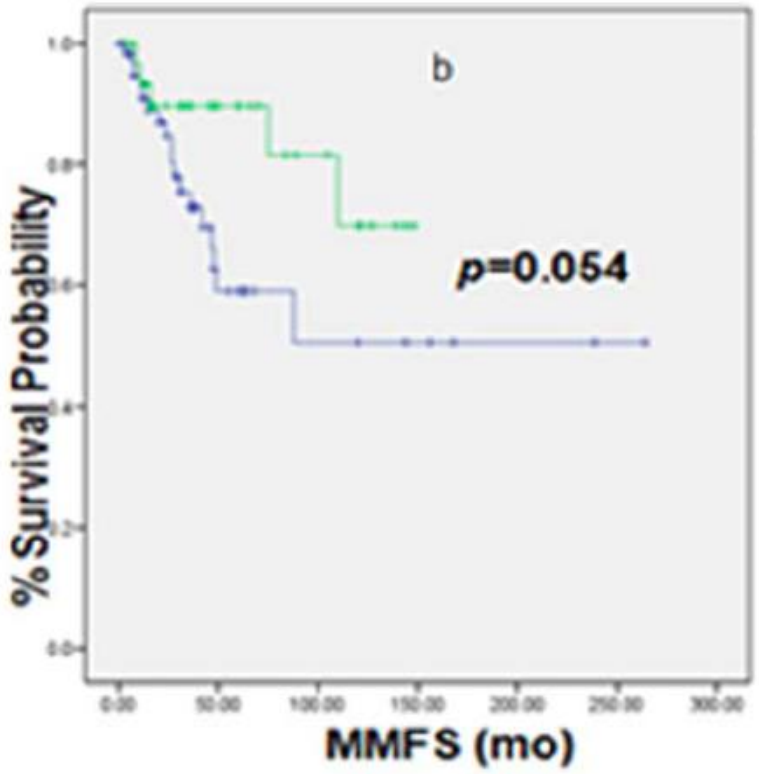
Covariable	OS RR	*p-value*	DFS RR	*p-value*	LC RR	*p-value*	MM RR	*p-value*	comment
Age (years)	0.59	<0.00001	0.79	0.02	-	-	0.78	0.01	≤ 60 years better
Localization (vertebra *vs.*other)	-	-	-	-	0.63	0.04	-	-	vertebra better
Tumor size (cm) (<5 *vs.* ≥5)	0.56	0.0007	-	-	-	-	-	-	<5 cm better

AJH

Clinical features, outcome, and prognostic factors for survival and evolution to multiple myeloma of solitary plasmacytomas: A report of the Greek myeloma study group in 97 patients

- 82 patients (82.5%) received RT
- Median RT dose 40 Gy
- 1991-2013





Bone

Extramedullary

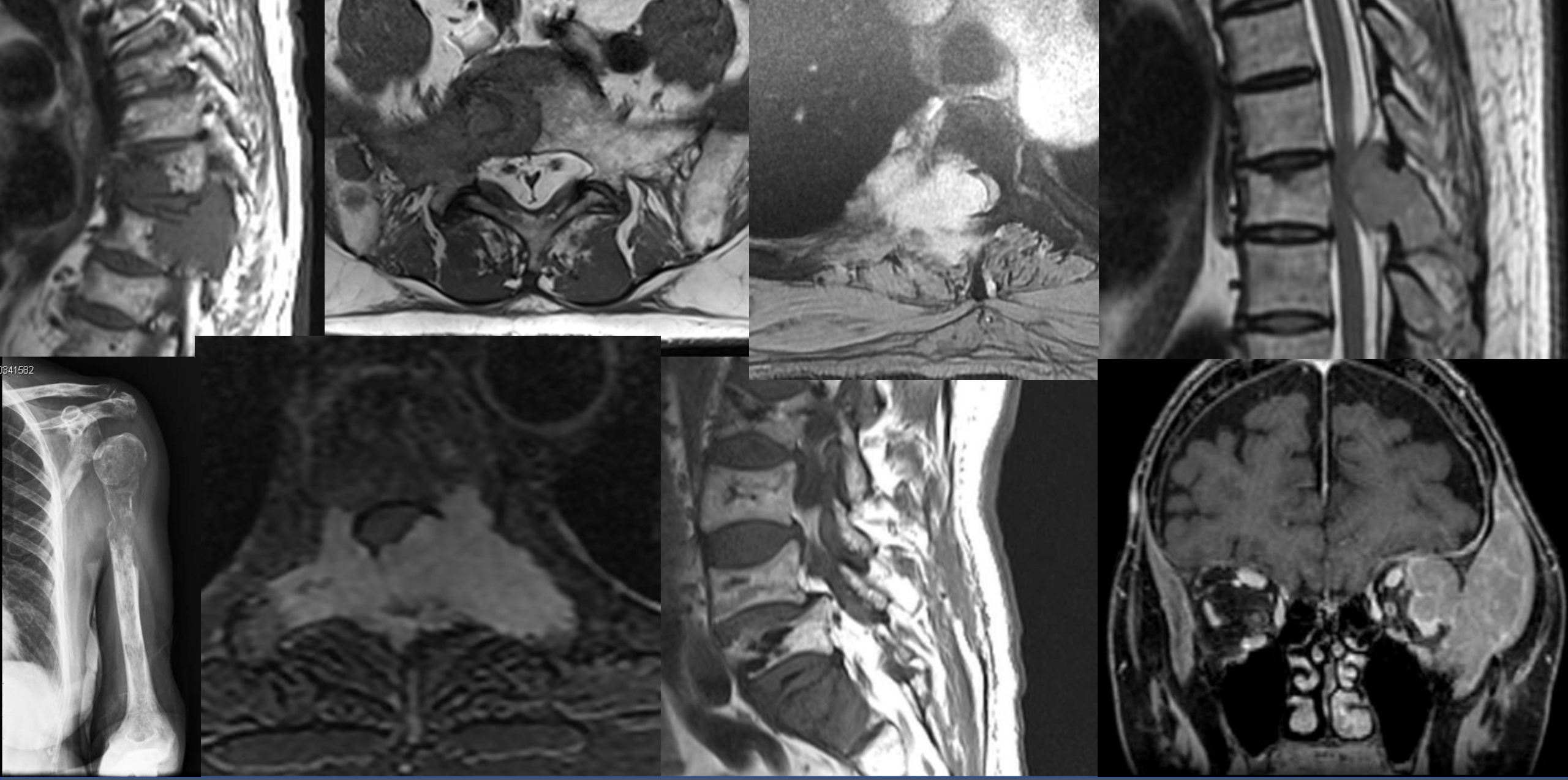
Future directions

- The addition of adjuvant novel agents to RT, such as proteasome inhibitors or immunomodulatory drugs (eg, lenalidomide), is a theoretically attractive approach, both in enhancing local control and possibly eradicating subclinical disease in patients with SP to prevent the development of systemic MM

- Preliminary data suggest feasibility and effectiveness of a combined approach

- This approach will be under active investigation in the United Kingdom in a phase 3 study, examining the potential role of lenalidomide with dexamethasone in improving progression-free survival

PALLIATIVE RADIOTHERAPY FOR MULTIPLE MYELOMA



DEPARTMENT OF
ONCOLOGY
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Role of RT in Multiple Myeloma

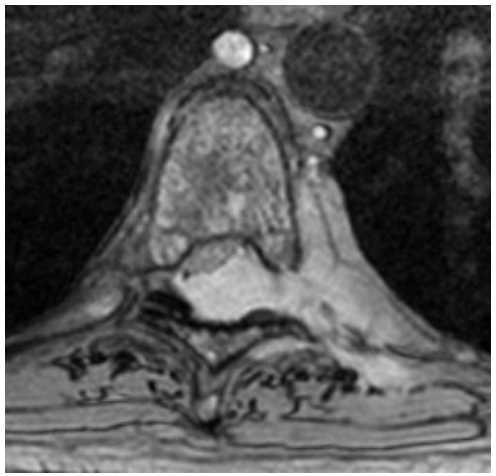
1) Prompt and highly effective modality in the **palliation of painful** bony lesions and **mass effects** from soft tissue extensions

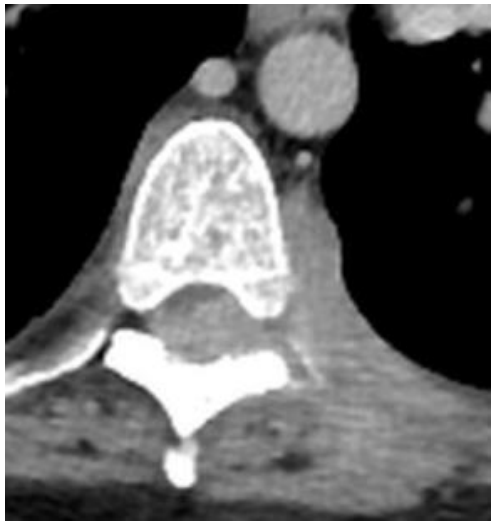
2) Efficacy in the **control of lytic** bone lesions

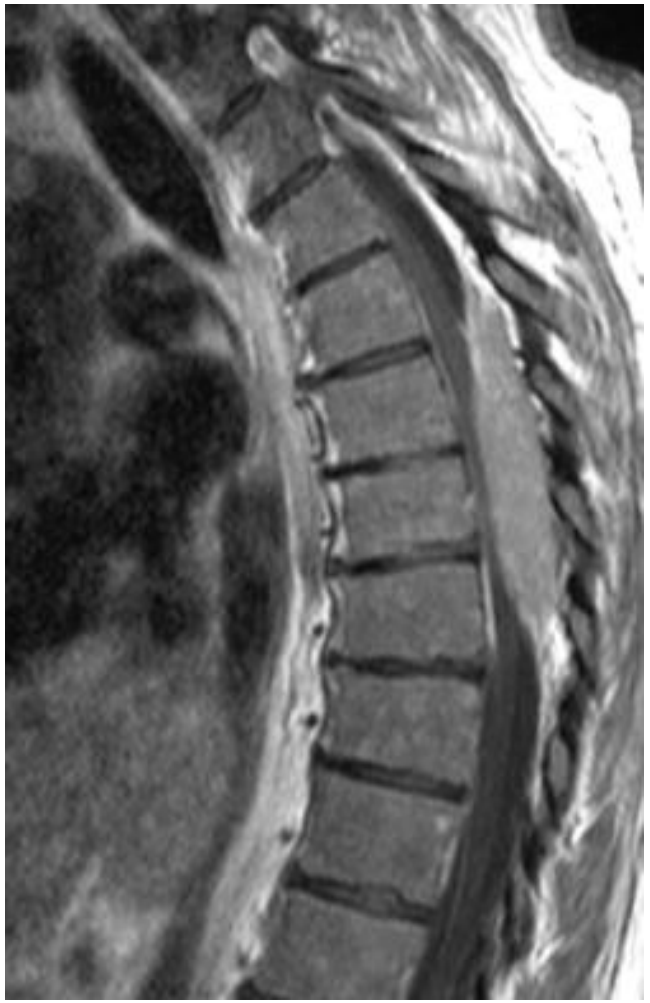
3) Efficient in **reversing** the morbidity of **spinal cord** and nerve root **compression**

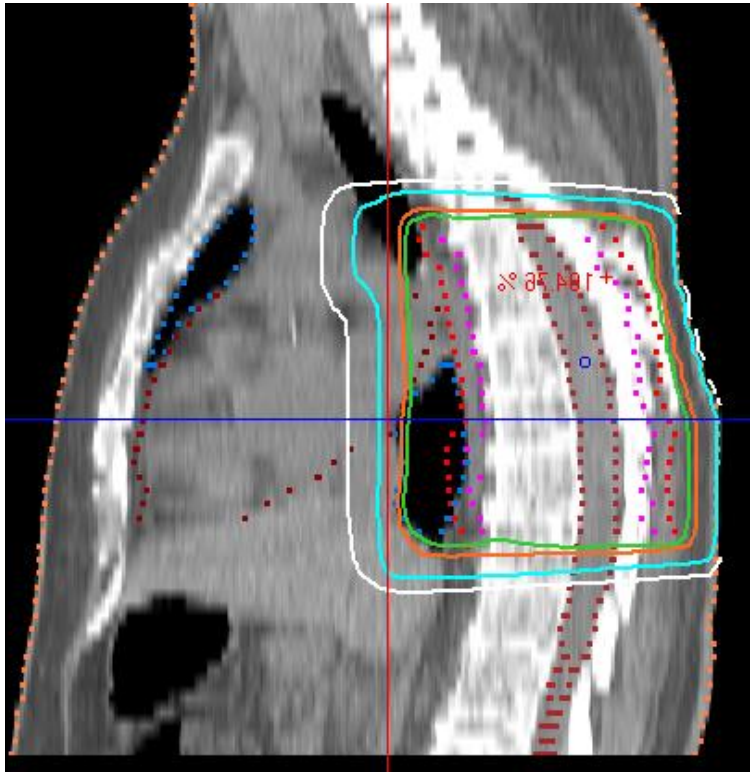
Example of Palliative RT for Multiple Myeloma @ University of Torino

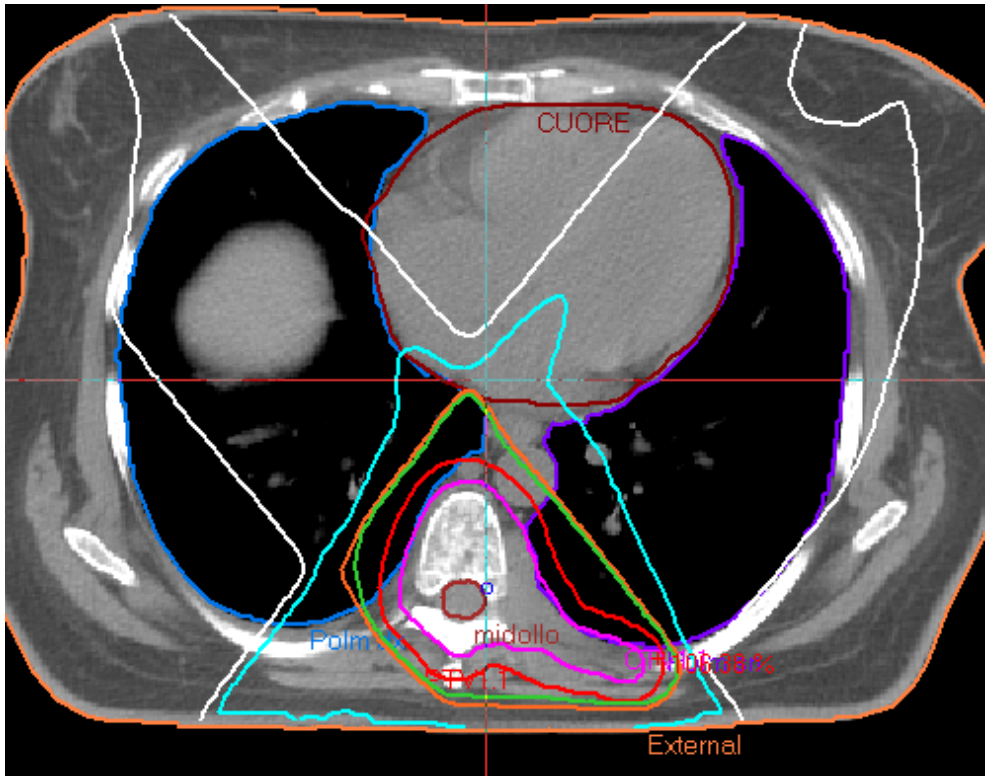
- 40 years old female
- No previous history of cancer.
- Abrupt dorsal pain + left leg weakness and paresthesia that required hospitalization
- PCC: anemia K , BJ and M protein elevated
- BOM: PC involvement 90%
- **First clinical event of MM**

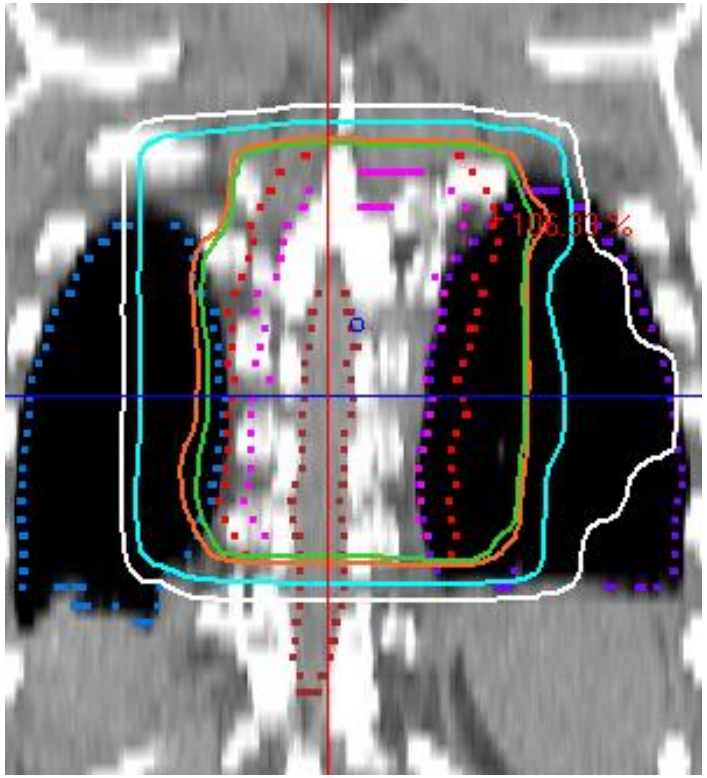






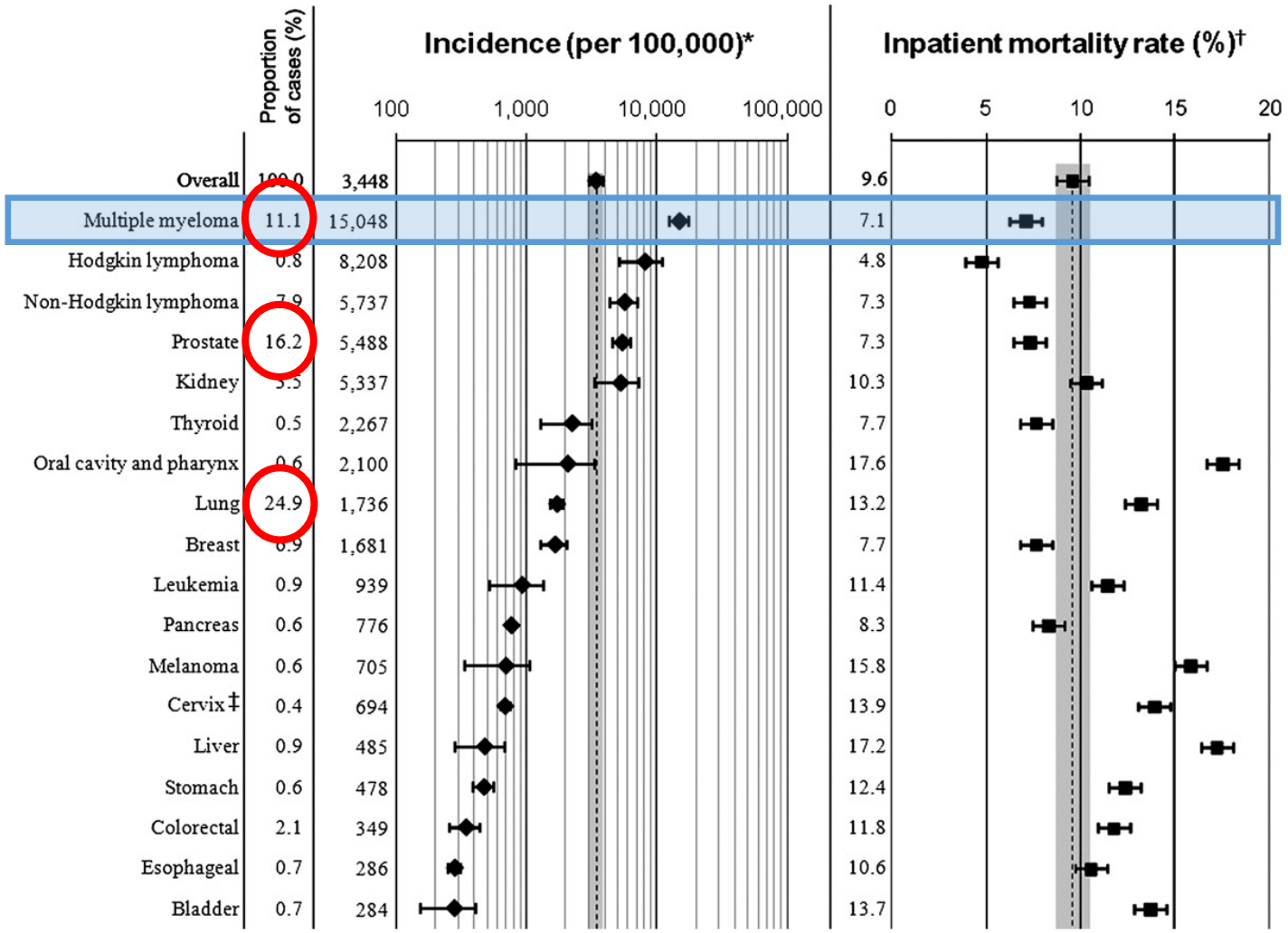






- Prescribed dose: 30 Gy/10 fractions
- Technique: 3DCRT
- Resolution of neurological symptoms after few sessions of RT

INCIDENCE AND TREATMENT PATTERNS IN HOSPITALIZATIONS FOR MALIGNANT SPINAL CORD COMPRESSION IN THE UNITED STATES, 1998–2006



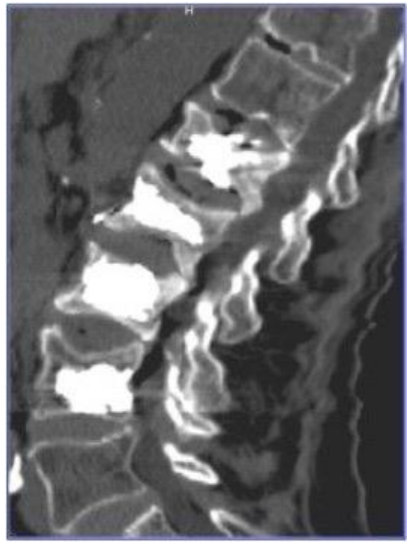
- NIS and SEER database
- 15.367 patients
- 1998-2006

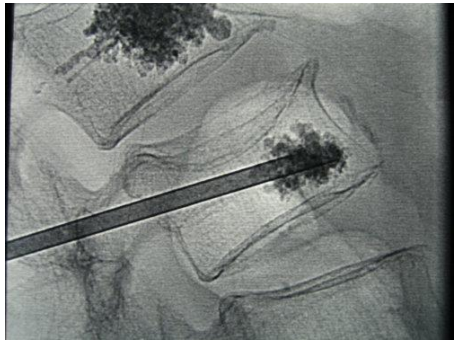
Multiple Myeloma is:

- **3rd** most prevalent diagnosis and
- **1st** leading cause of hospitalization in patients with malignant spinal cord compression

Mak et al. IJROBP 2011

Palliative treatment of bone metastasis





DRUGS & SURGERY

- **Bisphosphonates**
  - All patients receiving primary myeloma therapy should be given bisphosphonates (category 1)
  - Use of bisphosphonates in smoldering or stage I disease preferably in the context of clinical trial.
  - These patient should have bone survey annually and have monitoring for renal dysfunction or osteonecrosis of the jaw.

- **Orthopedic consultation** should be sought for impending or actual long-bone fractures or bony compression of spinal cord or vertebral column instability.

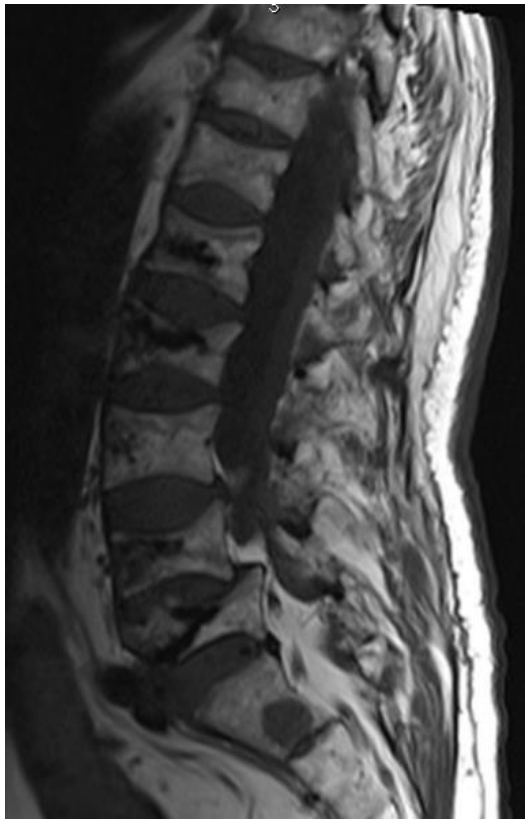
- **Consider vertebroplasty or kyphoplasty** for symptomatic vertebral compression fractures

BISPHOSPHONATES in Multiple Myeloma (International guidelines)

Factor	NCCN[14]	ESMO[17]	ASCO[15]	Mayo[16]	IMWG Reply to Mayo[18]	EMN[19]
Patient population	Active or all other stages of myeloma	Stage III or relapsed disease receiving conventional-dose chemotherapy	Lytic disease (lytic destruction of bone or compression fracture of spine from osteopenia) on plain radiographs or imaging studies	All patients with lytic bone disease on plain radiographs	In addition to radiographs, other imaging studies (MRI, CT, PET/CT)	All patients with lytic bone disease on plain radiographs
	Adjunctive therapy for bone disease		Patients with osteopenia but no evidence of lytic bone disease based on normal plain radiograph or BMD measurements	Patients with osteopenia or osteoporosis on BMD studies		Patients with osteopenia or osteoporosis on BMD studies Patients receiving chemotherapy
Administration	IV	Oral or IV	Oral or IV	IV	Oral or IV	Oral or IV
PAM IV infusion time	N/A	N/A	At least 2 hours	At least 2 hours	N/A	2 to 4 hours
Duration/frequency	N/A	Long term	Monthly for 2 years	Monthly for 2 years After 2 years: Discontinue if CR or stable plateau phase Decrease to every 3 months if active disease	2 years After 1 year: Discontinue if CR or VGPR and no active bone disease Continue if < VGPR and/or ongoing active bone disease After 2 years: Discontinue if no active bone disease If active bone disease, continue at own discretion	2 years, if not in CR After 1 year: Continue at physician discretion, if CR Restart on relapse
Monitoring	Chronic users should be monitored for renal function and ONJ	N/A	Monitor serum creatinine before each PAM or ZOL dose	N/A	N/A	Monitor patients for compromised renal function (creatinine clearance)
	Smoldering/stage I MM: Use BP in trial with yearly bone surveys		Regularly monitor serum calcium, electrolytes, phosphate, magnesium, hematocrit/hemoglobin			Patients with compromised renal function should have creatinine clearance rates, serum electrolytes, and albuminuria monitored
Choice	PAM or ZOL	N/A	ZOL, PAM, or CLO (non–United States)	PAM (favorable) or ZOL	PAM, ZOL, or CLO	ZOL, PAM, or CLO (where indicated)

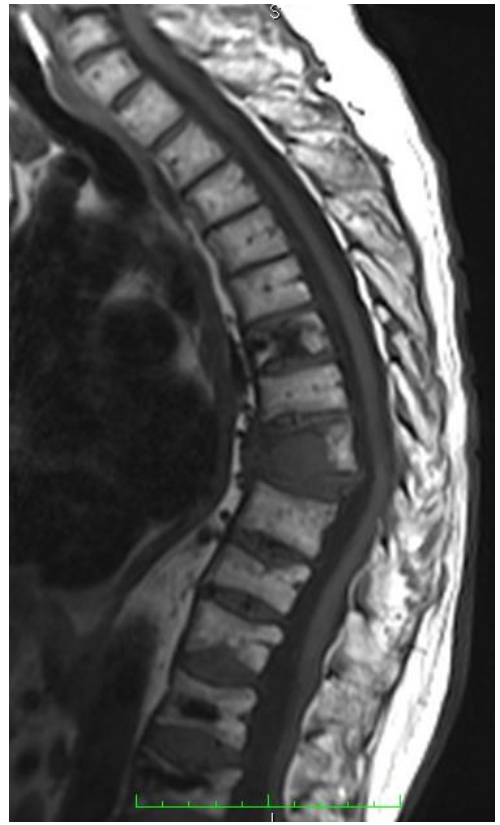
Terpos et al. JCO 2013;31(18):2347-2357

Palliative treatment of bone metastasis



RADIOTHERAPY

- Low dose radiotherapy (10-30 Gy) can be used as palliative treatment for:
  - ❑ Uncontrolled pain
  - ❑ Impending pathologic fracture
  - ❑ Impending cord compression
- Limited involved fields should be used to limit the impact of irradiation on stem-cell harvest or impact on potential future treatments



JOURNAL OF CLINICAL ONCOLOGY ORIGINAL REPORT

Outcome After Radiotherapy Alone for Metastatic Spinal Cord Compression in Patients With Oligometastases

Functional Outcome

Table 2. Multivariate Analysis (ordered logit model) of the Potential Prognostic Factors Regarding Functional Outcome

Variable	Estimate	95% CI	P*
Age, years			
≤ 64	−0.37	−0.75 to 0.01	.056
> 64†			
Sex			
Female	0.26	−0.32 to 0.84	.383
Male†			
Type of primary tumor			
Breast cancer	−0.01	−0.65 to 0.63	.985
Prostate cancer	−0.34	−0.89 to 0.21	.222
Myeloma/lymphoma	−2.61	−3.40 to −1.83	< .001
Lung cancer	0.03	−0.66 to 0.71	.941
Other tumors†			
Interval from tumor diagnosis to MSCC, months			
≤ 15	0.50	0.07 to 0.93	.022
> 15†			

Local Control

Table 3. Actuarial Local Control Rates After RT Related to the Potential Prognostic Factors: Univariate Analysis

Variable	% At 6 Months	At 1 Year	At 2 Years	At 3 Years	P*
Age, years					
≤ 64	96	93	89	77	
> 64	96	90	86	79	.855
Sex					
Female	97	96	89	82	
Male	95	89	86	73	.225
Type of primary tumor					
Breast cancer	98	96	87	79	
Prostate cancer	93	84	80	66	
Myeloma/lymphoma	98	98	98	98	
Lung cancer	96	86	86	64	
Other tumors	96	88	88	71	.003
Interval tumor diagnosis to MSCC, months					
≤ 15	95	92	92	85	
> 15	97	92	85	74	.350

Overall Survival

Table 4. Actuarial Survival Rates After Radiotherapy Related to the Potential Prognostic Factors: Univariate Analysis

Variable	% At 6 Months	At 1 Year	At 2 Years	At 3 Years	P*
Age, years					
≤ 64	92	71	58	52	
> 64	90	70	59	48	.757
Sex					
Female	92	77	65	54	
Male	91	65	53	49	.014
Type of primary tumor					
Breast cancer	93	81	68	51	
Prostate cancer	89	71	62	54	
Myeloma/lymphoma	95	89	81	72	
Lung cancer	85	52	34	34	
Other tumors	91	55	39	31	< .001
Interval tumor diagnosis to MSCC, months					
≤ 15	84	61	52	45	
> 15	97	79	64	54	< .001

Strahlentherapie
und Onkologie

Impact of Radiotherapy on Pain Relief and Recalcification in Plasma Cell Neoplasms

Pain Relief

Factor	Patients No. (%)
Pain intensity at baseline	
Mild	13 (29)
Moderate	27 (60)
Severe	5 (11)
Pain relief after radiotherapy	
Complete	*21 (47)*
Mild baseline pain	6 (29)
Moderate baseline pain	12 (57)
Severe baseline pain	3 (14)
Partial	*20 (44)*
Mild baseline pain	6 (30)
Moderate baseline pain	12 (60)
Severe baseline pain	2 (10)
No change	*4 (9)*
Mild baseline pain	1 (25)
Moderate baseline pain	3 (75)

91%

- 52 patients with osteolytic lesions
- 1996-2007
- **Median dose 38 Gy**
- Pain before RT : 45/53 (86.5%)
- Pain evaluated with 0-10 NRS score

Recalcification

Recalcification	Patients No. (%)
Evaluable	*42 (80,7)*
Complete	16 (38,1)
Partial	5 (11,9)
Stable	18 (42,9)
Progression	3 (7,1)

50%

Balducci et al. Strahlenther Oncol 2011

Fractionation regimens

- ❑ **8 Gy** in single fraction
- ❑ **20 Gy/5** fractions (4 Gy/die)
- ❑ **30 Gy/10** fractions (3 Gy/die)
- ❑ **37.5Gy/15** fractions (2.5 Gy/die)
- ❑ **40 Gy/20** fractions (2 Gy/die)

Effects of Radiotherapy in the treatment of multiple myeloma: a retrospective analysis of a Single Institution

RT Dose

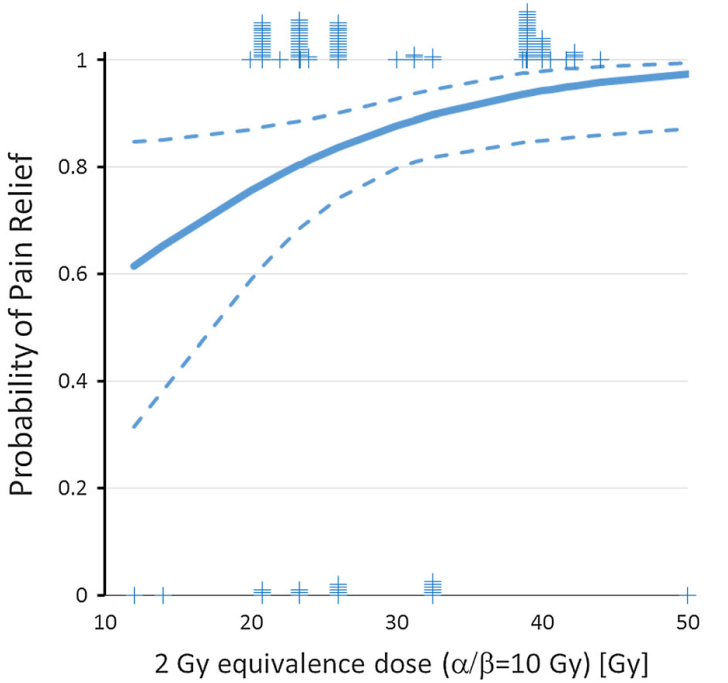


Figure 1 Binary logistic regression analysis of dose effects on pain relief (α/β = 10 Gy, p =0.023. Dotted lines indicate the 95% confidence limits of the regression line. Tick marks indicate the number of events (0 or 1) at the respective dose.

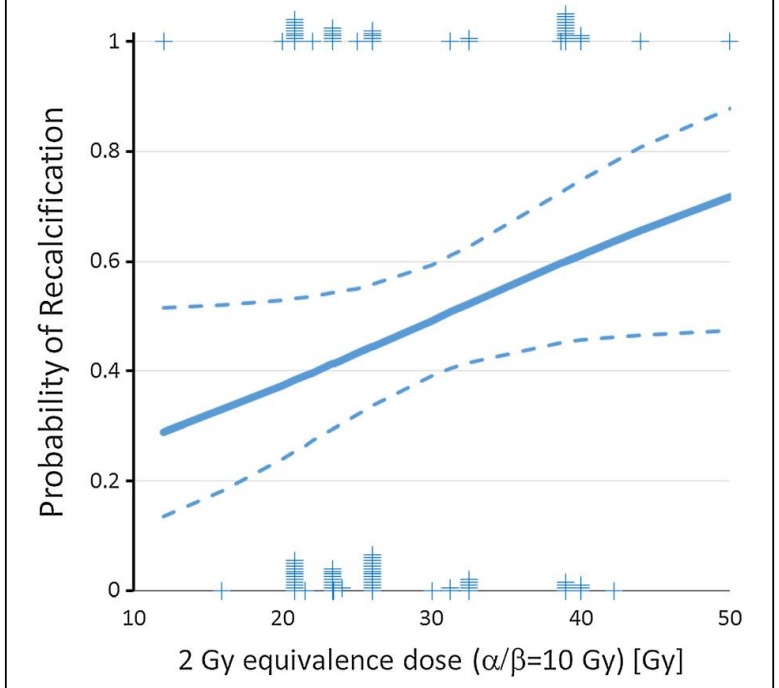


Figure 3 Binary logistic regression analysis of dose effects on recalcification (α/β = 10 Gy, p = 0.048. Dotted lines indicate the 95% confidence limits of the regression line. Tick marks indicate the number of events (0 or 1) at the respective dose.

RADIATION ONCOLOGY

- 153 patients
- 1989-2013

Higher total biological RT dose were associated with:

- Better pain relief (**≥30 Gy**);
- Better recalcification (**≥40 Gy**)

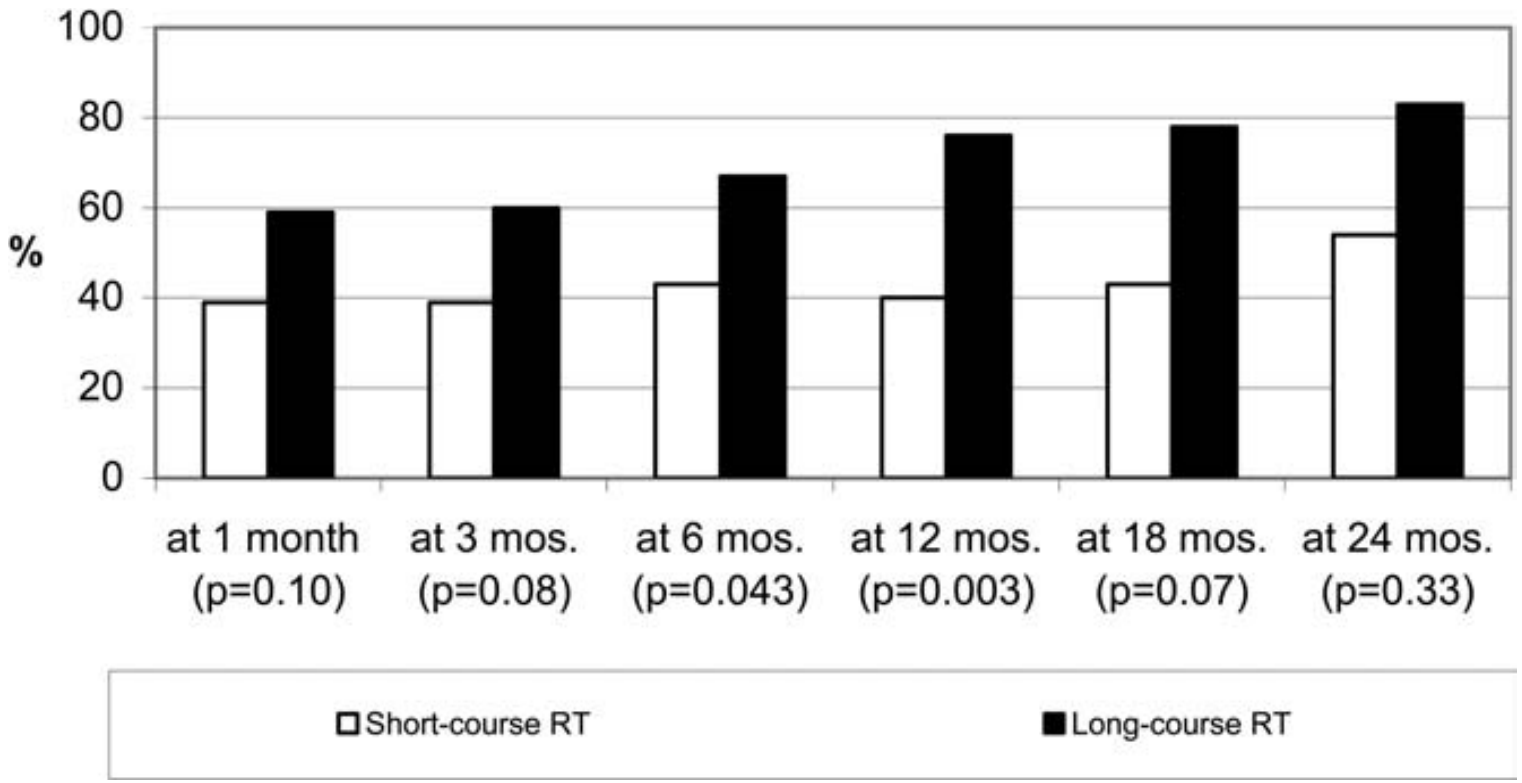
Matuschek et al Radiat Oncol 2015

DEPARTMENT OF ONCOLOGY
UNIVERSITY OF TURIN

SHORT-COURSE RADIOTHERAPY IS NOT OPTIMAL FOR SPINAL CORD COMPRESSION DUE TO MYELOMA

RT Dose

IMPROVEMENT OF MOTOR FUNCTION AFTER RADIOTHERAPY



172 patients
1994-2004

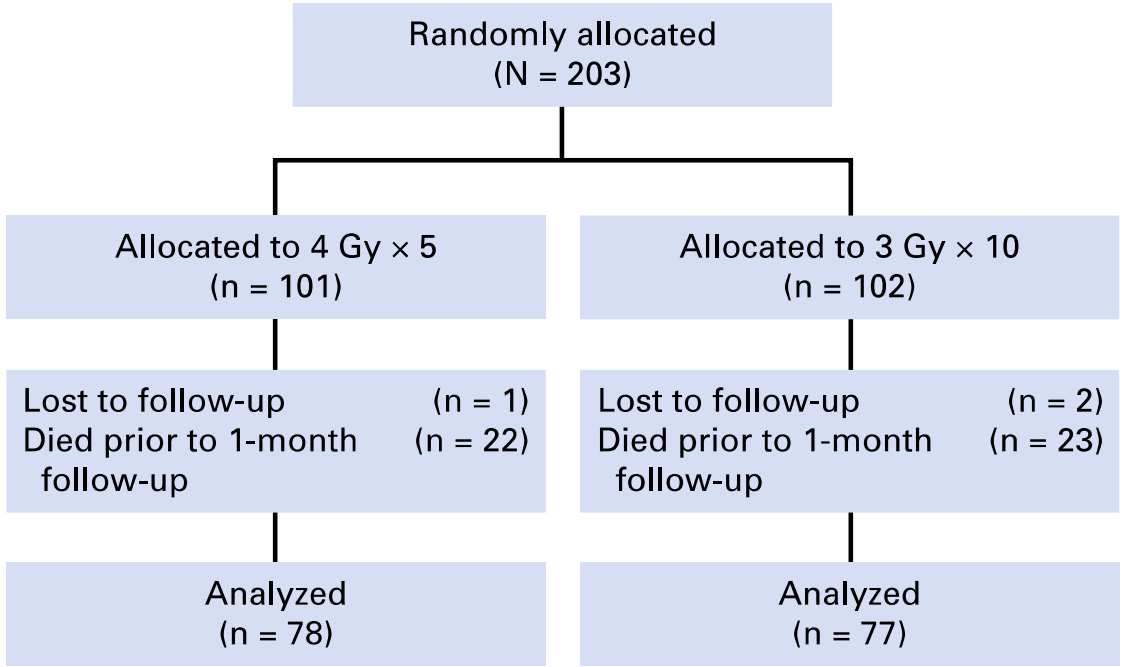
- **Short course RT:**
  - 8 Gy in single fraction
  - 20 Gy/5 fractions
- **Long course RT:**
  - 30 Gy/10 fractions
  - 37.5 Gy/15 fractions
  - 40 Gy/20 fractions

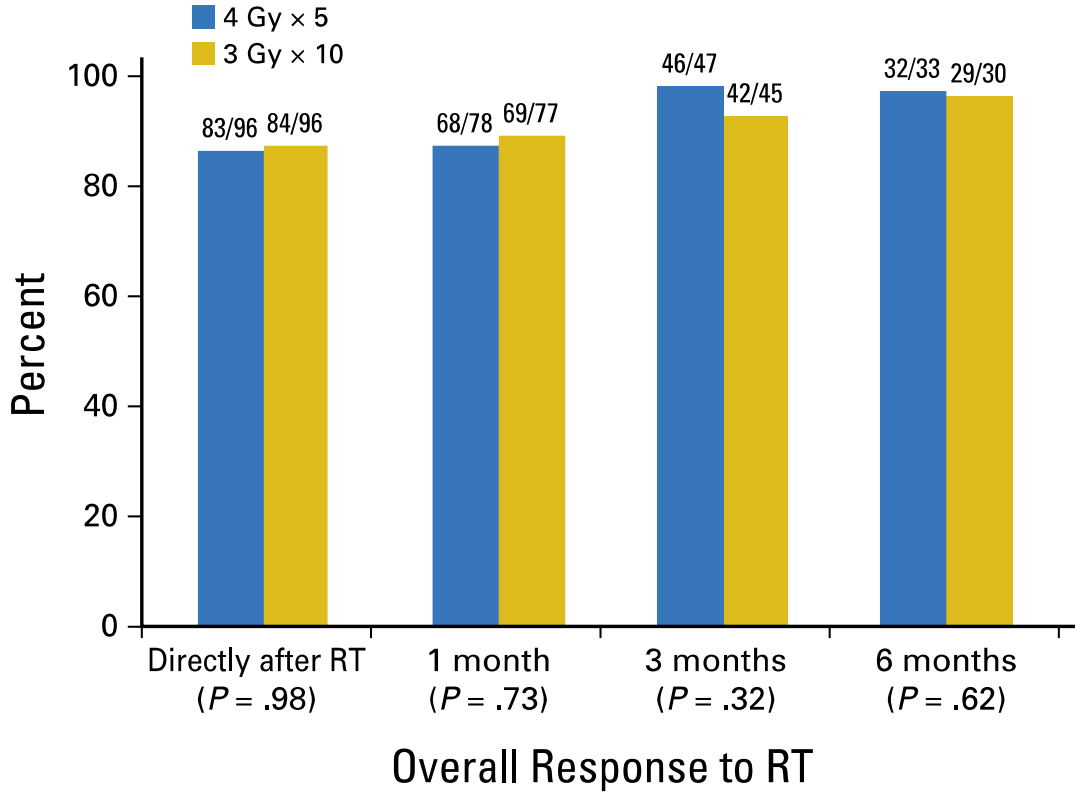
Rades et al IJROBP 2006;64(5):1452-1457

JOURNAL OF CLINICAL ONCOLOGY ORIGINAL REPORT

RT Dose

Radiotherapy With 4 Gy × 5 Versus 3 Gy × 10 for Metastatic Epidural Spinal Cord Compression: Final Results of the SCORE-2 Trial (ARO 2009/01)





Rades et al. JCO 2016

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JOURNAL OF CLINICAL ONCOLOGY ORIGINAL REPORT

RT Dose

Radiotherapy With 4 Gy × 5 Versus 3 Gy × 10 for Metastatic Epidural Spinal Cord Compression: Final Results of the SCORE-2 Trial (ARO 2009/01)

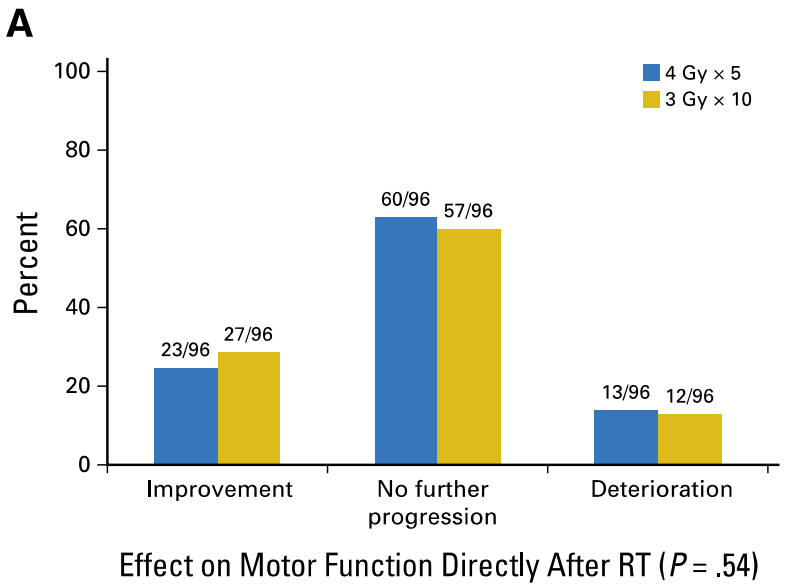
Table 1. Distribution of the Three Stratification Factors and Additional Characteristics

Stratification Factors and Additional Characteristics	Patients, n (%)		*P*
	4 Gy × 5	3 Gy × 10	
Stratification factor			
Ambulatory status before RT			
Ambulatory without aid (N = 52)	26 (25.7)	26 (25.5)	> .99
Ambulatory with aid (N = 65)	32 (31.7)	33 (32.4)	
Not ambulatory (N = 86)	43 (42.6)	43 (42.2)	
Time developing motor deficits before RT, days			
1-7 (N = 92)	46 (45.5)	46 (45.1)	> .99
8-14 (N = 53)	26 (25.7)	27 (26.5)	
> 14 (N = 58)	29 (28.7)	29 (28.4)	
Type of primary tumor			
Breast cancer (N = 32)	16 (15.8)	16 (15.7)	> .99
Prostate cancer (N = 32)	16 (15.8)	16 (15.7)	
Myeloma/lymphoma (N = 16)	8 (7.9)	8 (7.8)	
Lung cancer (N = 58)	29 (28.7)	29 (28.4)	
Other tumors (N = 65)	32 (31.7)	33 (32.4)	

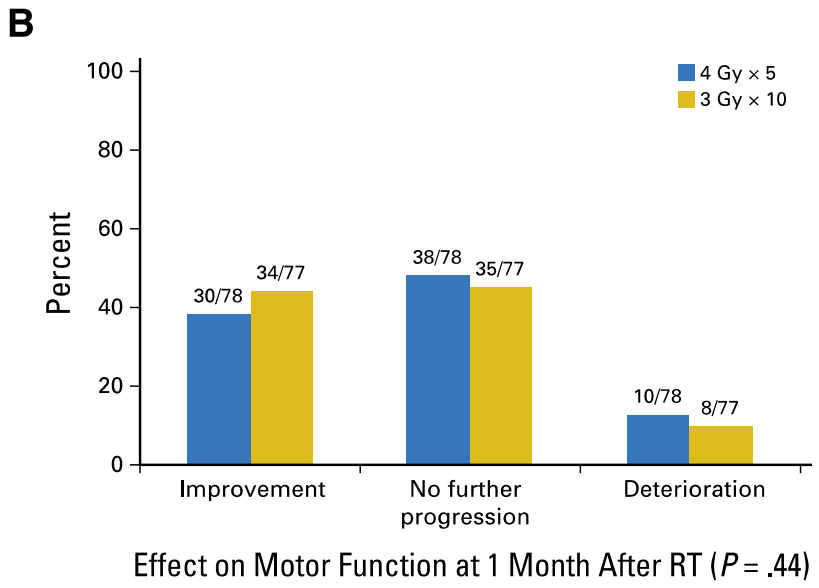
Rades et al. JCO 2016

RT Dose

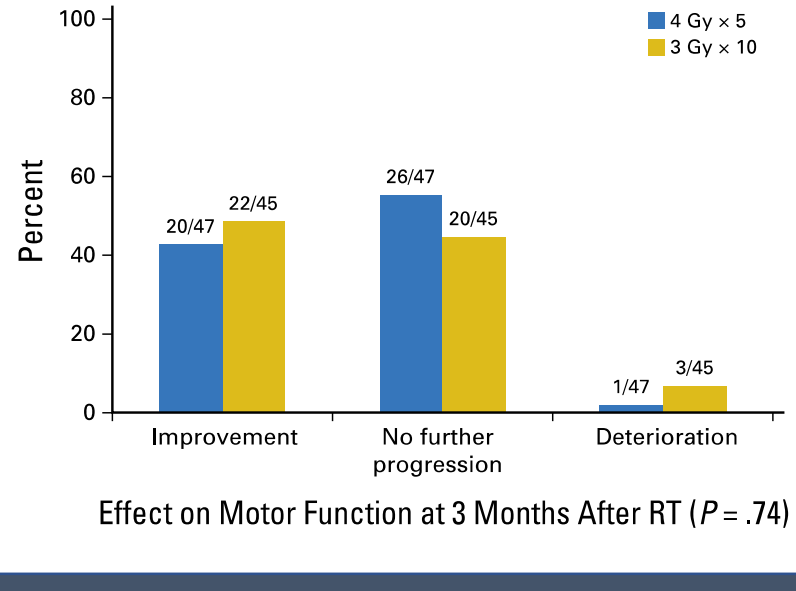
MOTOR FUNCTION



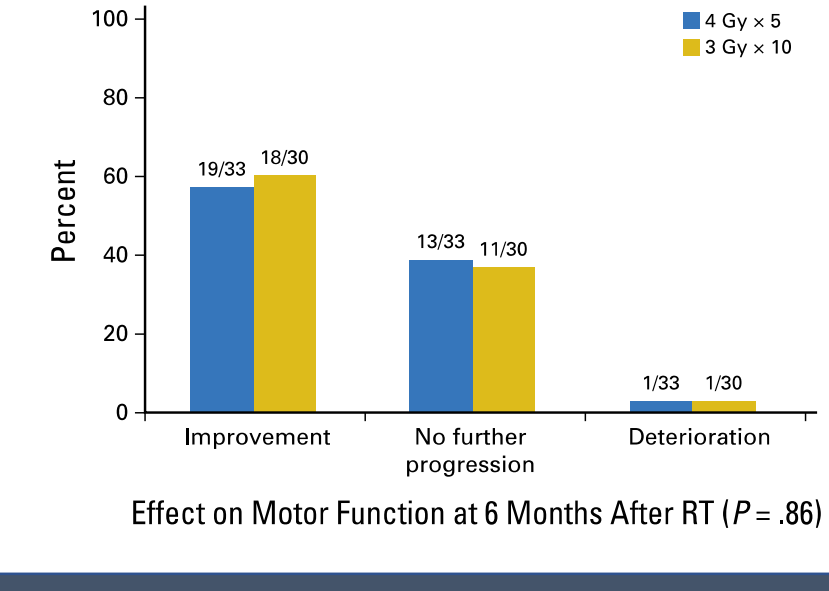
Effect on Motor Function Directly After RT (P = .54)



Effect on Motor Function at 1 Month After RT (P = .44)



Effect on Motor Function at 3 Months After RT (P = .74)



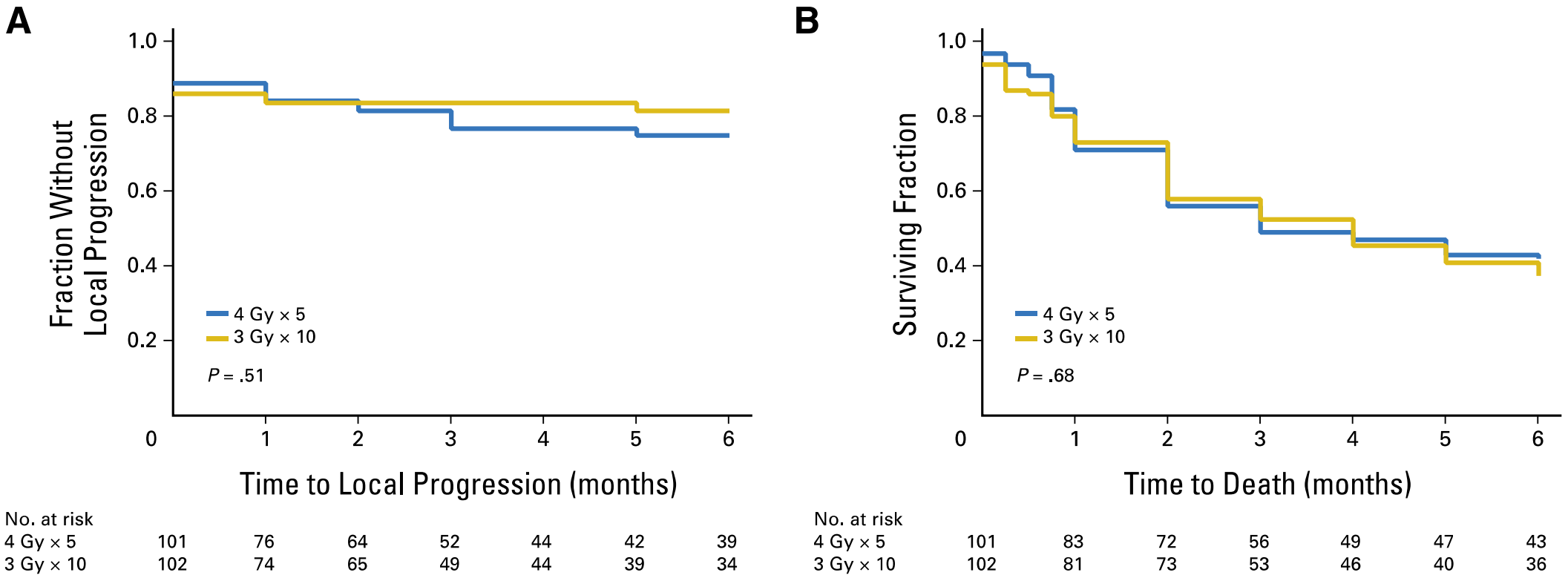
Effect on Motor Function at 6 Months After RT (P = .86)

Rades et al. JCO 2016

JOURNAL OF CLINICAL ONCOLOGY ORIGINAL REPORT

RT Dose

Radiotherapy With 4 Gy × 5 Versus 3 Gy × 10 for Metastatic Epidural Spinal Cord Compression: Final Results of the SCORE-2 Trial (ARO 2009/01)



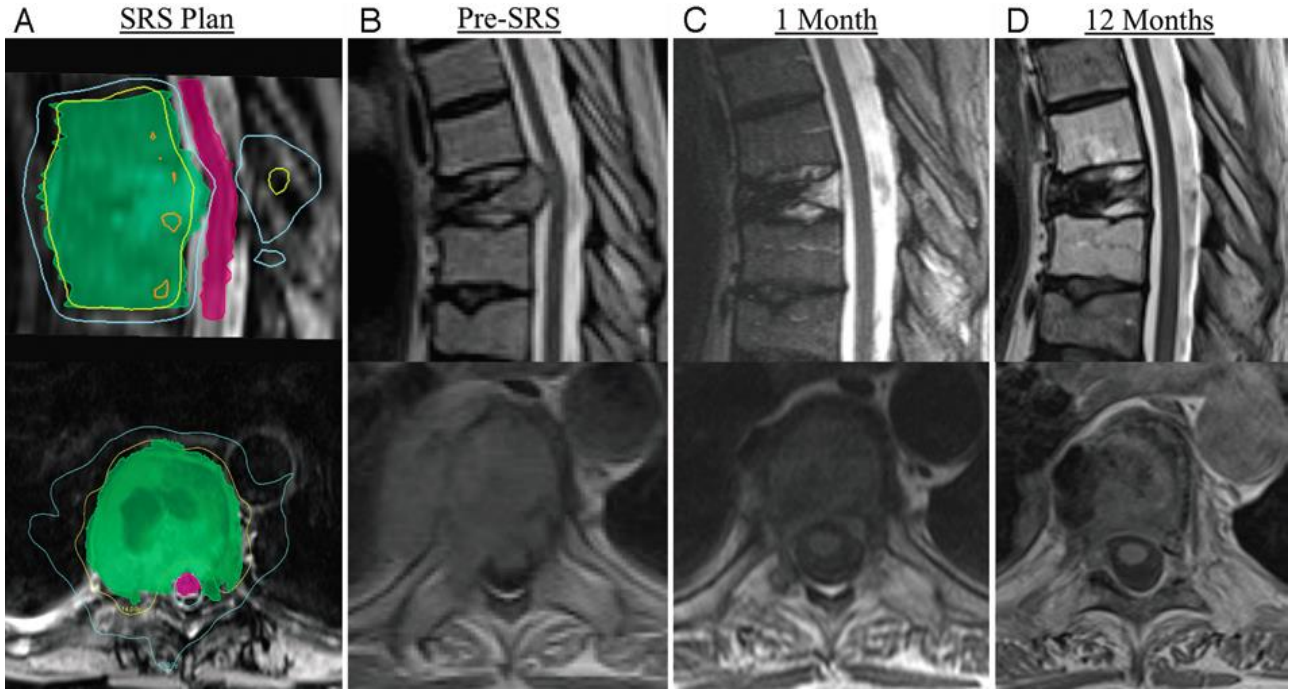
Rades et al. JCO 2016

Spinal SRS

Spine stereotactic radiosurgery for the treatment of multiple myeloma

JNS SPINE

CLINICAL ARTICLE



- Largest series of myeloma lesions (56) treated with spine SRS (14-16 Gy in single fraction)
- Rapid and durable symptomatic response (median time to pain relief: 1.6 months)
- LC @12 months: 85%
- SRS should be considered for patients with:
  - ✓ Limited spinal disease
  - ✓ Recurrent disease after EBRT
  - ✓ Requirement for “marrow sparing” RT

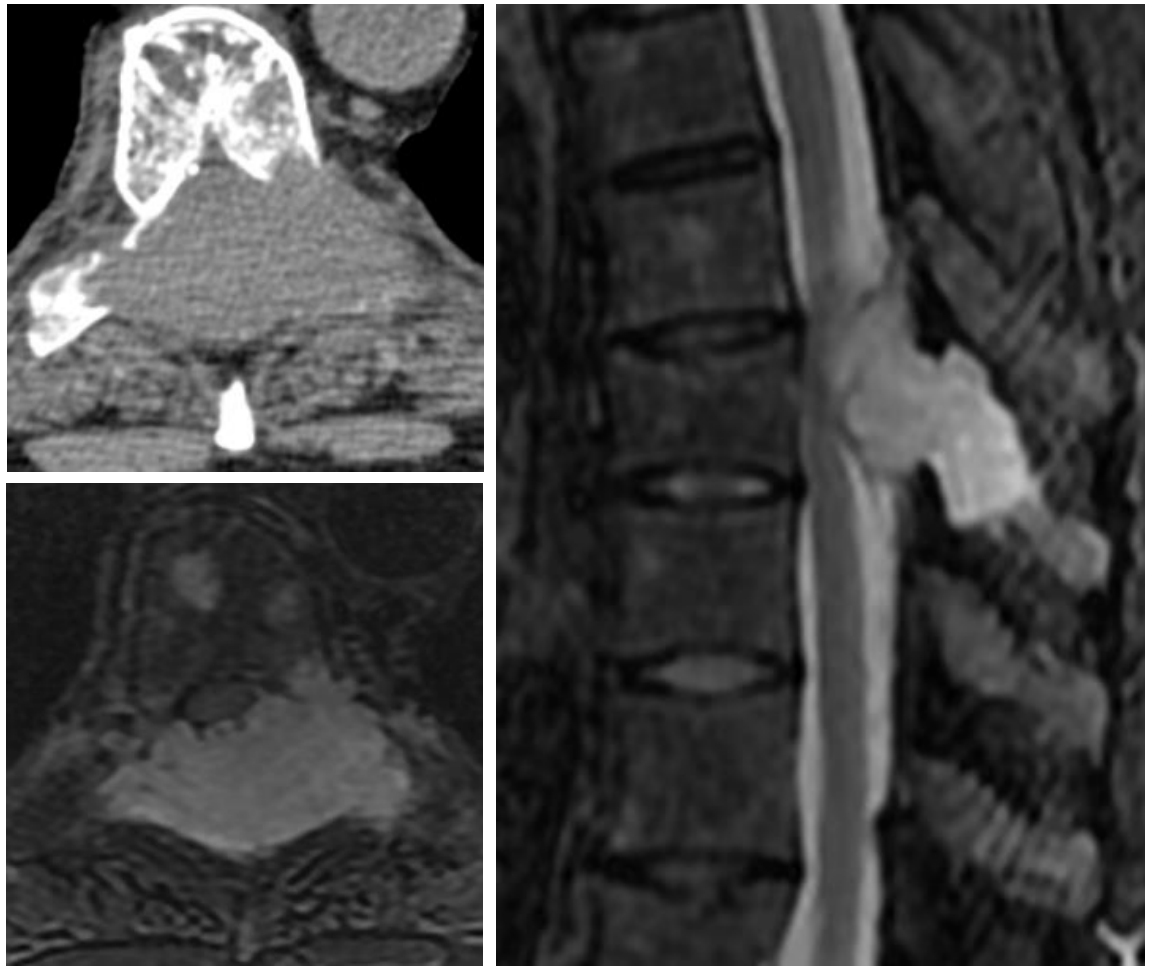
Miller JA, et al. J. Neurosurg Spine 2016

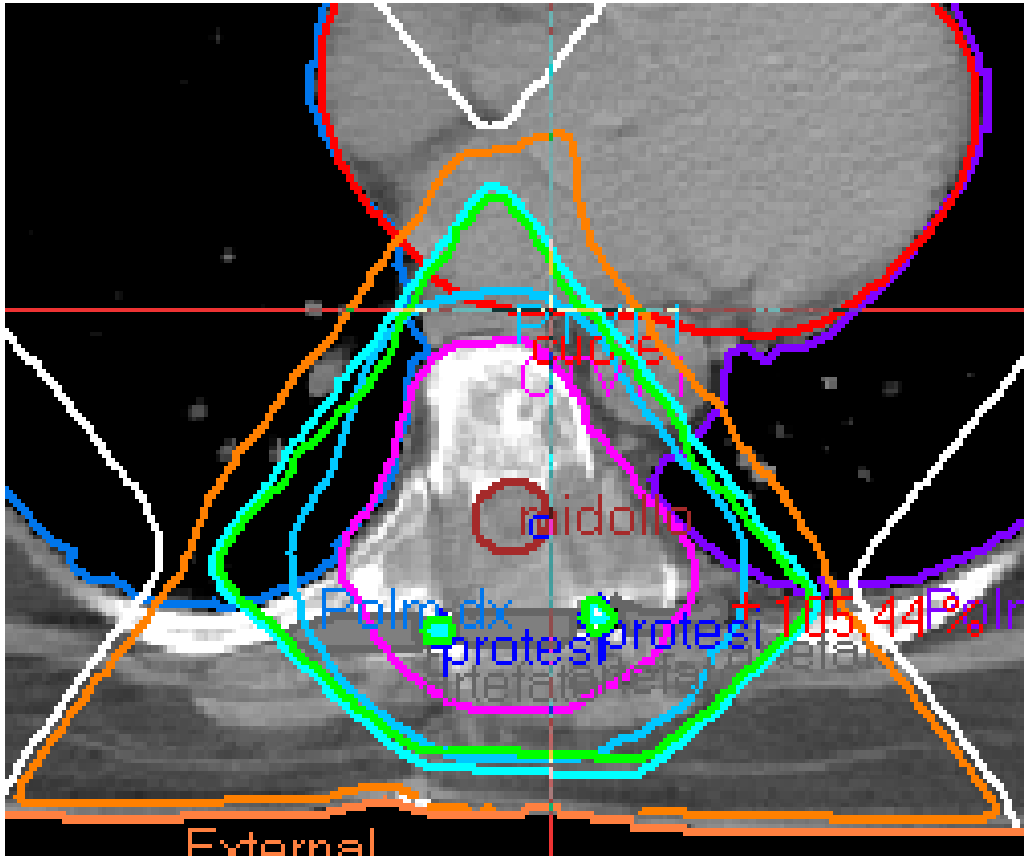
RT Dose – Summary

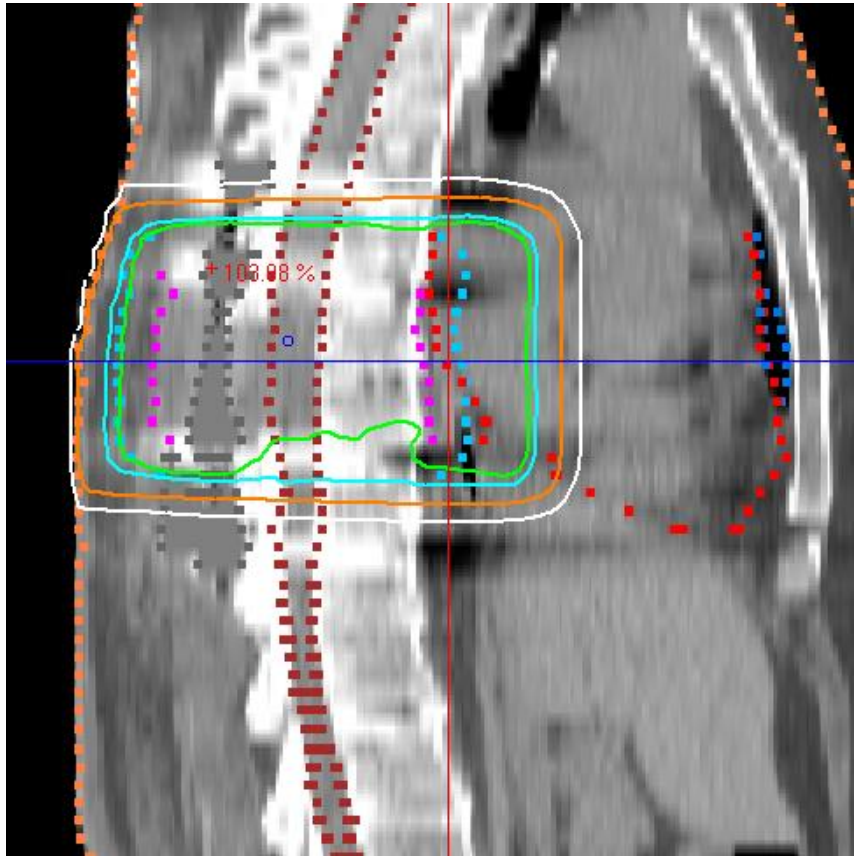
- When main goal is **pain relief: hypofractionated regimen** with a total dose of 8 to 30 Gy (3 to 8 Gy/day)
- **8 Gy is preferred** for bone disease in patients with **poor** prospects of **survival**
- For epidural disease with **spinal cord compression** or **bulky mass**, when durable local control is desired: **30 Gy/10** fractions or **20 Gy/5** fractions are equally effective
- **Conventional fractionation** (20-30 Gy in 2 Gy/day) may be preferred if RT volumes are large or for **retreatment**
- Spinal **radiosurgery** may represent an interesting opportunity for **highly selected patients** (e.g. reirradiation, small lesions without spinal cord compression)

Example of Palliative RT for Multiple Myeloma (#1)

- 53 years old patient
- Dorsal **pain** + bilateral leg **weakness** and **paresthesia**
- MRI and CT: multiple osteolytic lesions; **Spinal cord compression** at D8 level
- **Laminectomy (D8) + vertebral stabilization** and histological sampling → Multiple Myeloma.





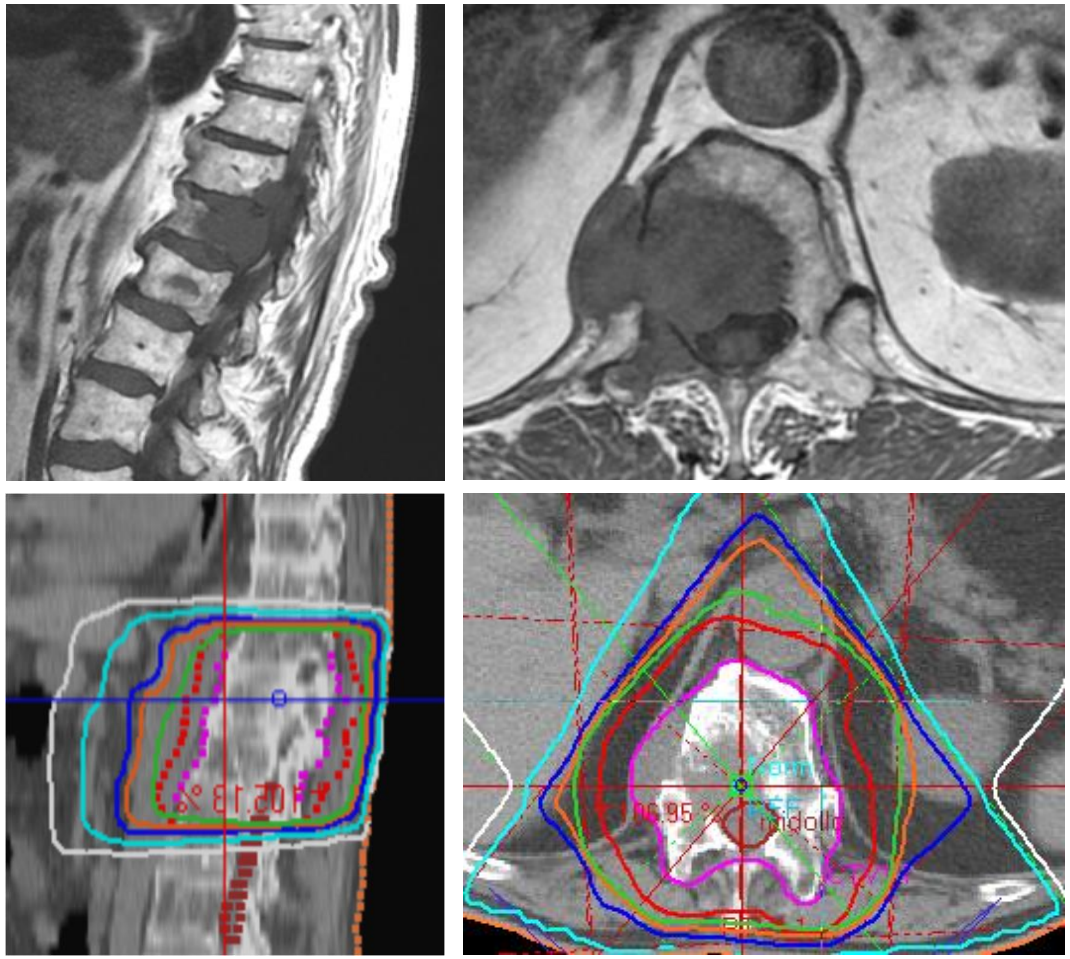


Tumor Board:

- ❑ Palliative RT on D8 followed by
- ❑ Chemotherapy + ASCT

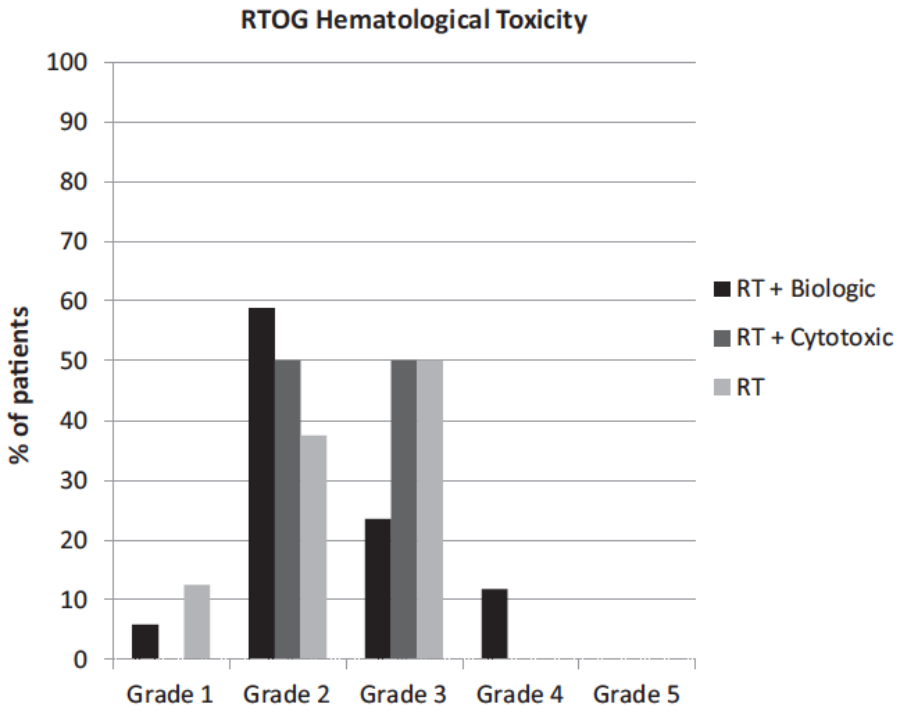
RT dose: 30 Gy/10 fractions

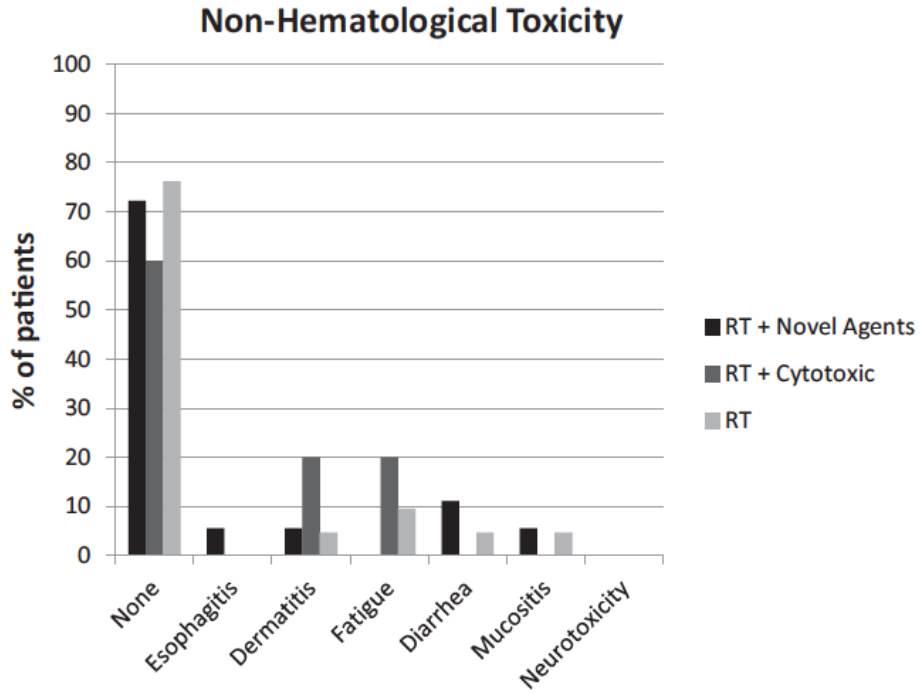
Example of Palliative RT for Multiple Myeloma (#1)



- 72 years old male
- Known history of MM, already treated with multiple lines of chemotherapy
- Osteolytic lesion at D11-D12, determining **spinal cord compression**, right leg weakness and severe **dorsal pain**.
- RT dose: **20 Gy/5 fractions**
- During treatment **neurologic improvement** (dorsal pain disappeared and leg weakness significantly reduced)

Feasibility and Efficacy of Local Radiotherapy With Concurrent Novel Agents in Patients With Multiple Myeloma





Novel Agents

- Bortezomib
- Carfilzomib
- Thalidomide
- Lenalidomide

Shin SM et al. Clin Lymph, Myel & Leuk 2014