

# Long-term results of non-surgical treatment of stage IIB osteosarcoma of the extremities

Gennady Machak

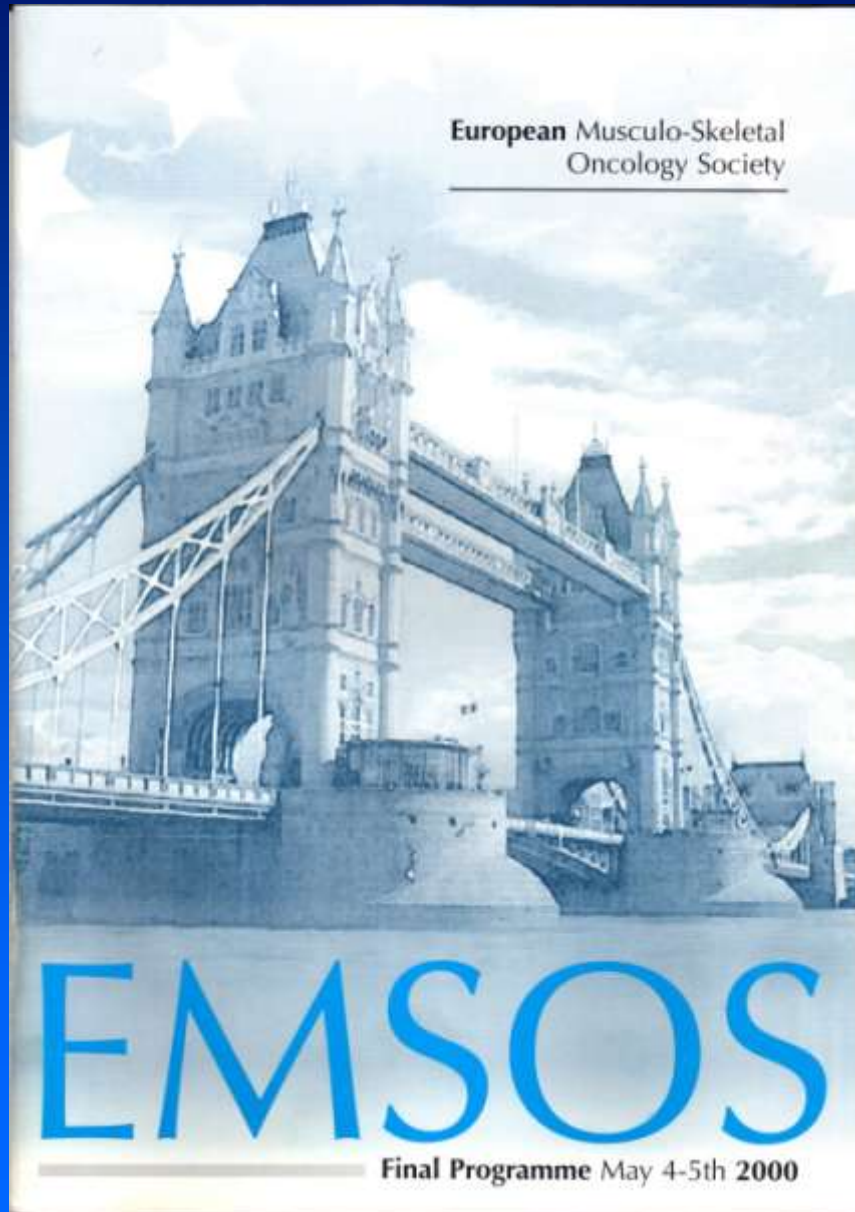
N.N. Blokhin Cancer Research Center  
Moscow, Russian Federation



23rd Annual Meeting of the  
European Musculo-Skeletal Oncology Society

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United Kingdom

# Our first publications about non-surgical treatment of high-grade osteosarcoma



## Original Article

### Neoadjuvant Chemotherapy and Local Radiotherapy for High-Grade Osteosarcoma of the Extremities

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• **Objective:** To determine the effectiveness of radiation therapy for local control of nonmetastatic osteosarcoma of the extremities after induction chemotherapy.

• **Patients and Methods:** Of 187 patients with nonmetastatic osteosarcoma of the extremities treated with induction chemotherapy since 1986, 31 refused surgery and underwent standard, fractionated external beam radiotherapy for local control. The median radiation dose to the limb was 60 Gy (range 40-68 Gy). Records were reviewed through April 2002, and outcomes including radiologic and biochemical response, local control, limb function, and survival were analyzed. The end points were local progression-free survival, metastases-free survival, and overall survival.

• **Results:** Overall survival, local progression-free survival, and metastases-free survival at 5 years were a mean  $\pm$  SD of 61% $\pm$ 11%, 56% $\pm$ 12%, and 62% $\pm$ 10%, respectively. The outcome correlated significantly with patients' imaging and biochemical response. In patients who had a pronounced response, overall survival and metastases-free survival at 5 years were 90% $\pm$ 9% and 91% $\pm$ 9%, respec-

tively, but it was only 35% $\pm$ 15% and 42% $\pm$ 13% in the nonresponders ( $P=0.005$  and  $P=0.005$ , respectively). Local control was also related to response after induction chemotherapy. None of the 11 patients with both a good imaging and a good biochemical response had local relapse; median follow-up was 67 months. The estimated local progression-free survival among nonresponders was 31% $\pm$ 16% at 3 years and 0% at 5 years. Of 22 patients surviving without local disease progression, 19 (86%) had excellent limb function (Enneking score between 90% and 100%) at the time of most recent evaluation.

• **Conclusion:** When used after effective induction chemotherapy for osteosarcoma of the extremities, radiation therapy can be a reliable modality to control local disease and preserve limb function.

*Mayo Clin Proc.* 2003;78:147-155

(CI = confidence interval; CT = computed tomography; MRI = magnetic resonance imaging; PET = positron emission tomography)

**31 patients with limb  
osteosarcoma**  
**Median follow-up – 39 months**  
**5 yrs overall survival - 61%**  
**5 yrs LPFS – 56%**  
**5 pathological fractures**

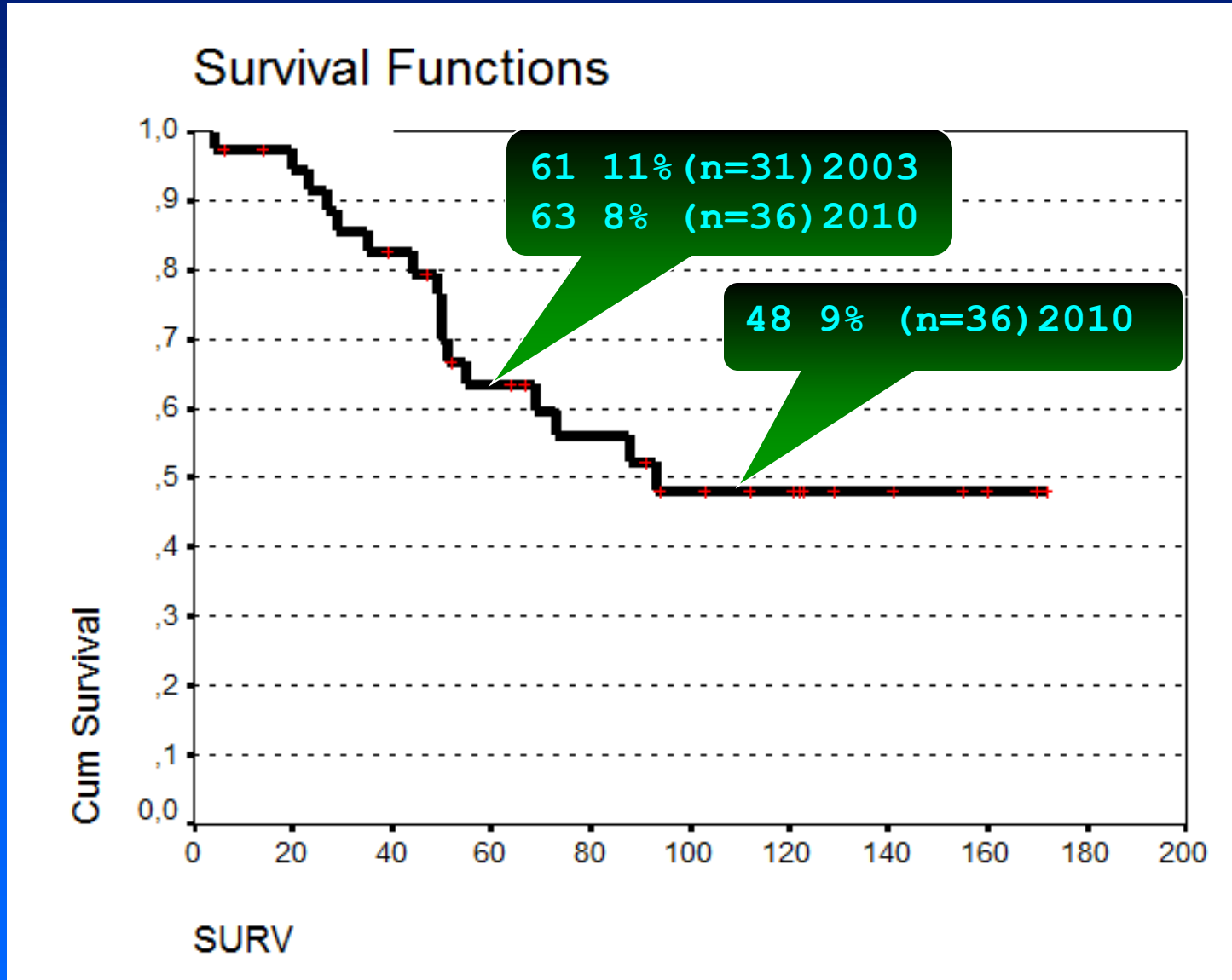
## AIM

The purpose of this study was to evaluate long-term results and complications related to such a non-standard and controversial treatment modality.

- New patients (5)
- New chemotherapy protocol (DOX+CDDP, IFO+VP-16)
- Increased median follow-up (39→88 months)

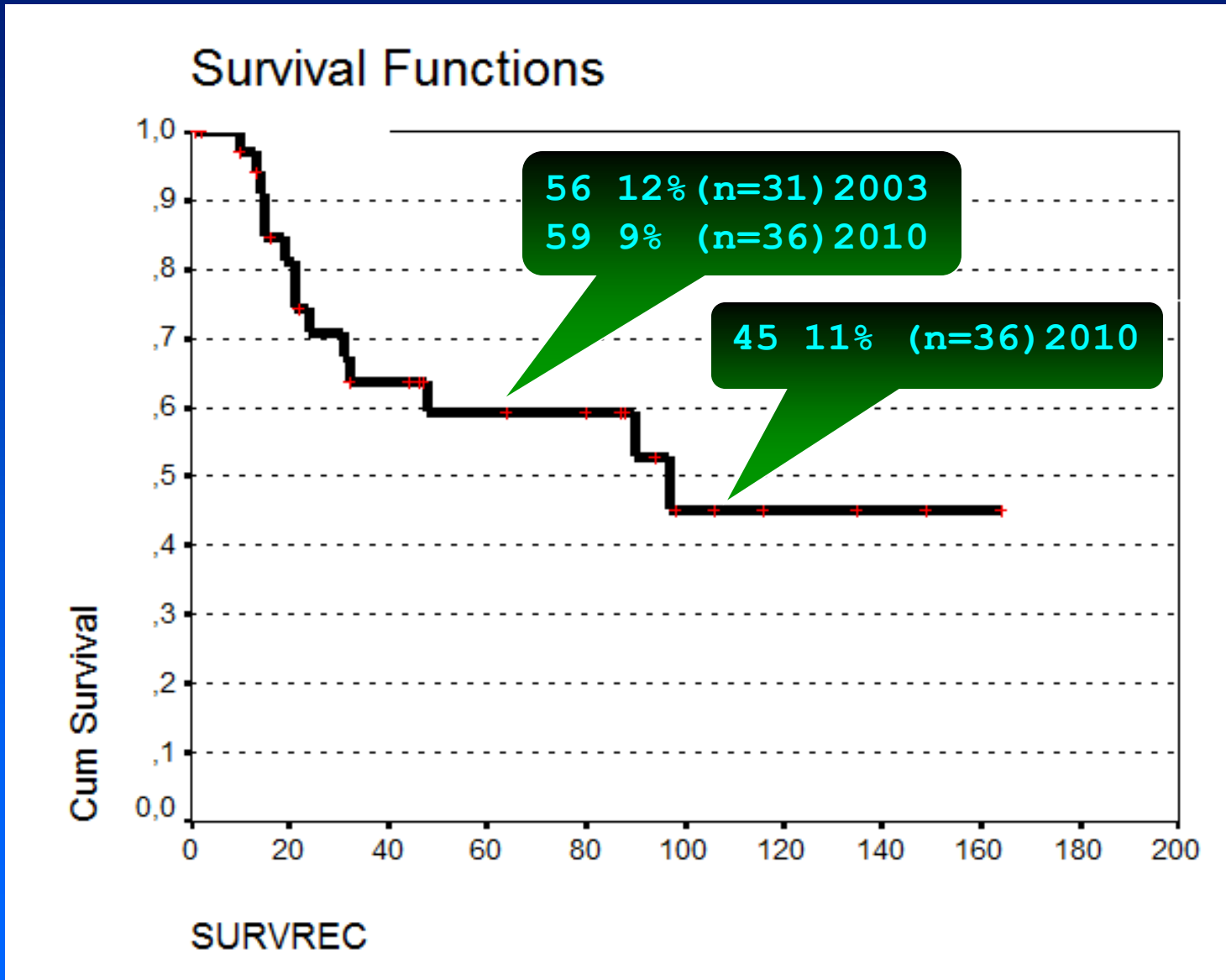
# RESULTS OF 36 OSTEOSARCOMA PATIENTS TREATED WITH LOCAL RADIATION WITHOUT SURGERY

## Overall survival



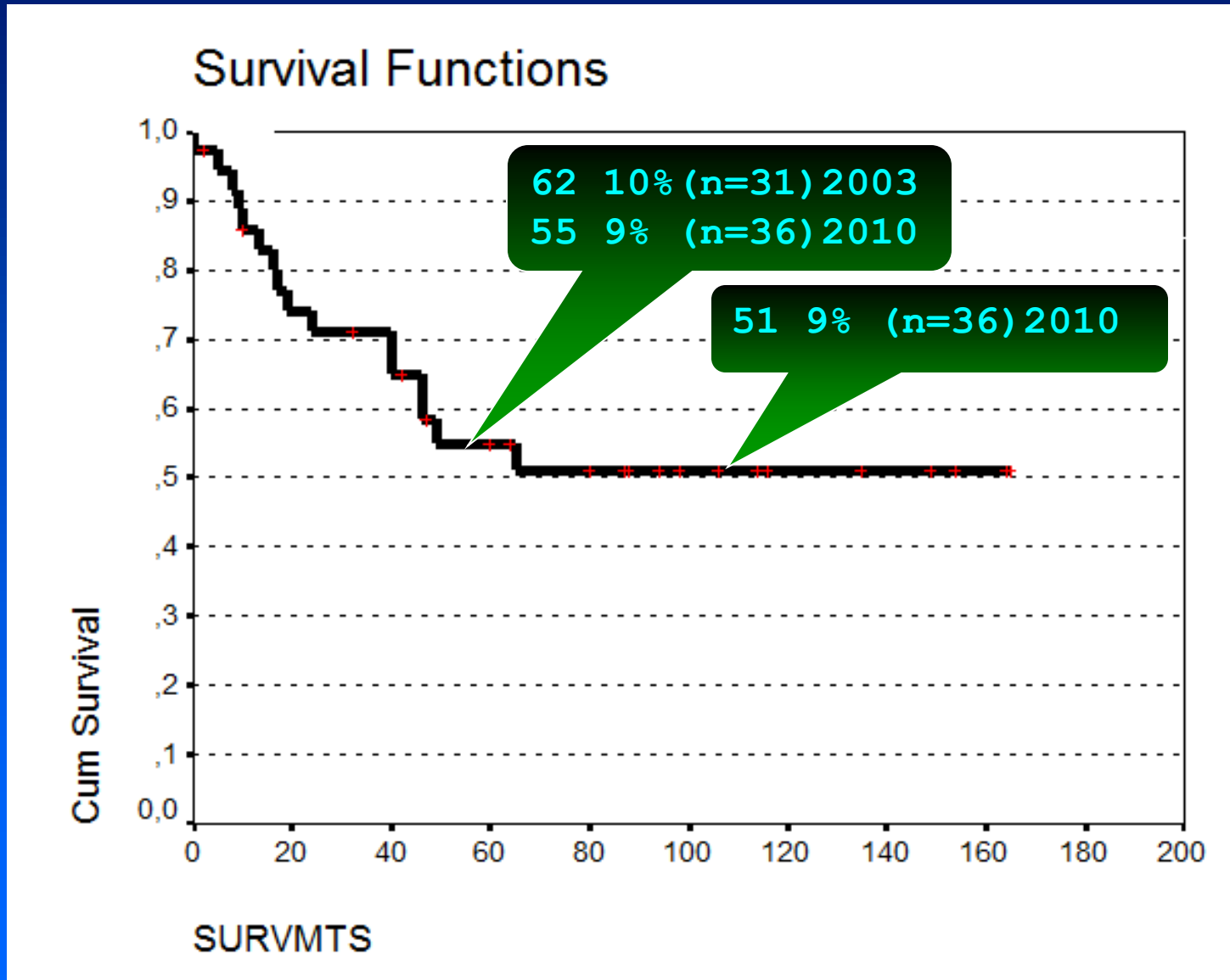
# RESULTS OF 36 OSTEOSARCOMA PATIENTS TREATED WITH LOCAL RADIATION WITHOUT SURGERY

## Local progression free survival



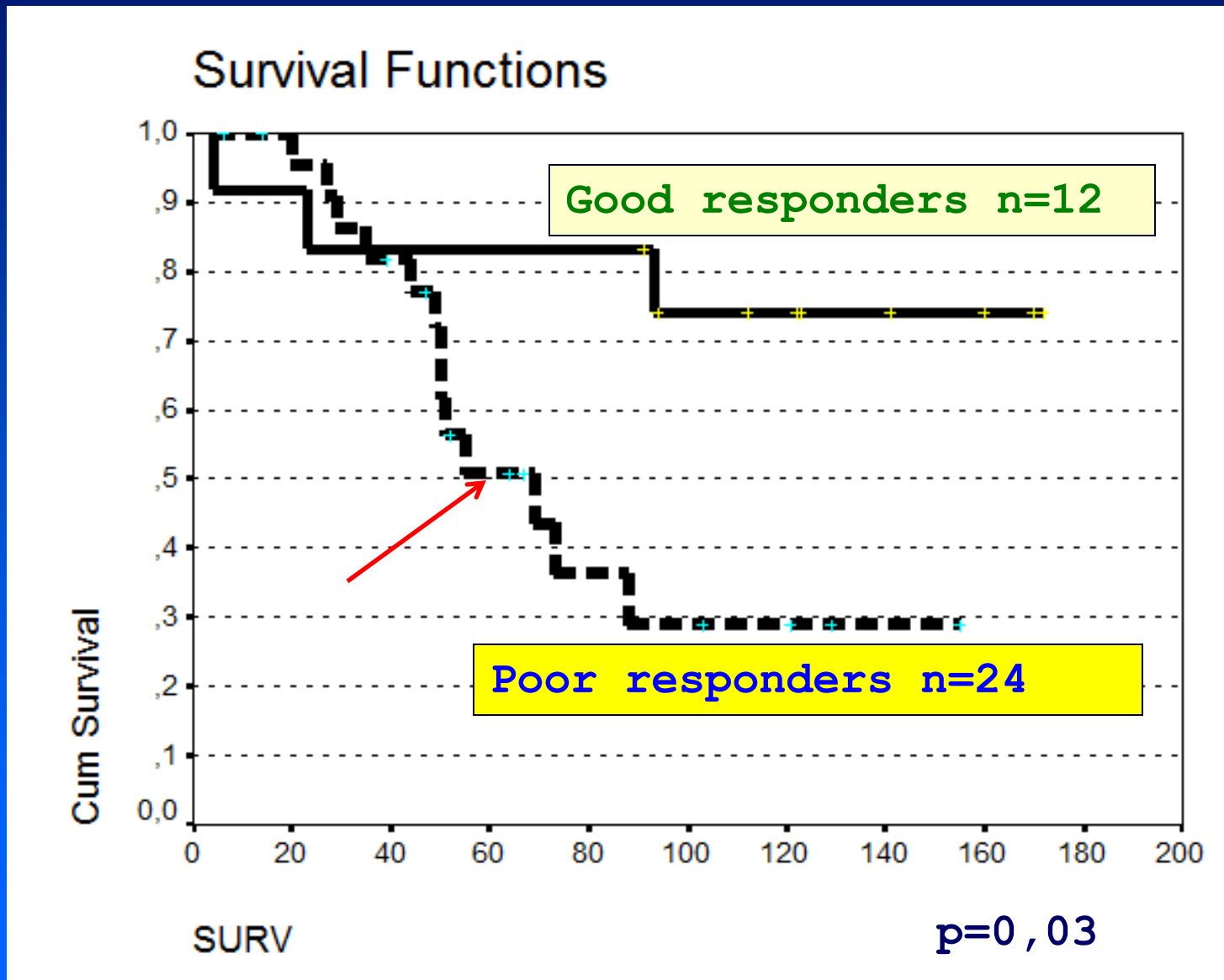
# RESULTS OF 36 OSTEOSARCOMA PATIENTS TREATED WITH LOCAL RADIATION WITHOUT SURGERY

## Metastases-free survival



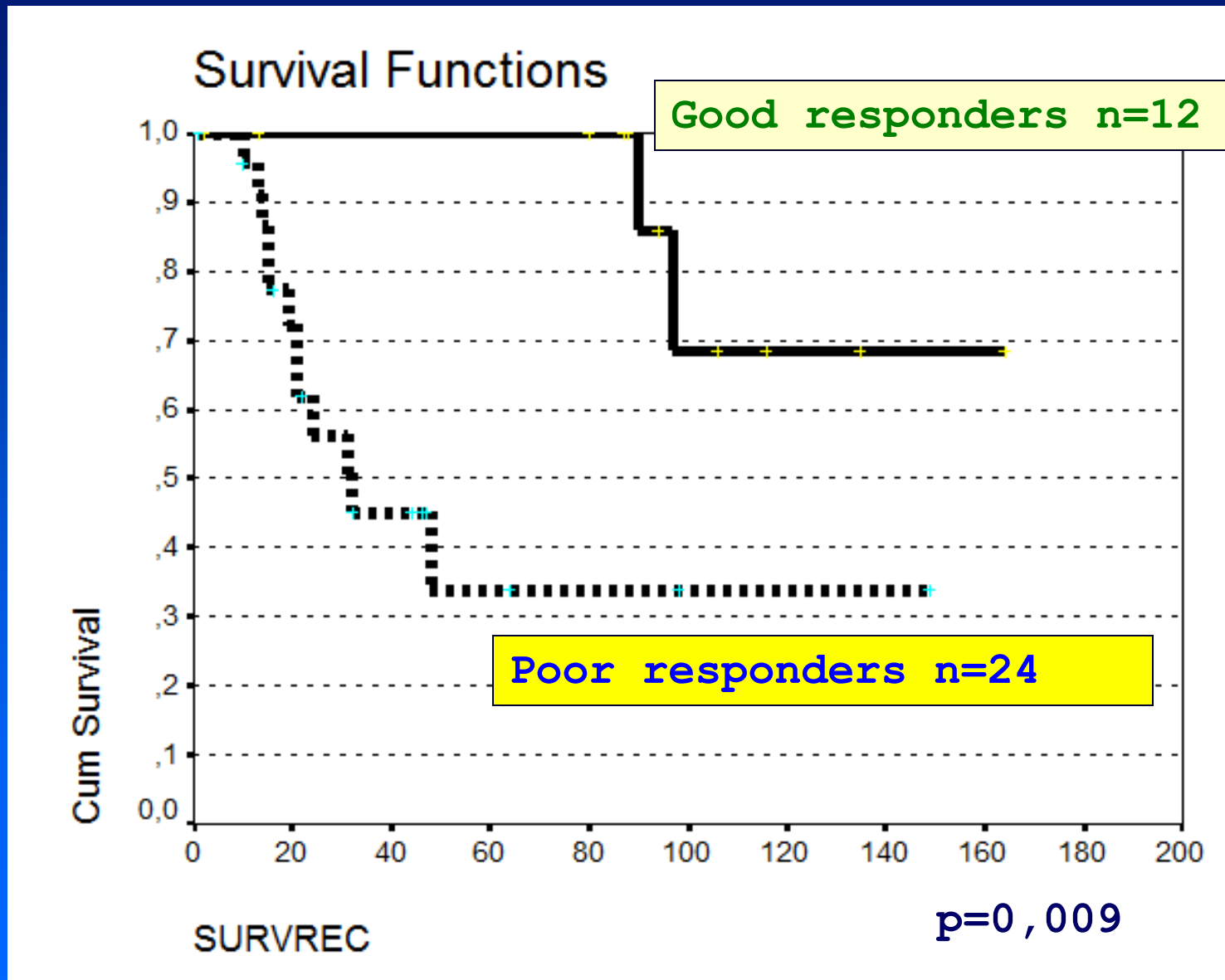
# THE IMPACT OF RESPONSE TO INDUCTION CHEMOTHERAPY ON DISEASE PROGRESSION IN PATIENTS TREATED WITH RADIATION

## Overall survival



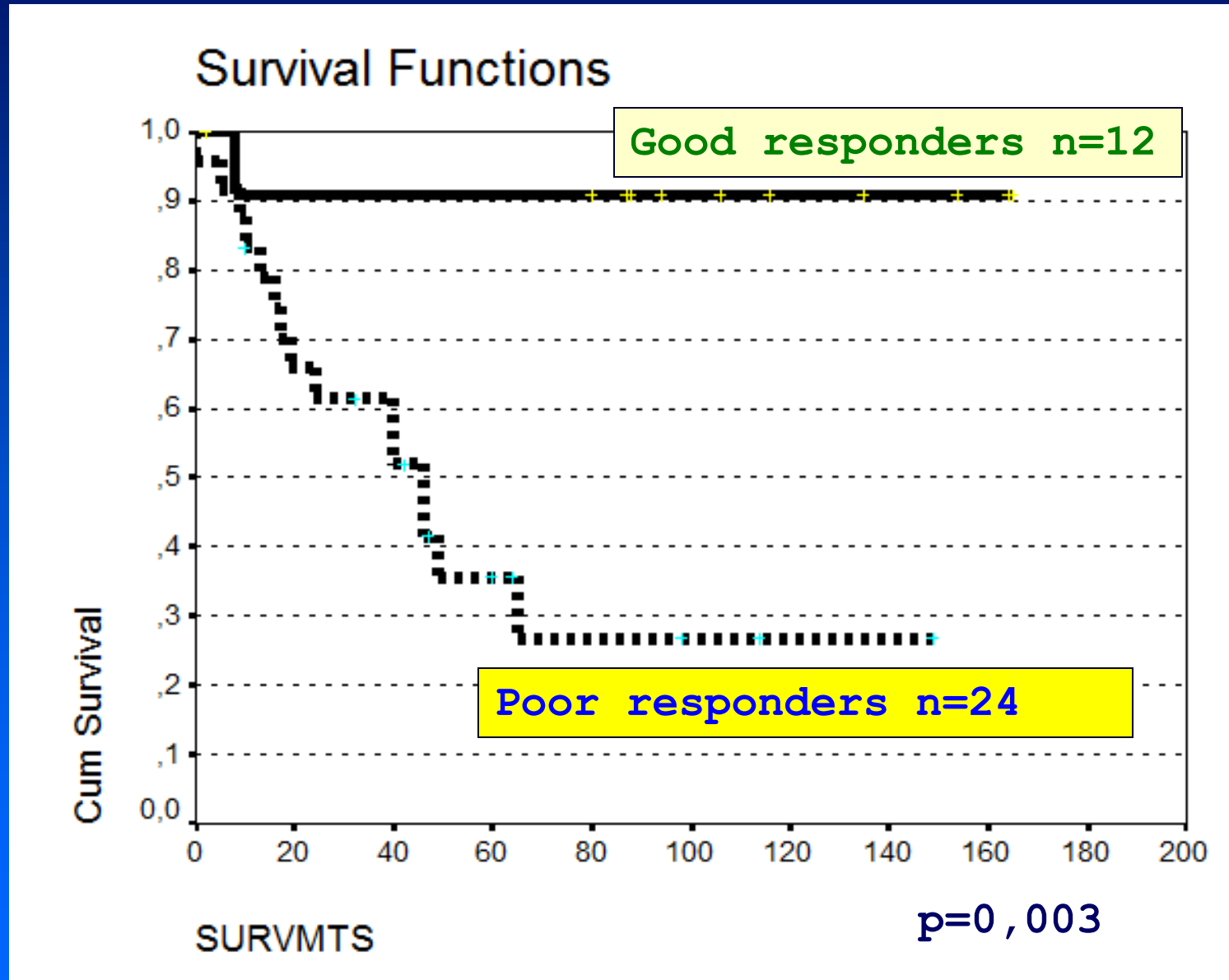
# THE IMPACT OF RESPONSE TO INDUCTION CHEMOTHERAPY ON DISEASE PROGRESSION IN PATIENTS TREATED WITH RADIATION

## Local progression free survival



# THE IMPACT OF RESPONSE TO INDUCTION CHEMOTHERAPY ON DISEASE PROGRESSION IN PATIENTS TREATED WITH RADIATION

## Metastases free survival



# GERMAN EXPERIENCE OF CHEMOTHERAPY AND RADIATION THERAPY INSTEAD OF SURGERY

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Short Communication

## Long-term outcome after polychemotherapy and intensive local radiation therapy of high-grade osteosarcoma

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### ABSTRACT

**Background:** Current standard therapy for high-grade osteosarcoma is neoadjuvant chemotherapy and complete resection of the primary tumour. Irradiation can improve local control if complete tumour resection is not possible or refused, but data on long-term outcome are not available.

**Patients and methods:** We report on long-term results for overall survival, occurrence of local recurrence and metastasis, joint function and side-effects in 13 patients with high-grade osteosarcoma having been treated with a combination of local irradiation and polychemotherapy (median follow-up of 13.5 years).

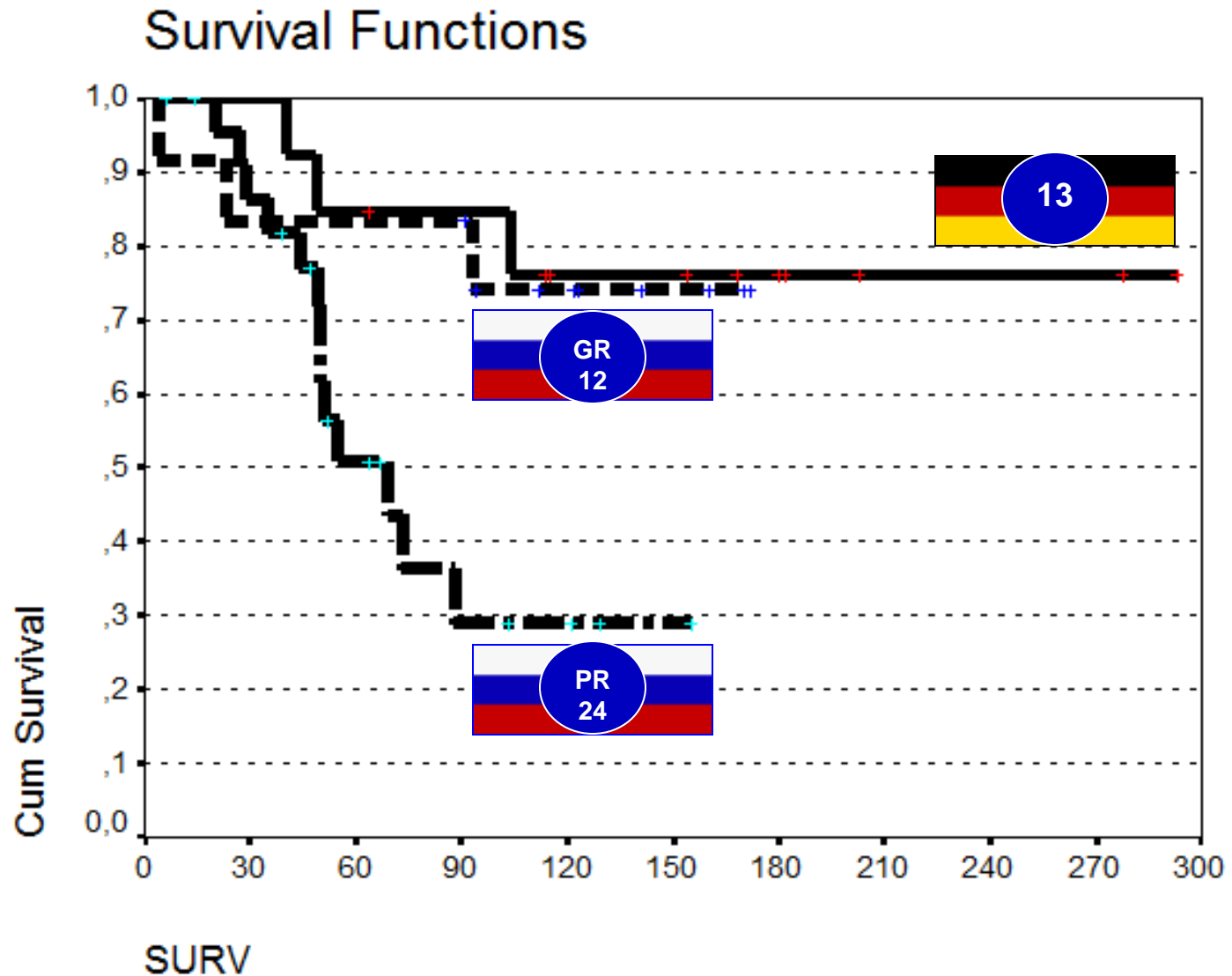
**Results:** Ten of the 13 patients were alive 4–23 years after diagnosis. Three patients suffered local recurrence, in 2 of them tumour control and long-term survival could be achieved by secondary salvage surgery and polychemotherapy. In 5 patients pathological fractures of the irradiated bones occurred, none of them was associated with local recurrence. In 7 of the 10 long-term survivors good or fair joint function was achieved.

**Conclusions:** We conclude that combination of chemotherapy and intensive local irradiation can achieve long-term local control and even cure in high-grade osteosarcoma. Thus radiation therapy may represent an alternative to definite surgery in selected patients, in particular in those with good response to chemotherapy, when surgery is not feasible or refused.

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**13 osteosarcoma patients**  
**Chemotherapy – COSS**  
**Median follow-up – 13.5 years**  
**10 yrs overall survival - 76%**  
**10 yrs LPFS – 76%**

# RUSSIAN AND GERMAN EXPERIENCE OF CHEMOTHERAPY AND RADIATION THERAPY INSTEAD OF SURGERY



## COMPLICATIONS

Pathological fractures:

Russia 7/36 (19%)

Germany 5/13 (38%)

## LIMB - SALVAGE RATE

All patients	23/36 (64%)
Long term survivors (> 3 yrs)	<u>10/18 (56%)</u>

# PATHOLOGICAL FRACTURE 10 YEARS AFTER RADIOTHERAPY



Before treatment

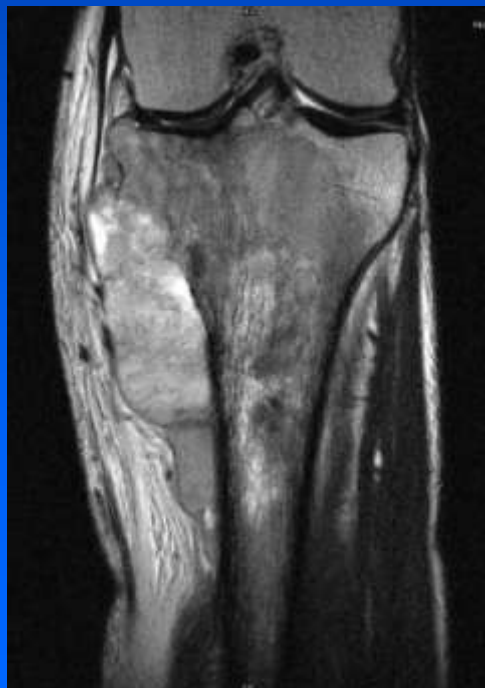


8 years after treatment



10 years after treatment

# OSTEOSARCOMA OF THE TIBIA BEFORE AND AFTER CHEMOTHERAPY





# Conclusions

**Radiation therapy did not impair the prognosis when compared with standard local treatment**

**It is effective in selected osteosarcoma patients who responded to induction chemotherapy**

**Majority of patients had a functional limb during and after treatment**

**More experimental and clinical studies are required to define the role of radiation therapy in osteosarcoma in modern chemotherapy era.**

A detailed watercolor illustration of a grand, multi-story Victorian building with a blue-tiled mansard roof, ornate architectural details, and a central bay window. The scene is set in a street with people, horse-drawn carriages, and a horse in the foreground.

Thank you!

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