Trattamento non chirurgico delle oligometastasi

Radioterapia Stereotassica

Marco Trovo

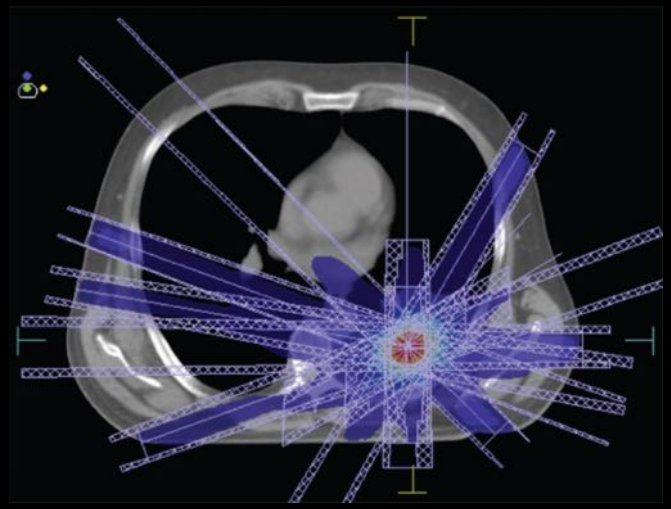
CRO Aviano

Outline

- Introduction: SBRT in lung cancer
- Aviano experience
- Published data on lung metastases
- Consideration on SBRT for oligometastatic patients
  - Clinical case
- Conclusions

Introduction: SBRT in lung cancer

- 3-year Local Control of T1-T2 pheripheral NSCLC treated with SBRT: 85-95%
- Isolated regional recurrences: 1-9%
- The predominant pattern of failure is distant!



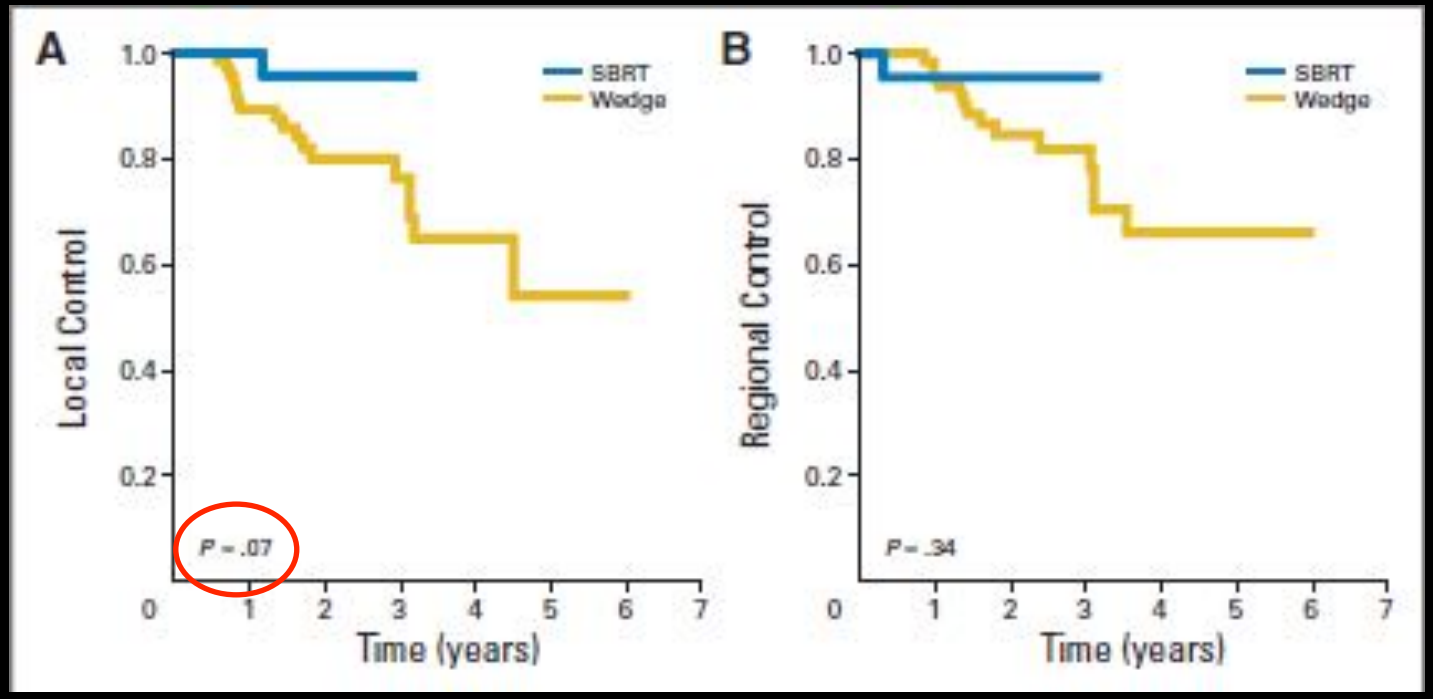
VOLUME 28 · NUMBER 6 · FEBRUARY 20 2010

JOURNAL OF CLINICAL ONCOLOGY

ORIGINAL REPORT

Outcomes After Stereotactic Lung Radiotherapy or Wedge Resection for Stage I Non–Small-Cell Lung Cancer

Inga S. Grills, Victor S. Mangona, Robert Welsh, Gary Chmielewski, Erika McInerney, Shannon Martin, Jennifer Wloch, Hong Ye, and Larry L. Kestin



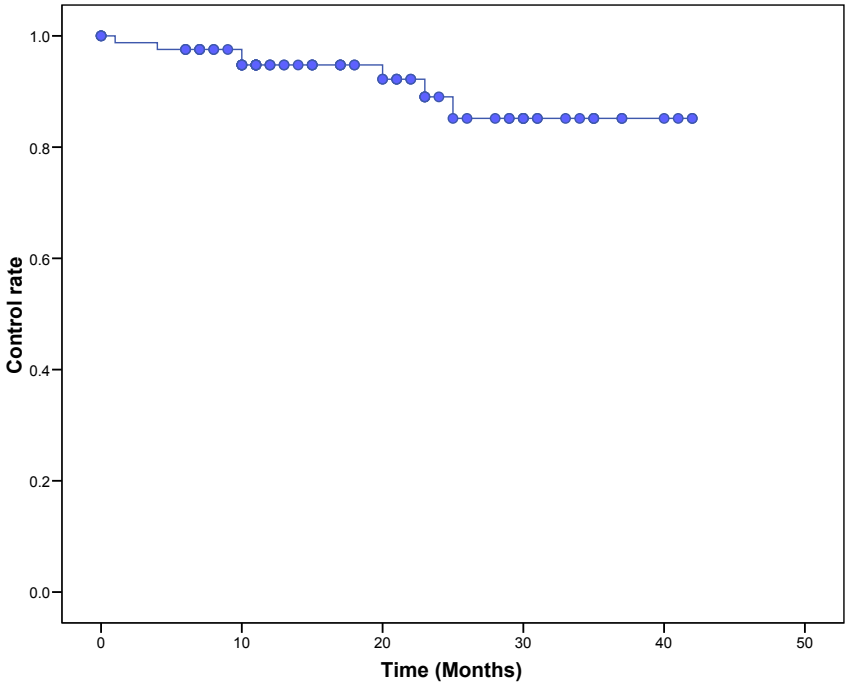
Impact of prescription dose on results.

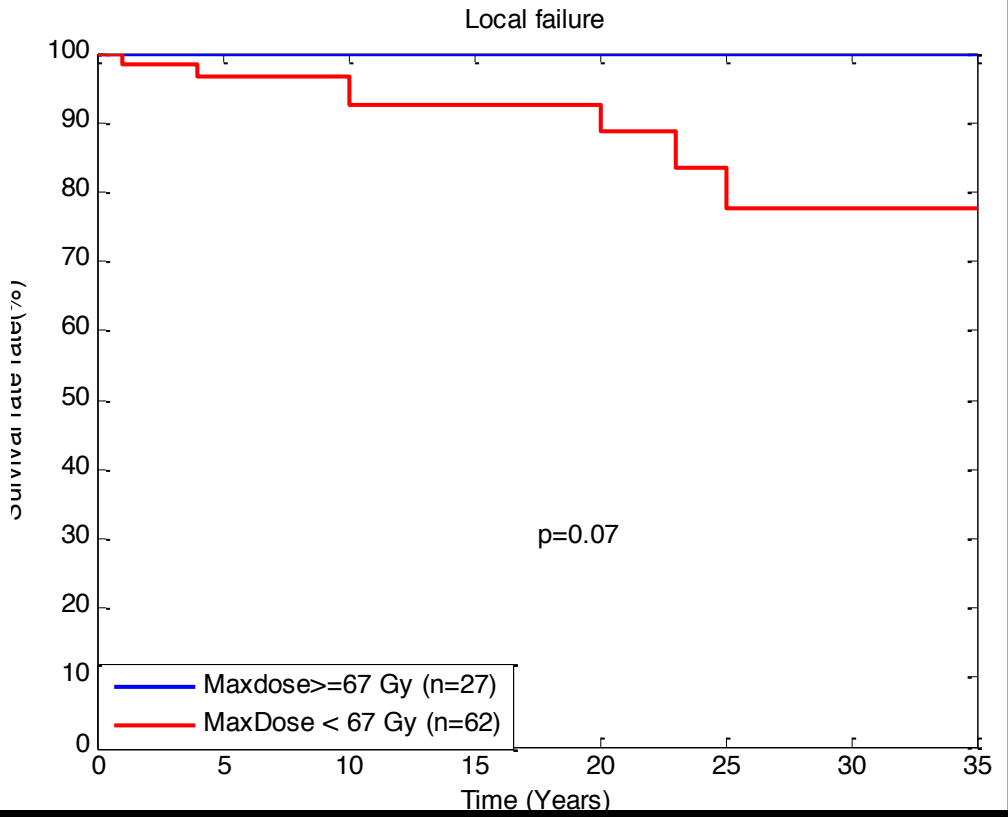
The dose is important!

81 SBRT for Early-stage NSCLC: The Predominant Failure Pattern is Distant

J. D. Bradley, I. El Naqa, M. Trovo, P. Parikh, R. E. Drzymala

Washington University Medical School, St. Louis, MO





Overall local control rate

Local control by maximum dose

ASTRO meeting 2008

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Aviano experience

AIRO GENOVA 2011

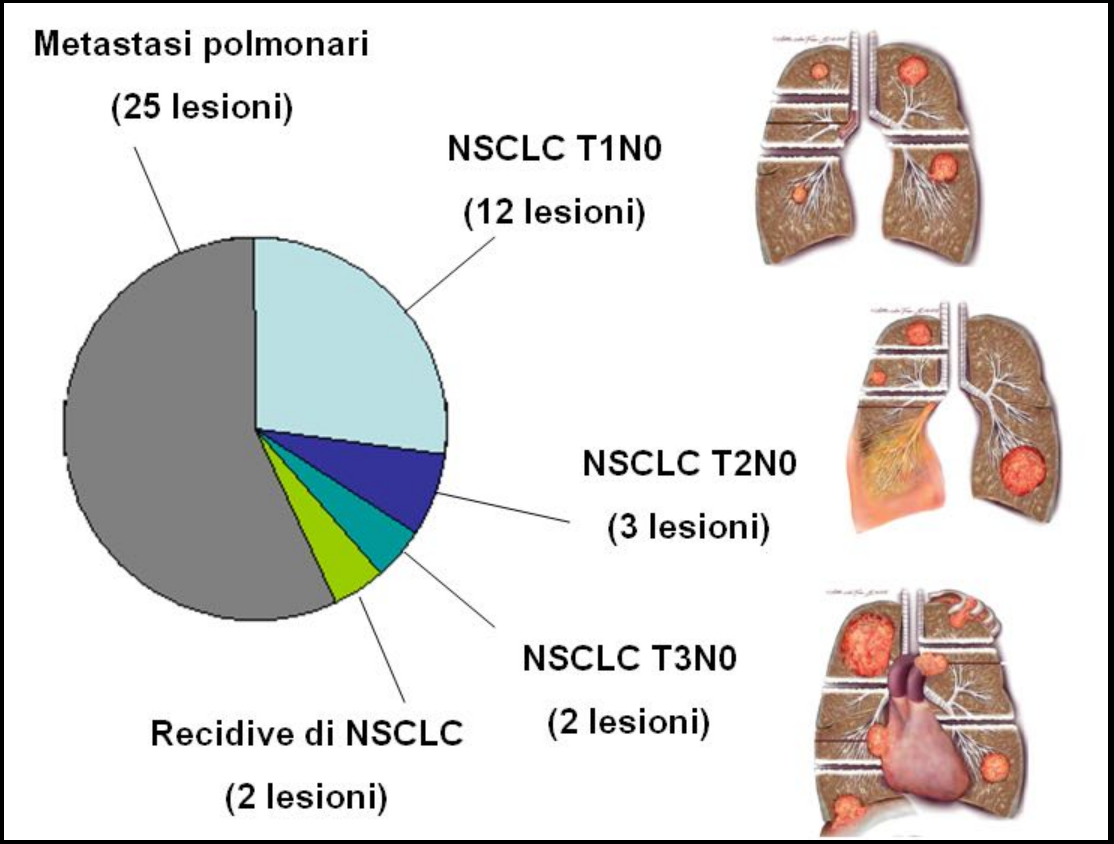
Radioterapia Stereotassica Frazionata con Tomotherapy per Tumori Primitivi e Secondari del Polmone: Tossicità e Controllo Locale

(L. Bandera, M. Trovò, E. Minatel, et al.)

Radioterapia Stereotassica Frazionata con Tomotherapy

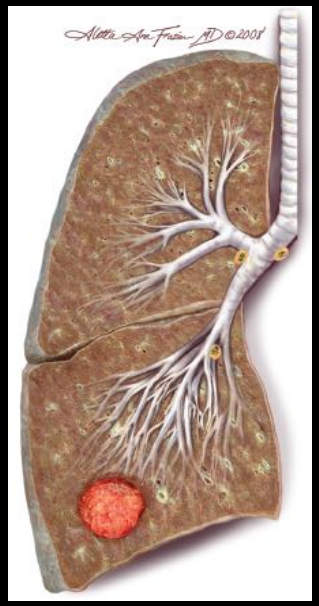
Tra giugno 2008 e marzo 2011, **34 pazienti** con **44 lesioni** polmonari sono stati sottoposti a SBRT con Tomotherapy

CARATTERISTICHE DEI PAZIENTI	
ETA' (aa)	
<50	7
51-70	14
>71	23
PS (ECOG)	
0	19
1	15
2	10
SEX	
M	25
F	9



CARATTERISTICHE DELLE LESIONI

PERIFERICO: 36



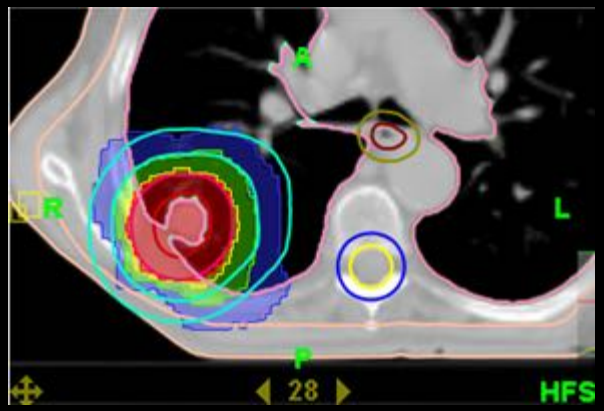
DIMENSIONI	PERIFERICO	CENTRALE
<10 mm	7	3
11-20 mm	11	2
21-30 mm	13	0
>30 mm	4	3
Non nota	1	0

CENTRALE: 8

Cause di non operabilità:

- ✓Rifiuto del paziente: 2
- ✓Performance Status: 3
- ✓Inoperabilità per cause mediche: 16
- ✓Scarsa funzionalità respiratoria: 8
- ✓Altro (metastasi, recidive, IV stadio) : 18

CARATTERISTICHE DEL TRATTAMENTO



Dose prescritta all'isodose dell' 80%

Frazionamenti con BED inferiore (localizzazione centrale / scarso PS)

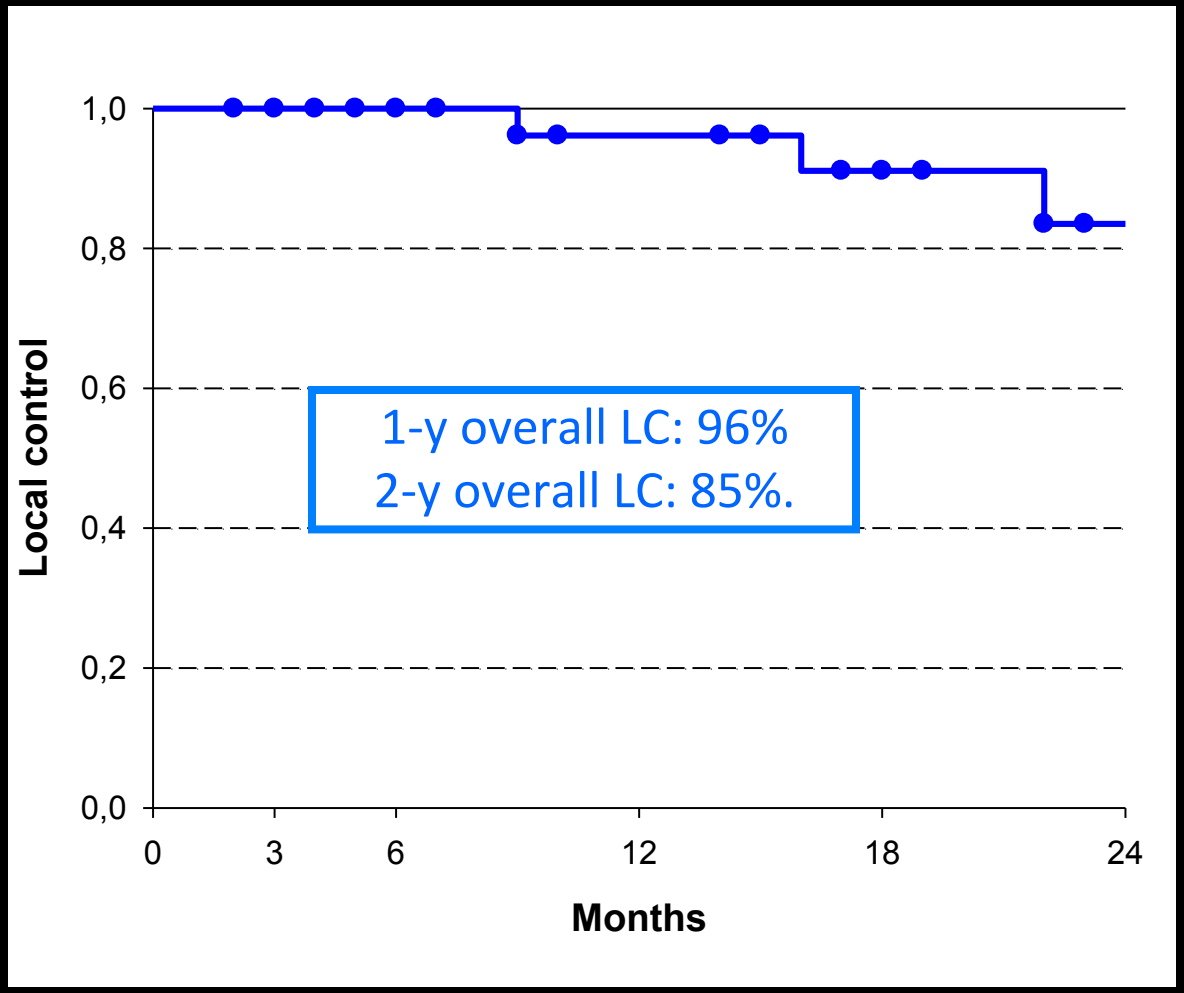
Frazionamento	N°
52 Gy (8fr)	33
39 Gy (6fr)	2
36 Gy (6fr)	2
42 Gy (6fr)	1
40 Gy (8fr)	3
52.2 Gy (15fr)	2
32 Gy (8fr)	1

RISULTATI

- Follow up mediano : 14 mesi (range, 2-31).

- 1-y DFS: NSCLC: 77%
  Mets: 56%

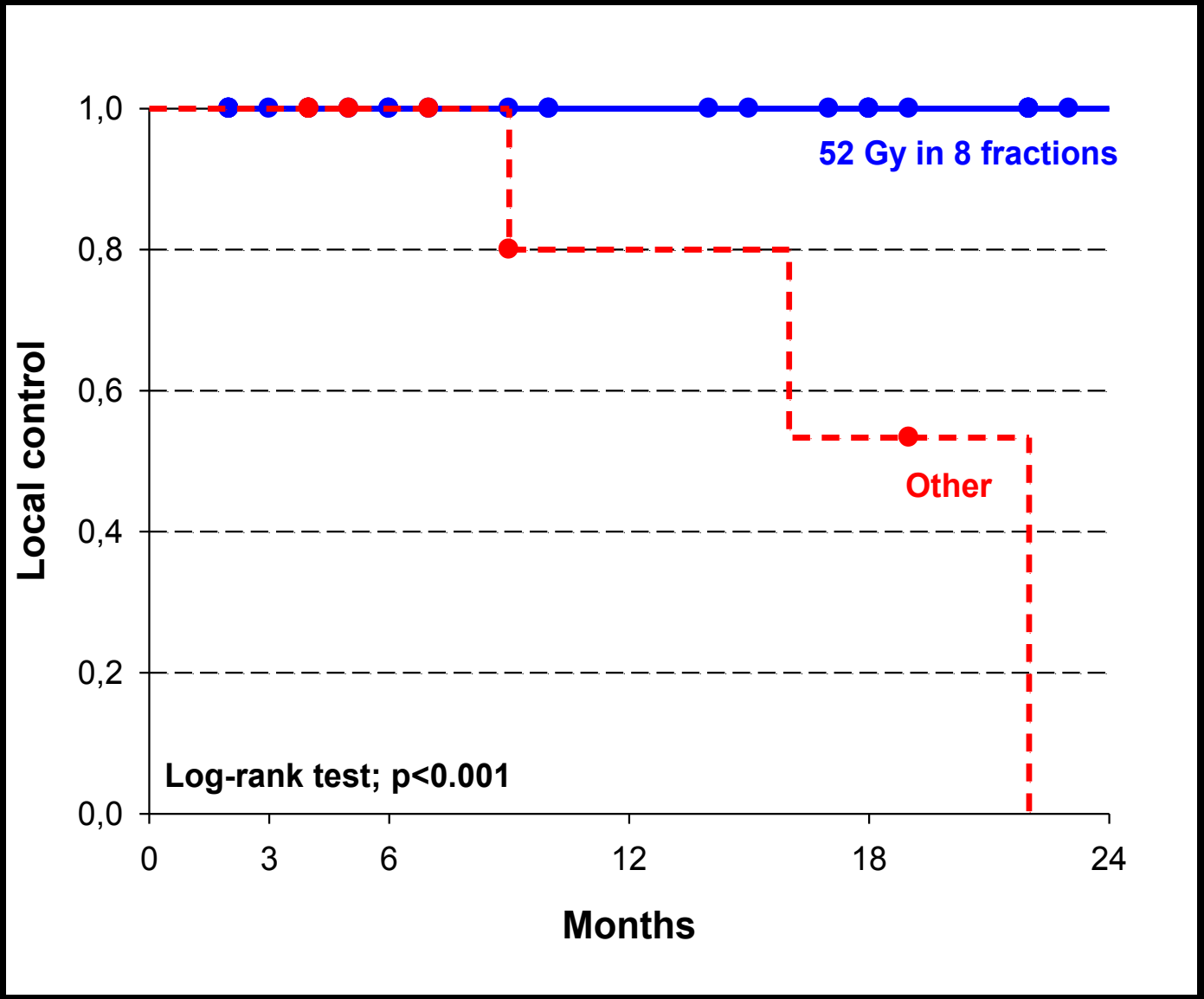
CONTROLLO LOCALE



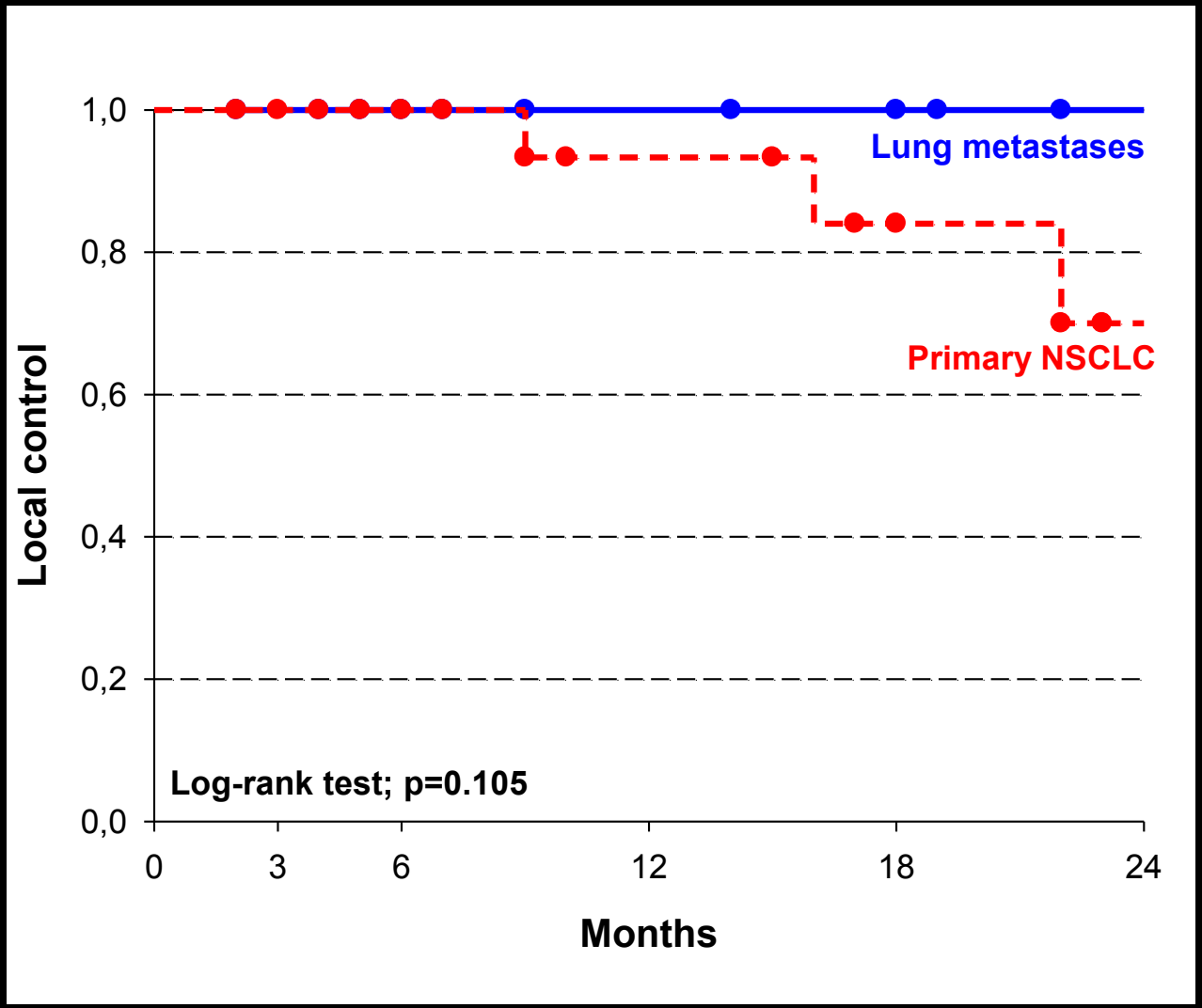
CONTROLLO LOCALE

100%

80%



CONTROLLO LOCALE



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Published data on lung metastases

Authors	Pat	Target Size	Location	N.of mets	Primary	FU (mo)	Single Dose Gy	LC	Toxicity
Nagakawa	14	40 ml	Pheriph Central	1	Liver, lung,	10	20	2-y 91%	
Hara	11	4 ml	Pheriph Central		Liver, lung, H&N	13	<30 -50% 30 -50%	2-y 48%	27% G2-3 Lung
Wulf	25	< 25ml	Pheriph Central	1-2	Lung, others	14	26	100% crude	
Le	12	26	Pheriph Central	1-2		18	25	2-y 56%	
Fritz	25	6	Pheriph Only	1-2	Lung, rectum	22	30	87% crude	
Hof	61	10	Pheriph Central	1-2	Lung, others	14	24/26	2-y 73%	5% G3 Lung

Authors	Pat	Target Size	Location	N.of mets	FU (mo)	Dose	LC	Toxicity
Lax	13	48 ml	Pheriph Central	Nn	8	21-66 Gy 1-3 fr	2-y 83%	Not reported
Uematsu	29	< 4 cm	Pheriph Central	Nn	11	33-76 Gy 1-8 fr	2-y 94%	Not reported
Onimaru	20	< 6 cm	Pheriph Central	1	18	48 Gy 8 fr	3-y 70-100%	1 Grade 5 esophagitis
Wulf	25	17 ml	Pheriph only	2	17	30-36 Gy 3 fr	2-y 70%	3% pneumonitis
Song	13	< 5 cm	Pheriph Central	2	14	35 Gy	2-y 87%	
Min Yoon	53		Pheriph Central	3	14	30-40 Gy 3-4 fr	70-100% crude	
Milano	50	2 cm < 7 cm	Pheriph Central	5	18	48-50 Gy 6-10 fr	3-y 90%	3% G3 pericardium
Norihisa	34		Pheriph Central	2	27	48-60 Gy 4-5 fr	2-y 90%	15% G 2-3 pneumonitis
Brown	35	< 5 cm	Pheriph Central	3	18	60 Gy 5 fr	77% crude	1 Grade 4 pneumonitis
Rusthoven	38	< 5 cm	Pheriph only	3	15	60 Gy 3 fr	2-y 96%	18% Grade 2-3

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Kyle E. Rusthoven, Brian D. Kavanagh, Stuart H. Burri, Changhu Chen, Higinia Cardenes, Mark A. Chidel, Thomas J. Pugh, Madeleine Kane, Laurie E. Gaspar, and Tracey E. Schefter

Primary tumor	No	%
CRC	9	23
Sarcoma	7	18
RCC	7	18
Lung	5	13
Melanoma	3	8
H&N	3	8
Others	4	10

No of thoracic lesions	No
1	13
2	15
3	7
4	3
Presence of extra thoracic disease	
Yes	5
No	33

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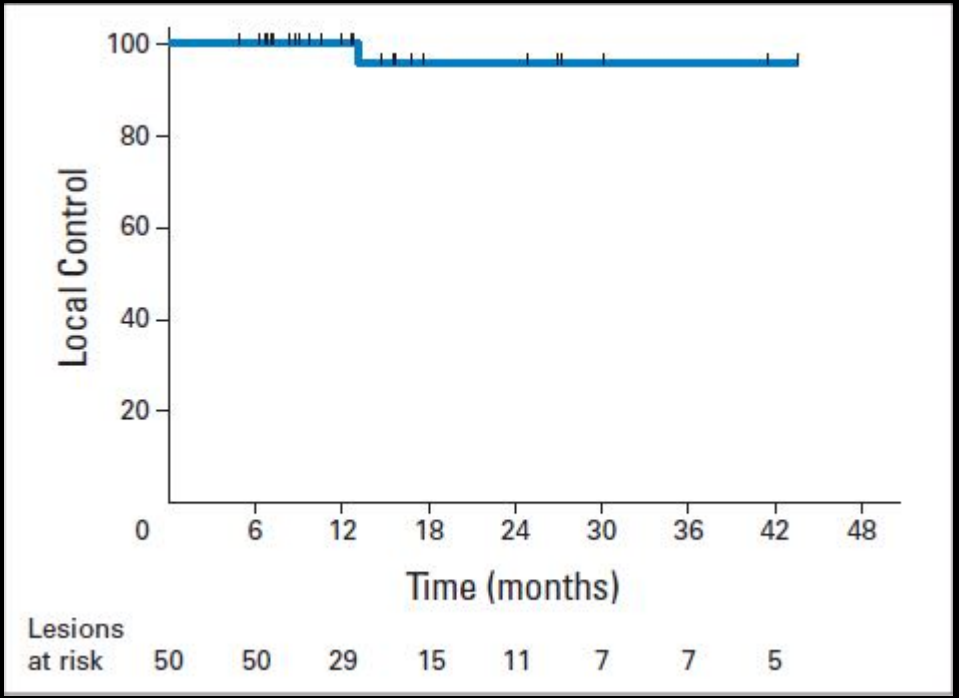
60 Gy / 3 fr



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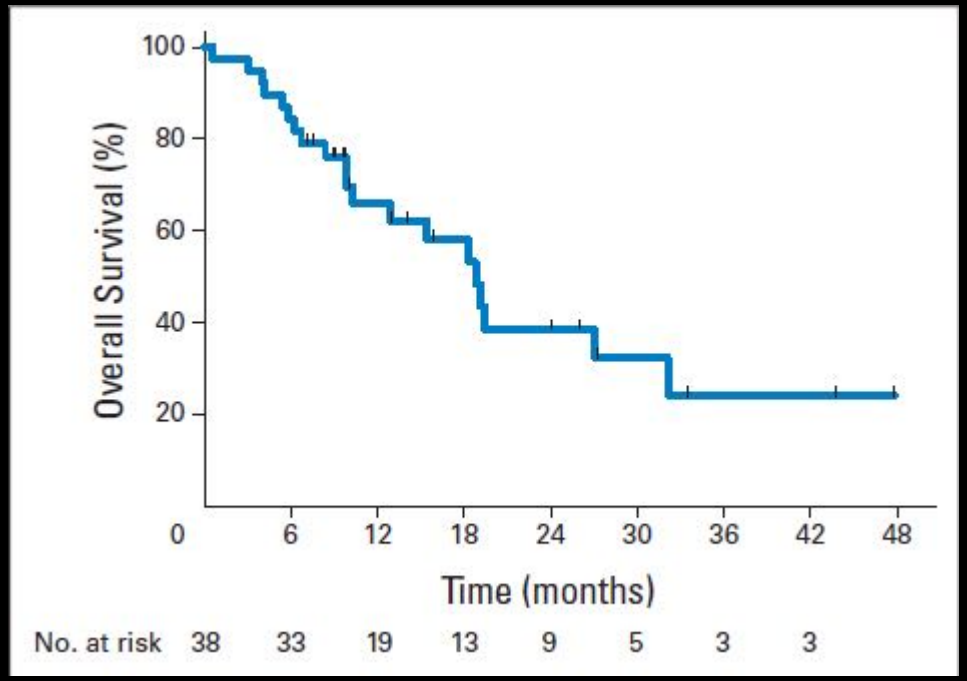

Distant progression
-24 (63%) of patients
-4 months after SBRT
-Median PFS 8 months

Contents lists available at ScienceDirect

Lung Cancer

journal homepage: www.elsevier.com/locate/lungcan

Stereotactic body radiation therapy for lung metastases

Umberto Ricardi[a], Andrea Riccardo Filippi[a,*], Alessia Guarneri[a], Riccardo Ragona[b], Cristina Mantovani[a], Francesca Giglioli[b], Angela Botticella[a], Patrizia Ciammella[c], Cristina Iftode[a], Lucio Buffoni[d], Enrico Ruffini[e], Giorgio Vittorio Scagliotti[f]

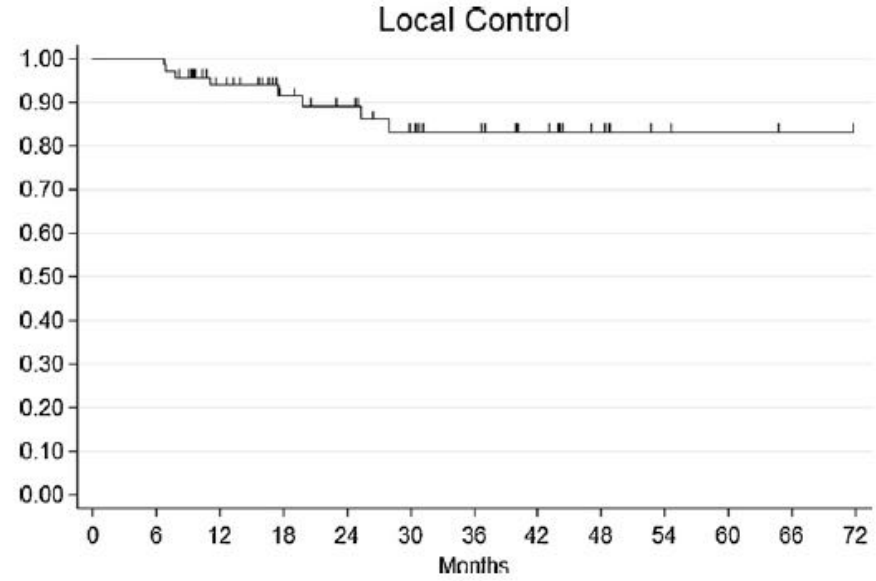

Fig. 1. Actuarial local control.

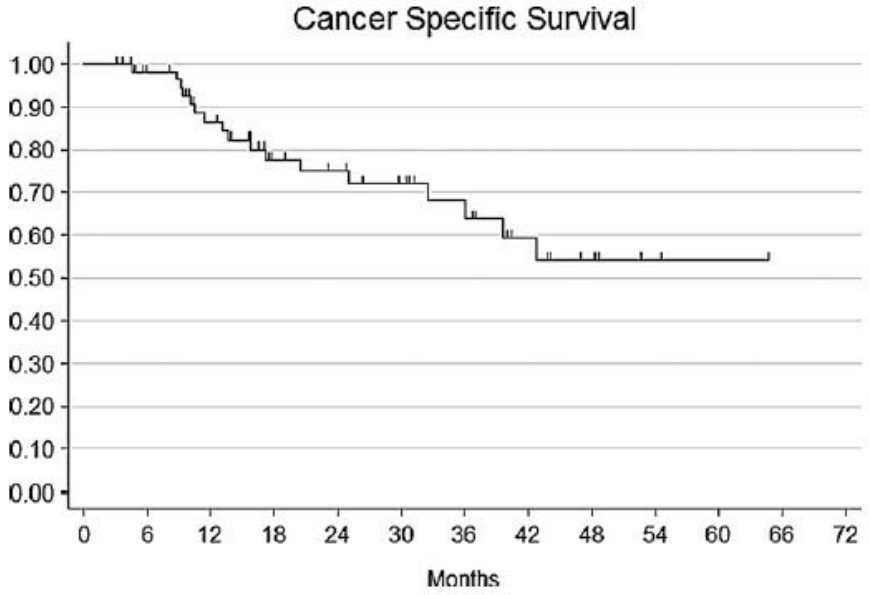

Fig. 3. Cancer-specific survival.

Outline

- Introduction: SBRT in lung cancer
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  - Clinical case
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Consideration on SBRT for oligometastatic patients

Hypothesis: local control achieved with SBRT may translate into clinical benefit.

Consideration on SBRT for oligometastatic patients

- It's deemed to be of limited value because it is impossible to eradicate all sites of metastatic disease with local therapy.
- Metastases will most probably progress and disseminate rapidly

Consideration on SBRT for oligometastatic patients

- Is the dose still important for lung metastases?
  - Is LC the primary end-point?
  - Dose LC of lung metastases have an impact on DFS (PFS)?
  - Should we lower the dose to treat more lesions?
  - How many lesions should we treat?

Consideration on SBRT for oligometastatic patients

- Is the dose still important for lung metastases?

ANTICANCER RESEARCH *33*: 655-660 (2013)

Ablative or Palliative Stereotactic Body Radiotherapy with Helical Tomotherapy for Primary or Metastatic Lung Tumor

MICHELA MARCENARO[1], STEFANO VAGGE[1], LILIANA BELGIOIA[1], DARIO AGNESE[1], GIORGIO LAMANNA[1], ELISA MANTERO[1], MARCO GUSINU[2], STEFANIA GARELLI[2], FRANCESCA CAVAGNETTO[2], STEFANO AGOSTINELLI[2] and RENZO CORVÒ[1]

Divisions of [1]Radiation Oncology and [2]Medical Physics, IRCCS San Martino – IST National Cancer Research Institute and University, Genoa, Italy

ANTICANCER RESEARCH *33*: 655-660 (2013)

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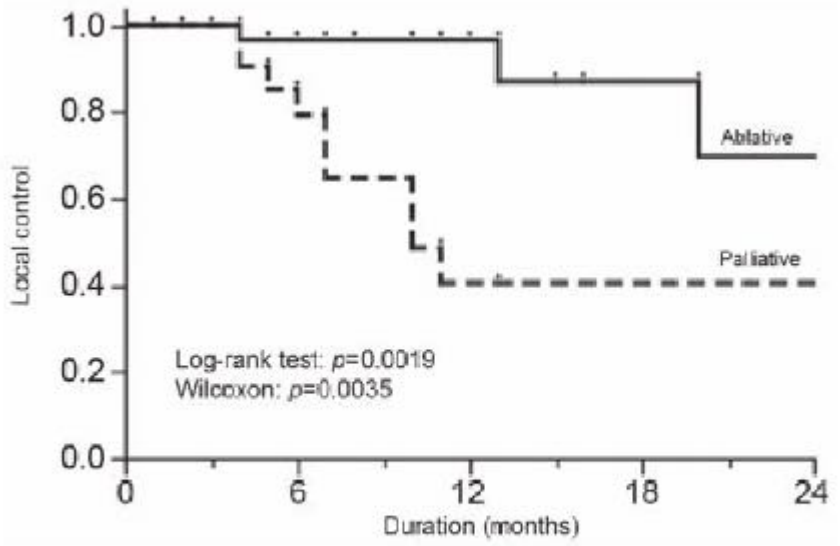


Figure 2. *Local control for ablative stereotactic body radiotherapy (SBRT) and palliative SBRT (40.4% and 69.6%, 24 months respectively).*

2-y LC 69% (ablative) vs. 40% (palliative) p=0.002

2-y OS 58% (ablative) vs. 49% (palliative) p=0.57

Consideration on SBRT for oligometastatic patients. Clinical case.

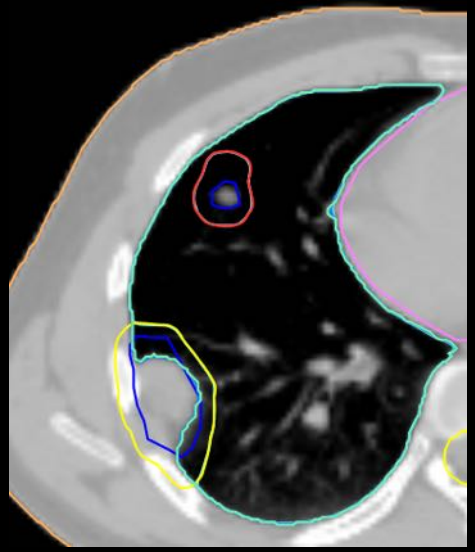
15 year old male
01.2005: local treatment (CH) for a sinovial sarcoma of the right foot;
02.2005: persistent local disease (MR) → RT→CH +IORT→CT

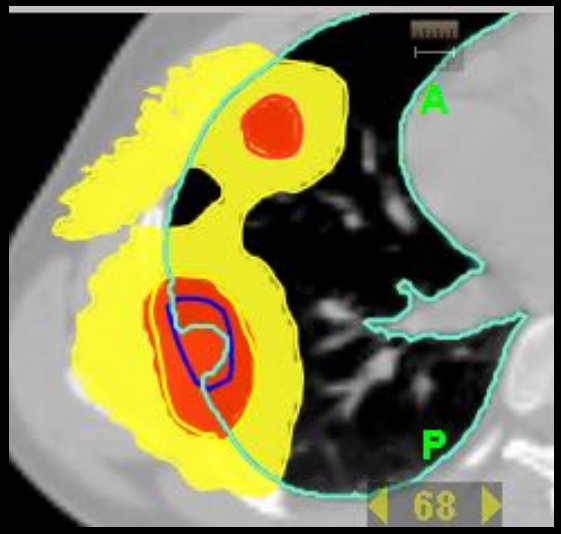
off therapy for 2 years

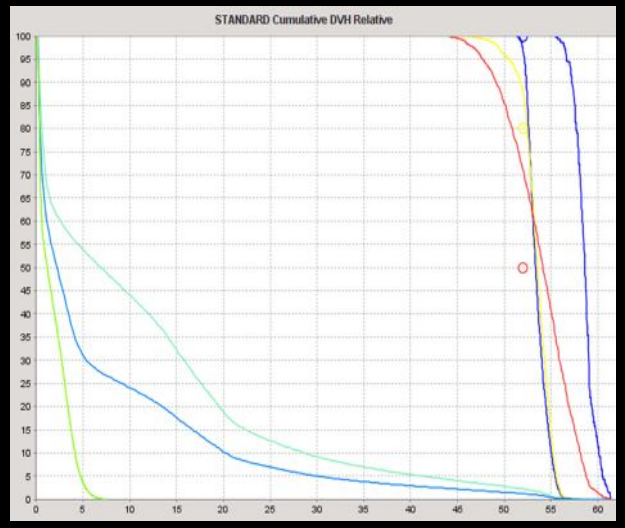
08.2007: local recurrence → CH
05.2008: (two) lung metastases
05-12.2008: 2nd line CT (9 cycles)
01.2009: lung metastases progression (4 lesions)
02.2009-03-2010: 3rd line CT (14 cycles)
03 and 05 2009: SBRT to all 4 lesions

Consideration on SBRT for oligometastatic patients. Clinical case.

Tomotherapy - SBRT: 52 Gy / 8 fractions (80% isodose)







Consideration on SBRT for oligometastatic patients. Clinical case.

Disease free for 18 months; off therapy for 6 months

09.2010: PD lung → 4th line CT; PD (lung mediastinum)→ salvadge CH→ palliative RT→
11.2011: death

A Prospective Pilot Study of Curative-intent Stereotactic Body Radiation Therapy in Patients With 5 or Fewer Oligometastatic Lesions

Characteristic	No. of patients (%)
No. of patients	121 (100)
Age, y	
Median [range]	60 [34–88]
Mean ± SD	58 ± 12
Enrolling institution	
University of Rochester, Rochester, NY	111 (92)
M. D. Anderson Cancer Center, Orlando, Fla	10 (8)
Primary cancer	
Breast	39 (32)
Colorectal	31 (26)
Lung, head and neck, or esophagus	23 (19)
Pancreas, biliary tract, or liver	7 (6)
Sarcoma	7 (6)
Other	14 (12)*

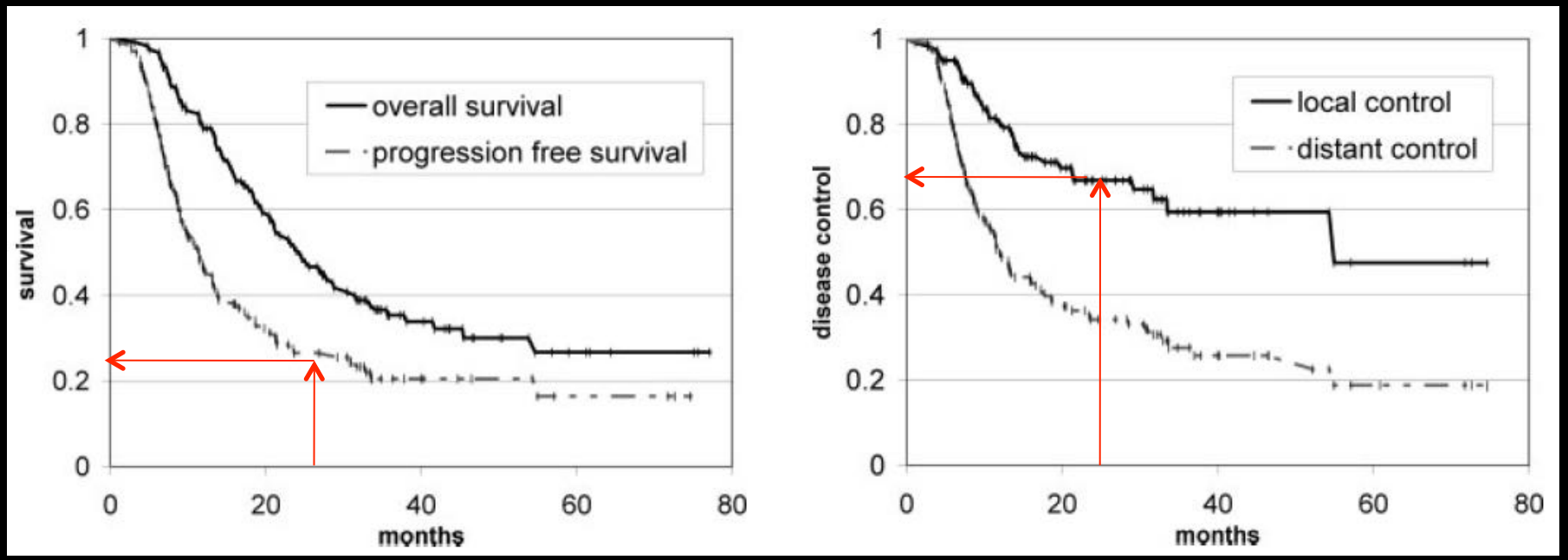
Milano MT, et al. *Cancer* 2008

A Prospective Pilot Study of Curative-intent Stereotactic Body Radiation Therapy in Patients With 5 or Fewer Oligometastatic Lesions

Sites involved with oligometastatic disease	
Lung	50 (41)
Thoracic lymph nodes	24 (20)
Liver	54 (45)
Pelvic or abdominal lymph nodes	4 (3)
Brain	5 (4)
Adrenal glands	2 (2)
Bone	15 (12)
No. of oligometastatic lesions	
1	37 (31)
2	32 (26)
3	28 (23)
4	12 (10)
5	12 (10)
No. of involved organs	
1	92 (76)
2	25 (21)
3	4 (3)

Milano MT, et al. *Cancer* 2008

A Prospective Pilot Study of Curative-intent Stereotactic Body Radiation Therapy in Patients With 5 or Fewer Oligometastatic Lesions



Milano MT, et al. *Cancer* 2008

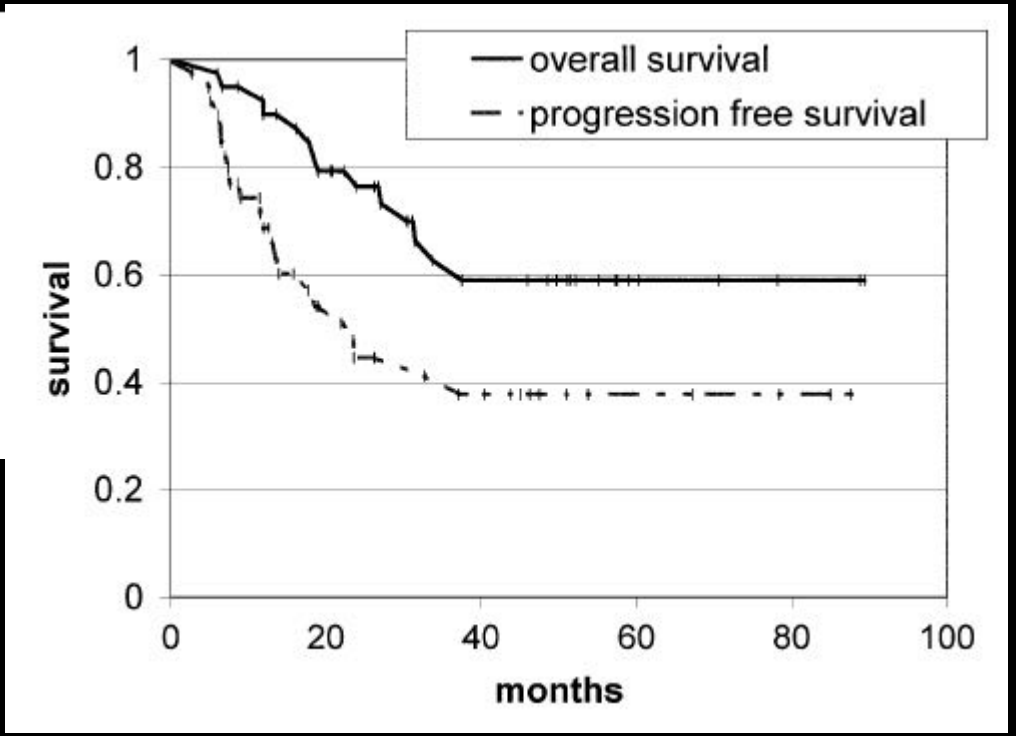
Breast Cancer Res Treat (2009) 115:601–608
DOI 10.1007/s10549-008-0157-4

CLINICAL TRIAL

Oligometastatic breast cancer treated with curative-intent stereotactic body radiation therapy

Michael T. Milano · Hong Zhang · Su K. Metcalfe · Ann G. Muhs · Paul Okunieff

Number of lesions	85
Sites involved with oligometastatic disease	
Liver	33 (39)
Lung	19 (22)
Bone	17 (20)
Thoracic lymph nodes	14 (16)
Pelvic or abdominal lymph nodes	2 (2)



A Prospective Pilot Study of Curative-intent Stereotactic Body Radiation Therapy in Patients With 5 or Fewer Oligometastatic Lesions

- Most patients with local failure did experience recurrent distant failure
- The risk of developing distant failure is not increased significantly by the occurrence of local failure
- Reflecting the magnitude of patients who fail distantly despite LC.
- Whether local failure led to distant spread could not be readily determined.

Milano MT, et al. *Cancer* 2008

Consideration on SBRT for oligometastatic patients

There is a lack of information on:

- Toxicity !!!
- QoL !!!
- Interaction with SBRT - CT
- Patient selection criteria

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Conclusions

- SBRT is a highly effective local treatment for primary and metastatic lung cancer
- Prospective studies are warranted to assess
  - Impact on DFS, OS
  - Toxicity
  - QoL

Thank you for your attention !

marco.trovo@cro.it