30 Gy single dose Stereotactic Body Radiation Therapy to lung lesions: outcome in a large series of patients

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Background

Lung is one of the primary site of metastases from solid tumor
Local treatment include surgery and radiotherapy

SBRT is a useful tool to treat oligometastatic* disease

ADVANTAGES

Optimal local control

Low toxicity

Good compliance

Low costs

DISADVANTAGES

Optimal dose schedule for SBRT to the lung is still under investigation

Dangerous localizations

* Hellman S, Weichselbaum RR. Oligometastases. J Clin Oncol 1995;13:8–10

Clinical Outcomes of Single Dose Stereotactic Radiotherapy for Lung Metastases

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103 lung lesions in 66 patients

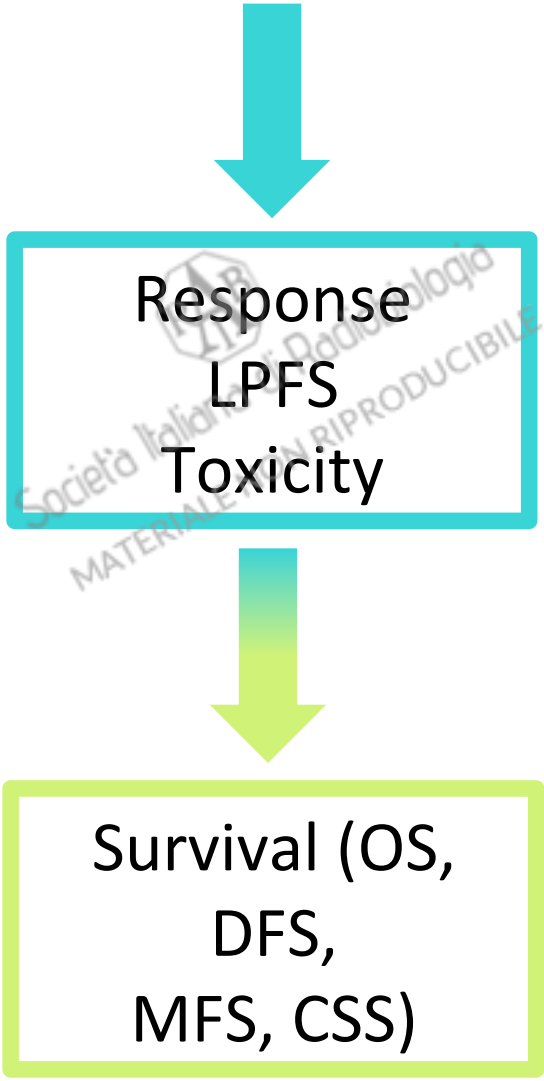
15 months FUP

	Dose	LC 1 year
49 lesions	**23Gy/1fr**	**79.4%**
54 lesions	**30Gy/1fr**	**94.7%**

Dose-response relationship

Although difference was not statistically significant..

Retrospective analysis:
Large series of oligometastatic to the lung cancer or primary lung cancer treated with single dose 30 Gy SBRT



Materials and methods

201 lung lesions in 160 patients
Inclusion criteria:

OLIGOMETASTATIC

Controlled primary tumor

≤4 synchronous or metachronous lung metastases at the time of treatment;

EARLY-STAGE NSCLC

Primary lung tumor stage I or II, not candidate to surgery;

No other active sites of distant metastasis

Patient's charateristics (n=160)	
Mean Age	70 (24-90)
Sex	
Male	99 (62)
Female	61 (38)
Location of Primary Cancer	
Lung	82 (51.5)
Colon-rectum	41 (25.5)
Breast	8 (5)
Others	29 (18)
Primary/metastasis (n=201)	
Primary	35 (17.4)
Metastasis	166 (82.6)
Site	
Peripheral	149 (74)
Central	52 (26)

Constraints	
Esophagus	<15.4Gy
Total lung volume	V20 <10% V10 <20%
MLD	<15Gy
Spinal chord	<14Gy
Hearth/Pericardium	<22Gy
Great vessels	<37Gy
Trachea and proximal bronchi	<2.2Gy
Skin	<26Gy
Brachial plexus	<17.5Gy
Rib	<30Gy

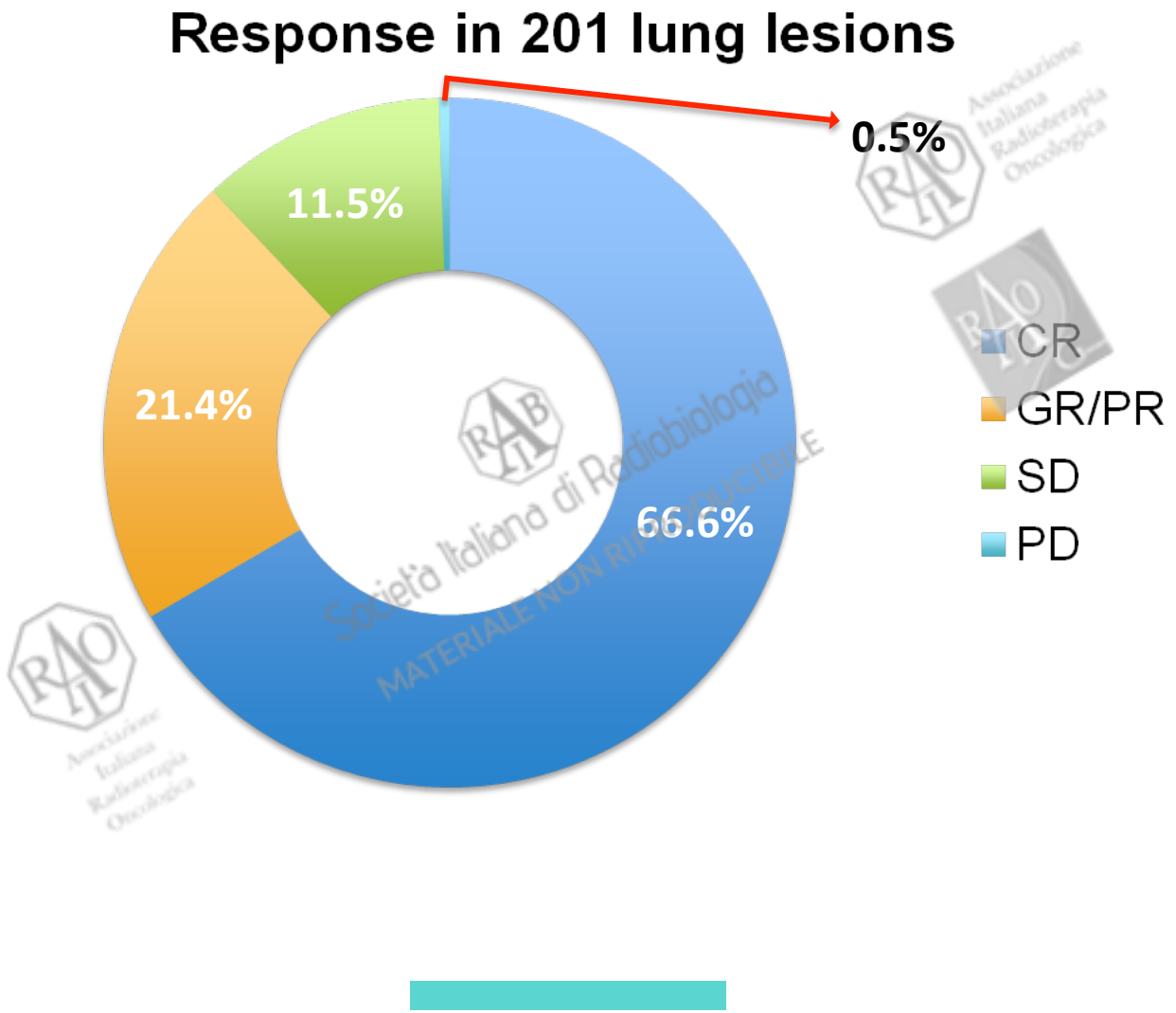
Mean size	
15.7 mm	2-50 mm
Mean PTV volume	
8.7 cc	(0.95 – 65.1)
N° of lung metastases	
1	128 (80)
2	27 (17)
3-5	5 (3)

CHT before SBRT	
Yes	114(71)
No	46 (29)

CHT after SBRT	
Yes	104 (65)
No	56 (35)

Results

Response and survival

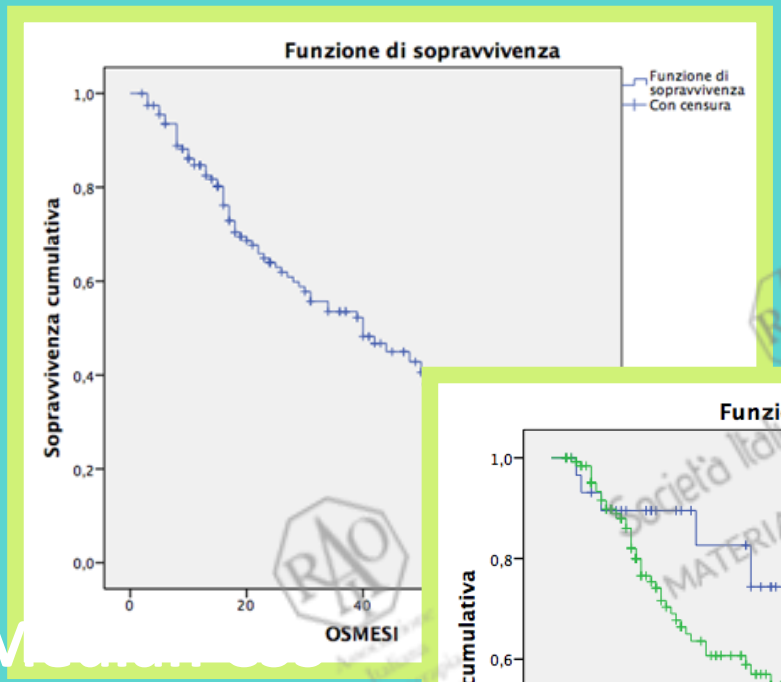


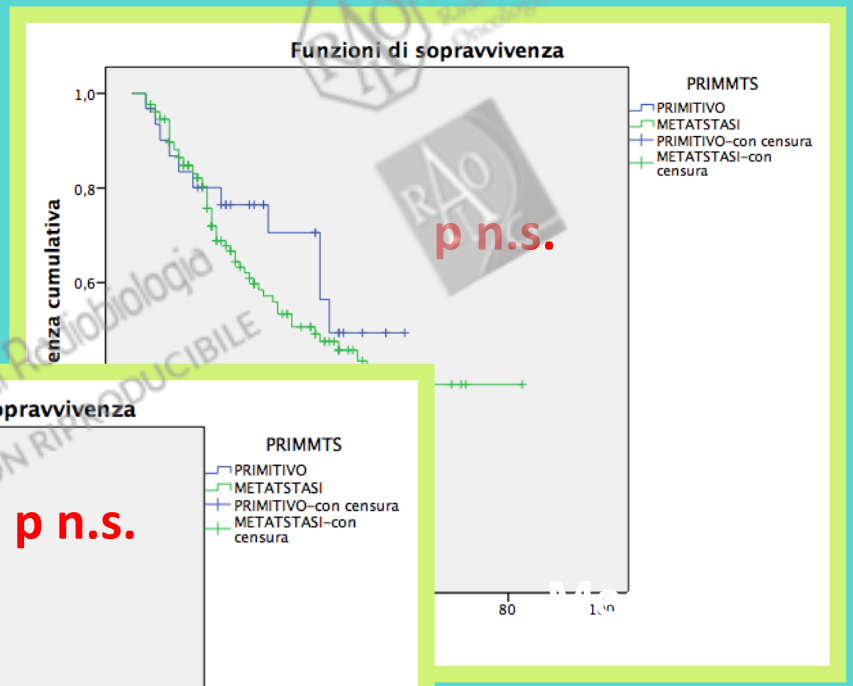
Overall response rate was **99.5%** (200/201 lesions)

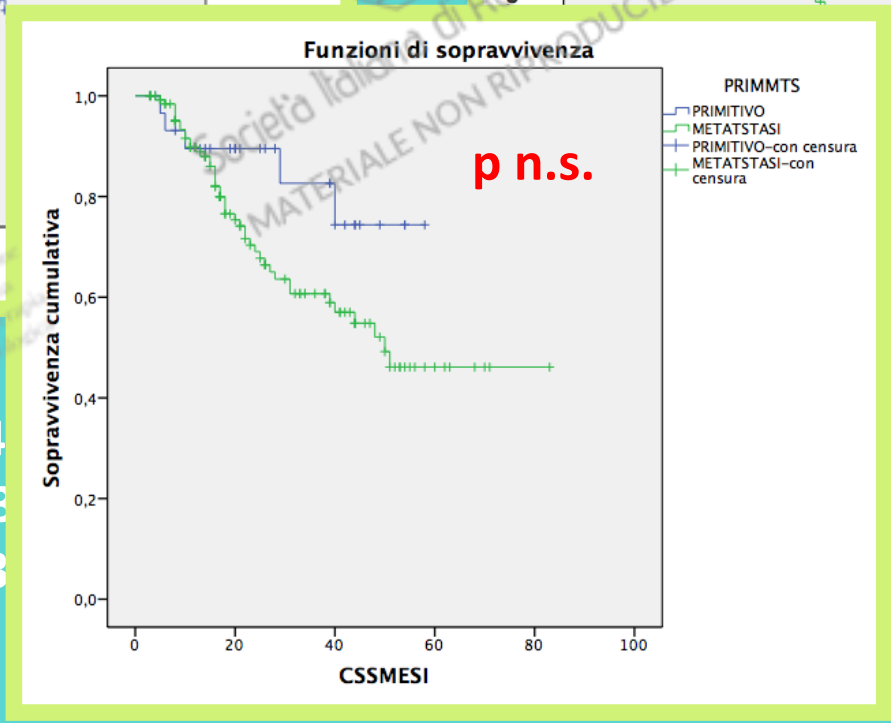
Median OS: 40 mo

Median OS

Early-stage: 42 mo
Oligomts: 39 mo







M

(total): 48 mo

1 year: 84

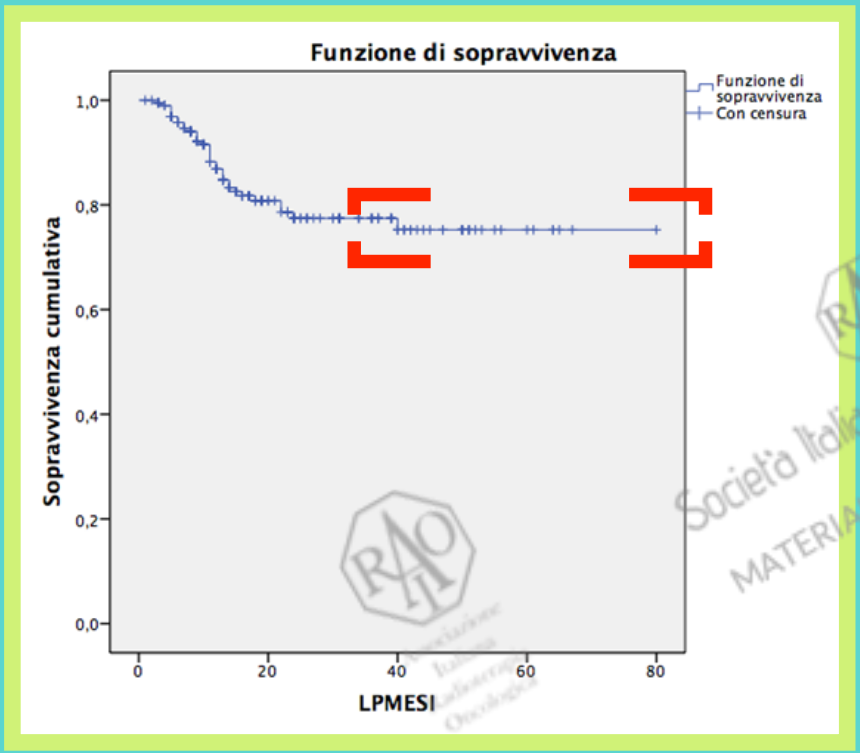
2 years: 63

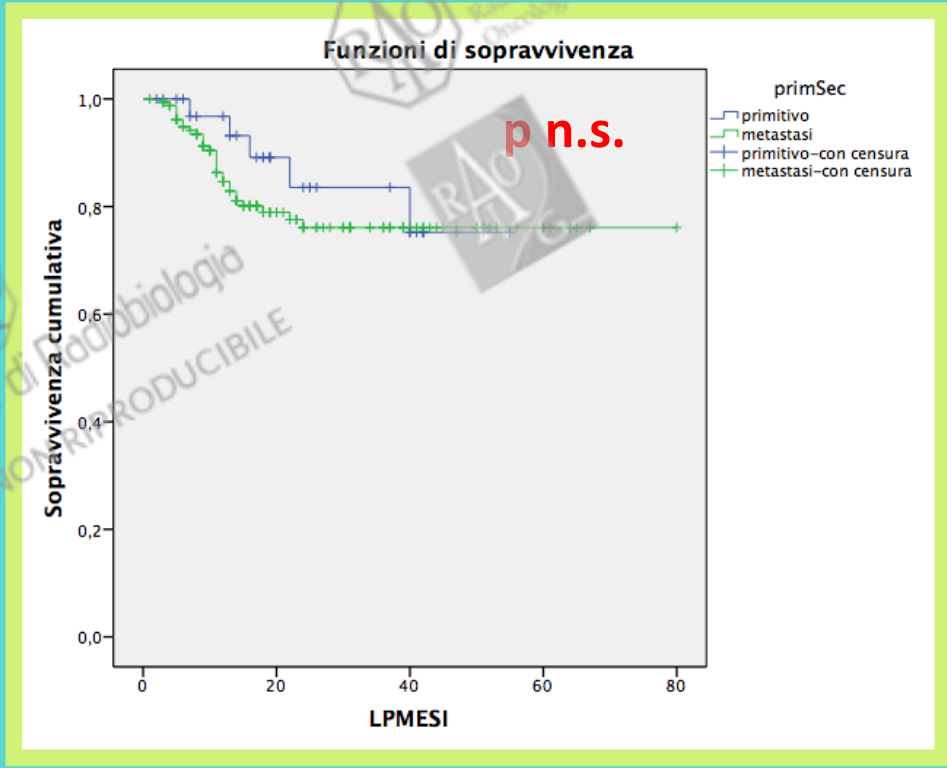
5 years: 3

Early stage: n.r.
Oligomts: 50 mo

Median LPFS: n.r.

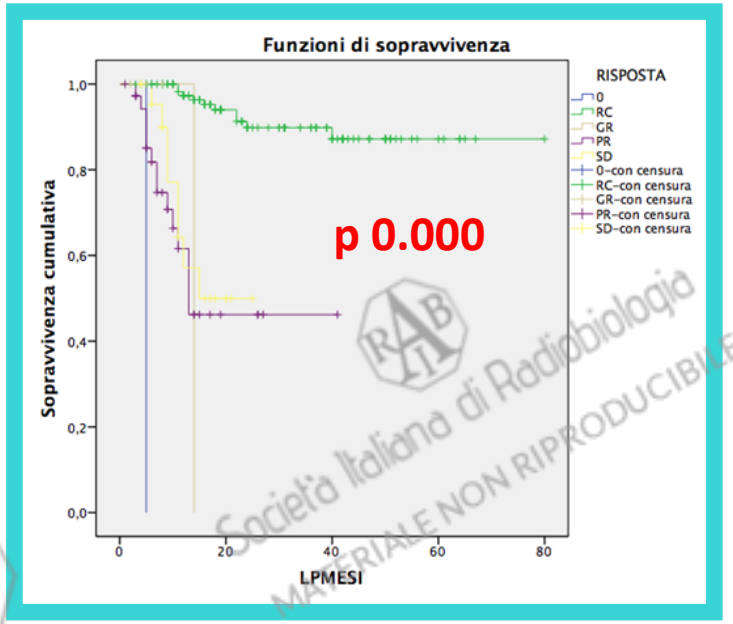
LPFS
Early stage/Oligomts





1 year: 86.9%
2 years: 77.5%
5 years: 75.2%

LPFS – response tailored

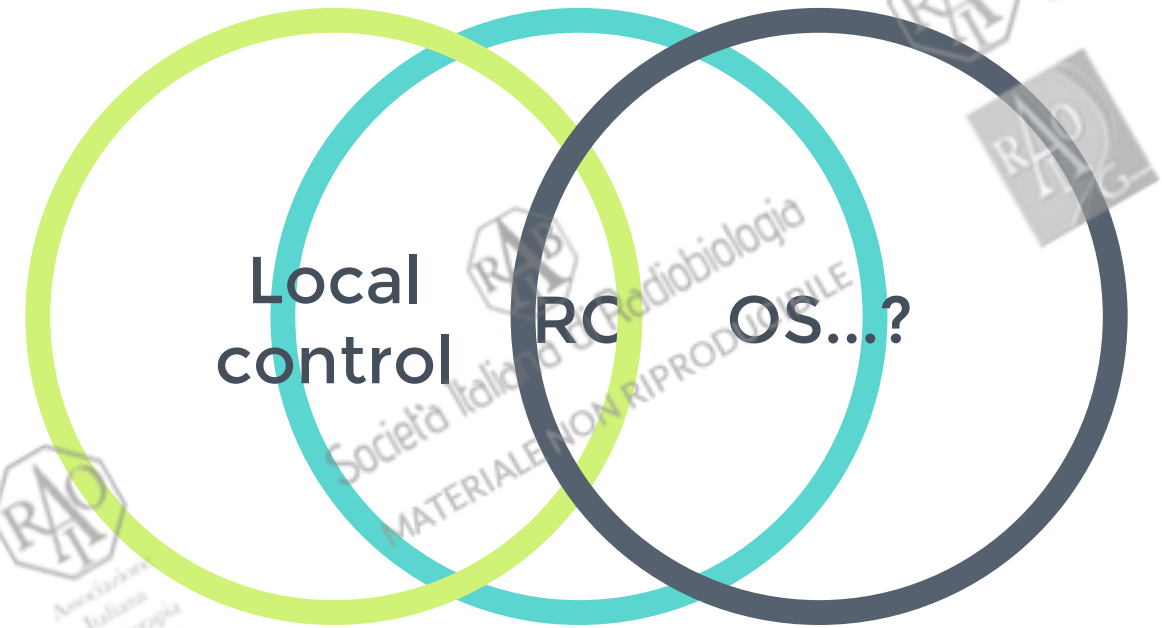


Median LPFS
RC: nr
GR: 14 mo
PR: 13 mo
SD: 15 mo

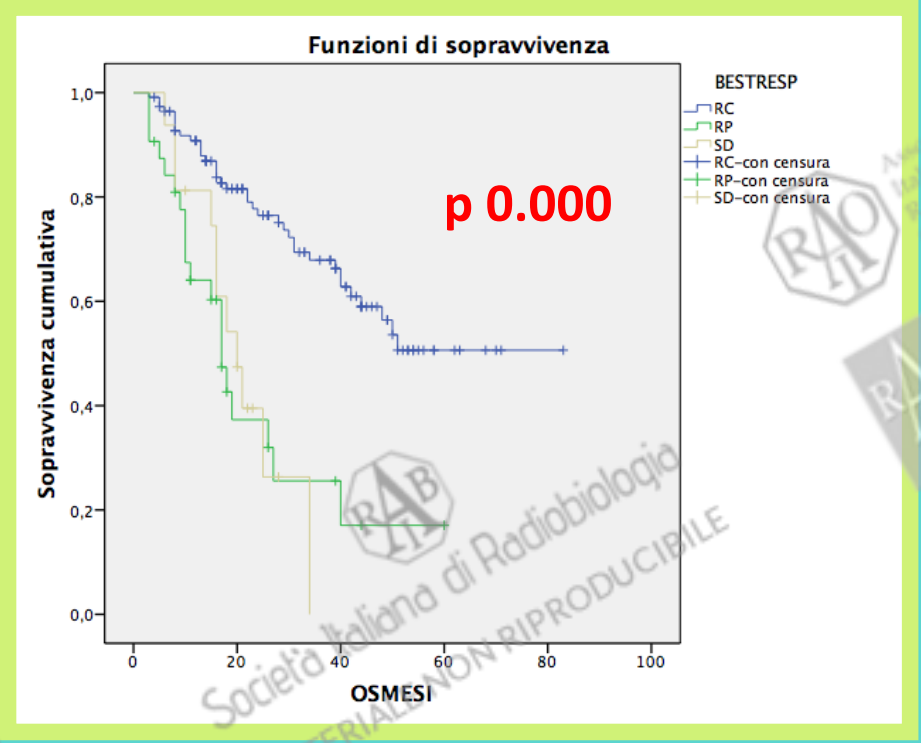
	CR (median N.R.)	PR (median 13 mo)	SD (median 15 mo)
1 year	**100%**	**61.6%**	**57.1%**
2 years	**98.2%**	**46.2%**	**50%**
5 years	**87.2%**	**46.2%**	


Why RC is so important?

Oligometastatic disease hypotesis

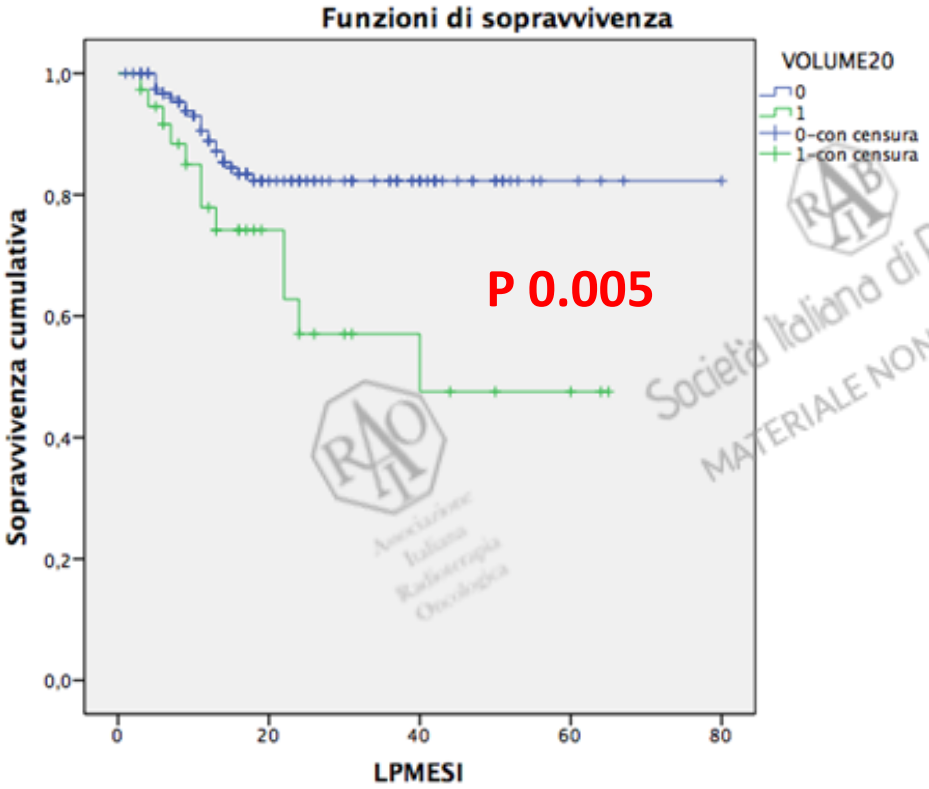


OS - response tailored



OS	CR (median mo)	PR (median mo)	SD (median mo)
1 year	90.8%	64.1%	81.3%
2 years	76.5%	37.3%	39.5%
5 years	50.6%	17.1%	0%

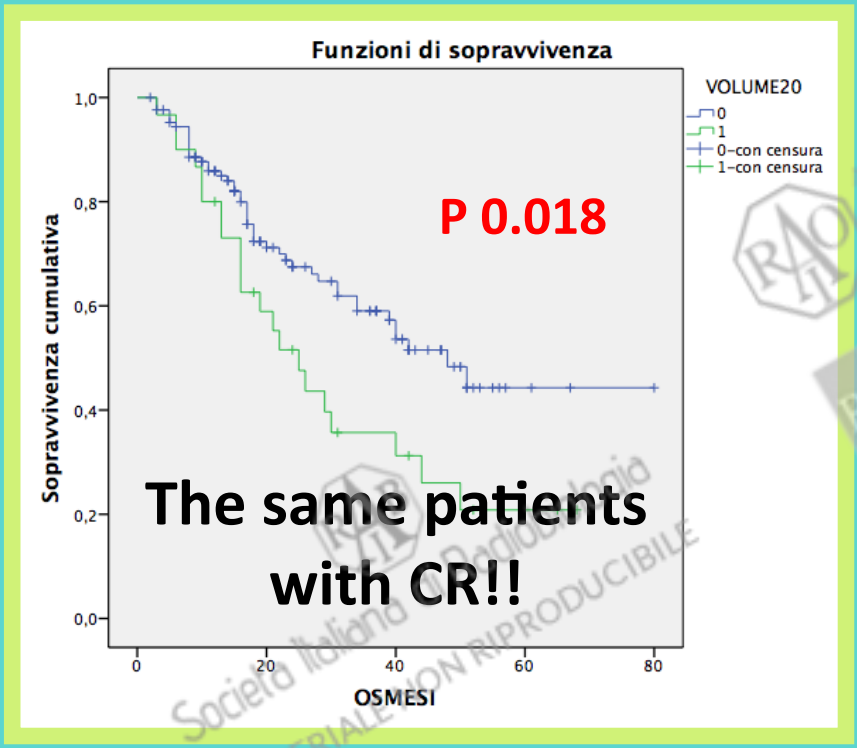
LPFS- volume tailored



	Vol < 20 cc	Vol > 20 cc
1 year	88.9%	77.9%
2 years	82.3%	57.1%
5 years	82.3%	47.6%

A volume <20 cc is associated with LPFS

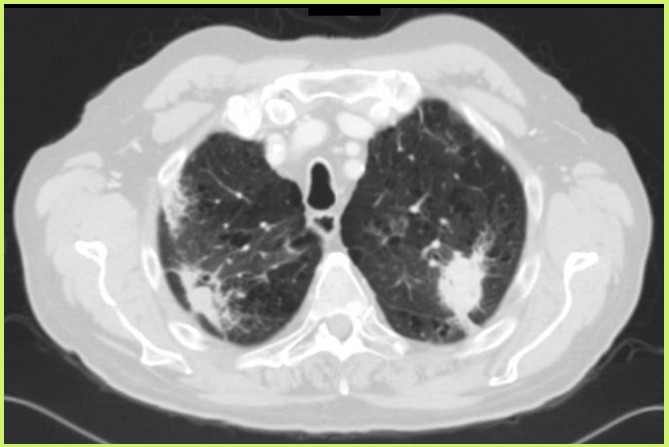
OS – volume tailored

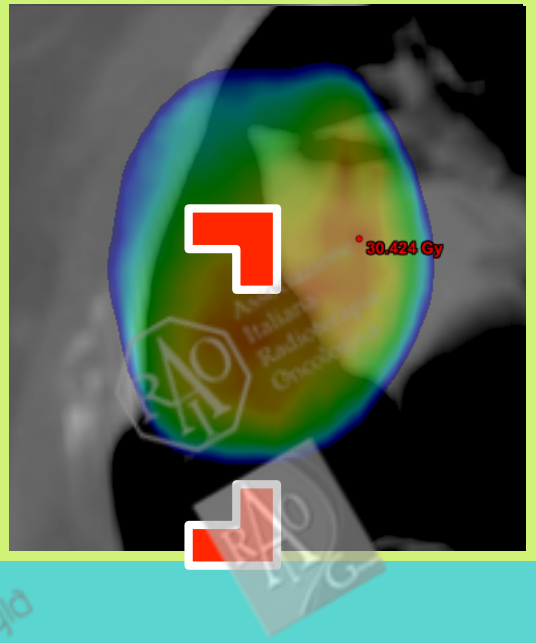


OS	Vol < 20 cc	Vol > 20 cc
1 year	85.9%	80%
2 years	67.5%	51.6%
5 years	44.3%	20.8%

Toxicity

Toxicity





G1-2 Acute toxicity

43 (21.3%) cases

G1-2 Late toxicity

80 (39.8%) lesions (asymptomatic fibrosis)

≥G3 toxicity

10 (4.9%) G≥3 pneumonitis

12 (5.9%) cases G≥3 fibrosis

Others

1 Toxic death (pneumonitis)

pts lost on FUP after SBRT

2 cases of rib fracture. These patients are actually alive after 38 and 71 from SBRT

Conclusions

Conclusions

Take home message - 1

Efficacy

30 Gy can achieve high rates of LC. Longer survival in some oligometastatic patients

Patients selection

Number of lesions and dimensions, time to oligometastatization

Toxicity

Well tolerated

Early diagnosis and treatment of acute toxicity!

Low costs

One-day treatment

Easy interface with systemic therapies

But best sequence it has not been investigated

Care to peripheral lesions

Execially when ribs are near treatment field

Take home message - 2

Unmet needs

Randomized trial to assess the real efficacy of SBRT in the oligometastatic disease

Identify the best sequence SBRT-systemic treatments, in order to maximize efficay and survival

Thanks!

Any questions?