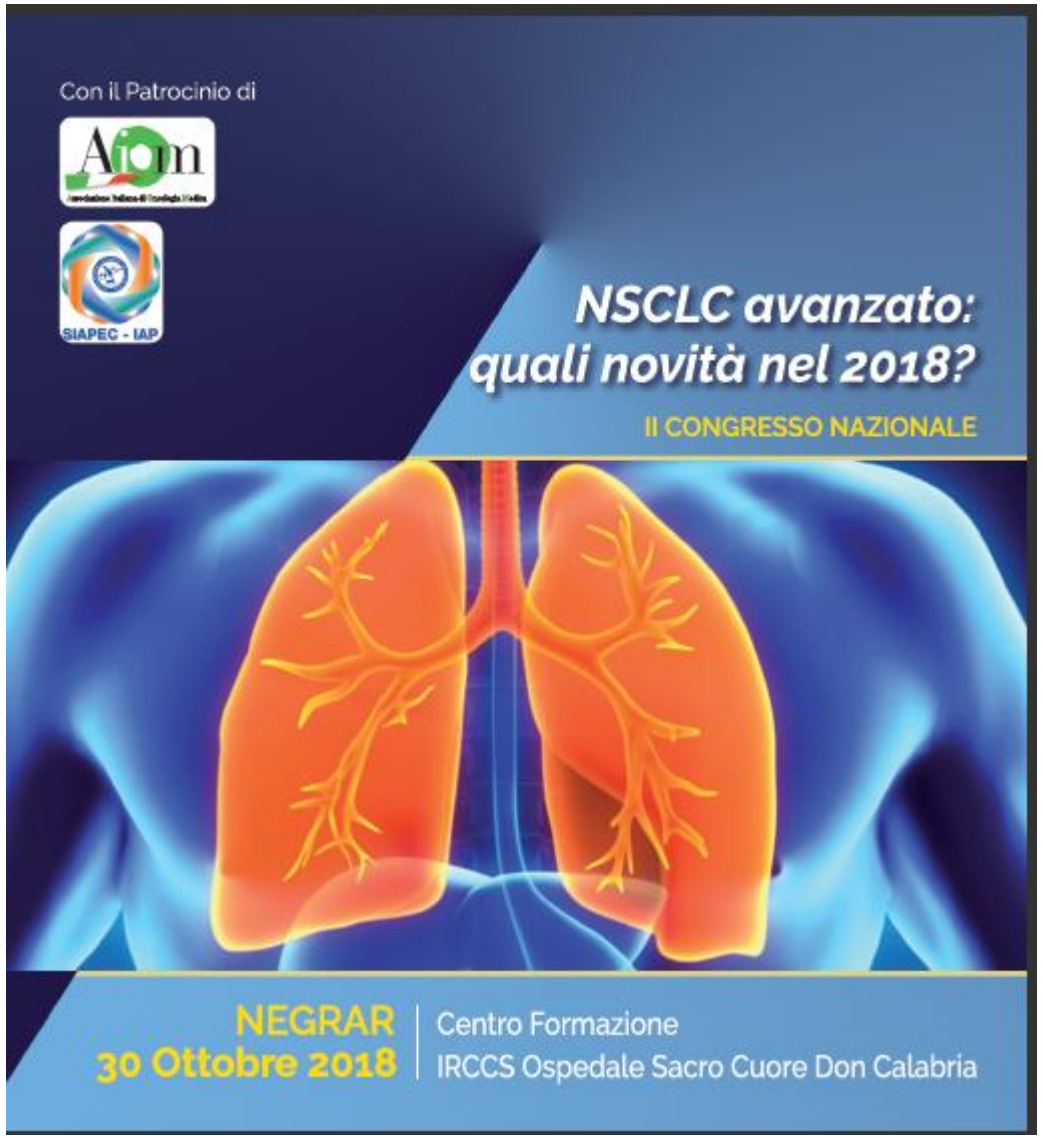


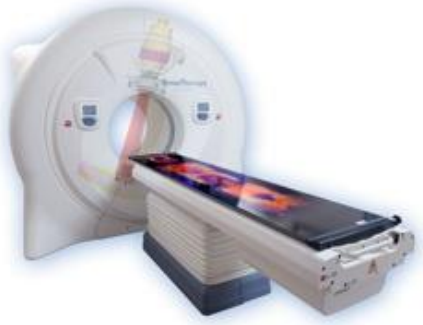
Radioterapia nella malattia metastatica: indicazioni nel 2018?

Filippo Alongi, MD
Associate Professor of Radiation Oncology

Chair of Radiation Oncology Department
Sacro Cuore Don Calabria Cancer Care Center,
Negrar-Verona, Italy

A CONTINUOUS CHANGING:

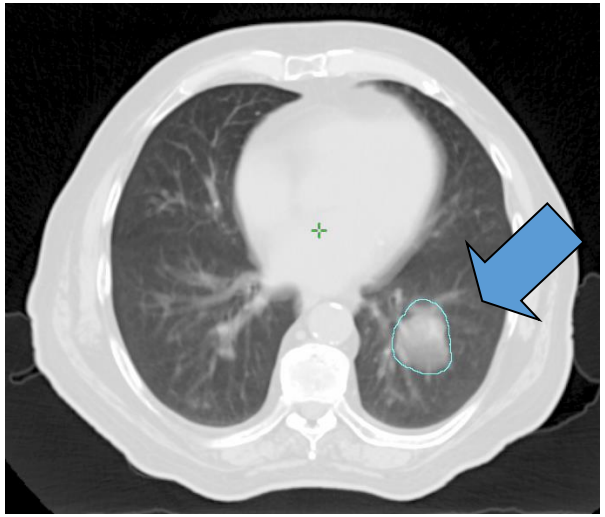
FROM 2D… TO 5 D?



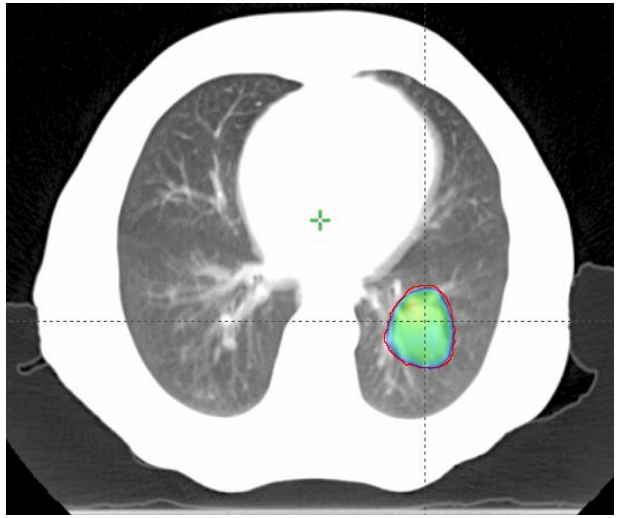
PRECISION DEVISES TO DELIVERY SBRT/SRS

- 3D/4D target definition on CT slices
- 3D/4D dose ULTRA-conformation
- Possibility to significantly > doses/<fractions and >LC (SBRT/SABR).
- Better set-up checking (CBCT/EXAC TRAC)
- <toxicity (fit to target conformation by mMLC and ripid gradient by VMAT/IMRT/robotic approach)

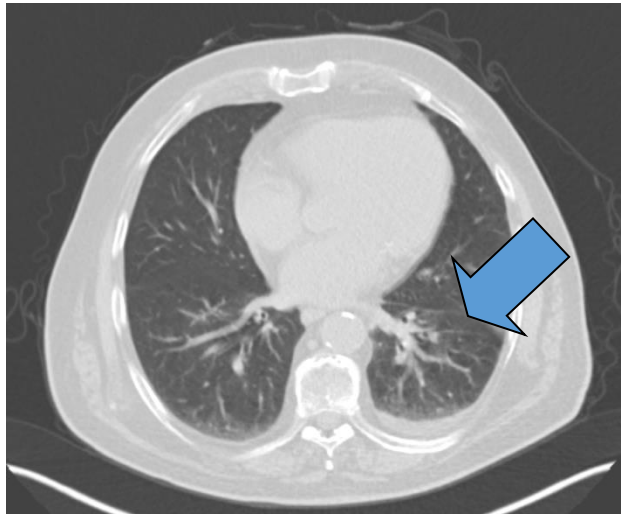
LUNG SBRT :
EXPERIENCE WITH FFF BEAM ON TRUEBEAM



Planning CT



Dose distribution



Restaging CT after 3 months

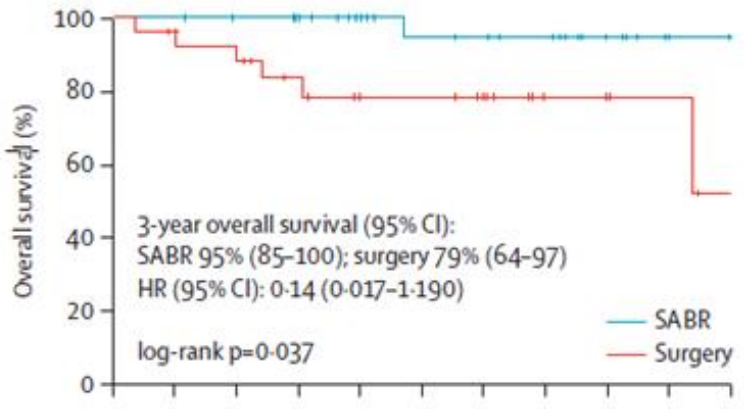
50 Gy in 4 fractions with FFF

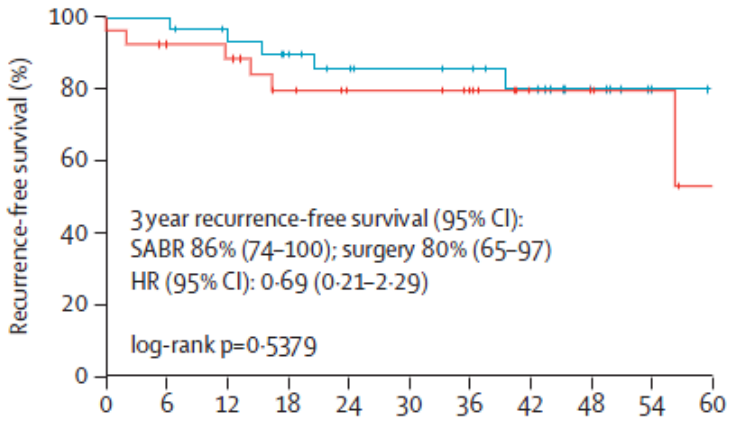
EARLY STAGE LUNG NSCLC:
IS SABR EFFECTIVE AS SURGERY?

Lancet Oncol 2015

Stereotactic ablative radiotherapy versus lobectomy for operable stage I non-small-cell lung cancer: a pooled analysis of two randomised trials

Joe Y Chang, Suresh Senan*, Marinus A Paul, Reza J Mehran, Alexander V Louie, Peter Balter, Harry J M Groen, Stephen E McRae, Joachim Widder, Lei Feng, Ben E E M van den Borne, Mark F Munsell, Coen Hurkmans, Donald A Berry, Erik van Werkhoven, John J Kresl, Anne-Marie Dingemans, Omar Dawood, Cornelis J A Haasbeek, Larry S Carpenter, Katrien De Jaeger, Ritsuko Komaki, Ben J Slotman, Egbert F Smit†, Jack A Roth†*





- The difference in **OS** between the two groups was statistically significant **in favour of SABR**.
- No significant differences in of local, regional, or distant metastasis or in RFS between the treatment groups.

Chang et al. *Lancet Oncol 2015.*

AGENDA

- Early stage NSCLC

- **Oligometastases and oligorecurrent patients**

Sacro Cuore Don Calabria

Cancer Care Center Negrar - Verona

UNIVERSITAS · STUDIORUM · BRIXIAE

Is the same the effectiveness of SBRT for the oligometastases?

OLIGOMETASTASES:
THE NEW PARADIGMA FOR ABLATIVE DOSES WITH RT

H. Badakhshi · A. Grün · C. Stromberger · V. Budach · D. Boehmer
Department for Radiation Oncology, Charité University Medicine, Berlin

Oligometastases: the new paradigm and options for radiotherapy

A critical review

The Oncologist®

Radiation Oncology

Review and Uses of Stereotactic Body Radiation Therapy for Oligometastases

Filippo Alongi,[a] Stefano Arcangeli,[a] Andrea Riccardo Filippi,[b] Umberto Ricardi,[b] Marta Scorsetti[a]

VOLUME 31 · NUMBER 11 · APRIL 10 2013

JOURNAL OF CLINICAL ONCOLOGY | COMMENTS AND CONTROVERSIES

Extracranial Oligometastases: A Subset of Metastases Curable With Stereotactic Radiotherapy

Kimberly S. Corbin, Samuel Hellman, and Ralph R. Weichselbaum, *University of Chicago Medical Center, Chicago, IL*

OLIGOMETASTASES:
WHAT DEFINITION?

Synchronous oligometastasis

uncontrolled primary T

< 2 months from cancer diagnosis

Metachronous oligometastasis

uncontrolled primary T

> 2 months from cancer diagnosis

Not exhaustive terminology in 2018

Oligorecurrence

controlled primary T

No systemic therapy ongoing

Oligoprogression

controlled primary T

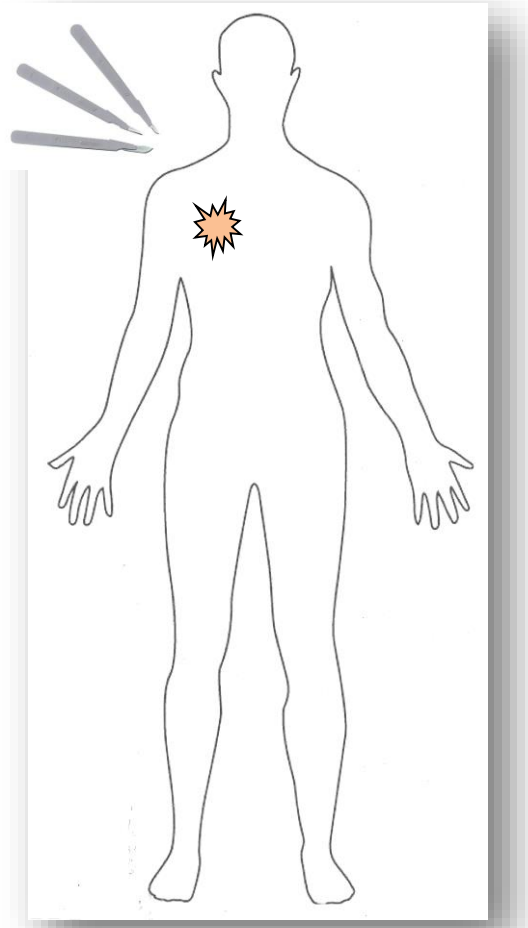
Few mts in progression during systemic therapy

OLIGOMETASTASES:
IMPACT OF SURGERY

For several anatomical sites, ***surgical resection*** of metastases prolongs survival in selected patients.
Rubin P, et al. Semin Radiat Oncol,2006

For example, *surgical resection* is the standard choice for patients with oligometastatic lung cancer.

Unfortunately the benefits of resection and appropriate *selection criteria* in patients who develop metastasis are still poorly defined.
Miller G, et al. J Am Coll Surg, 2007.



LUNG OLIGOMETASTASES:

.. THE ROLE OF SABR

ELSEVIER

Seminars in RADIATION ONCOLOGY

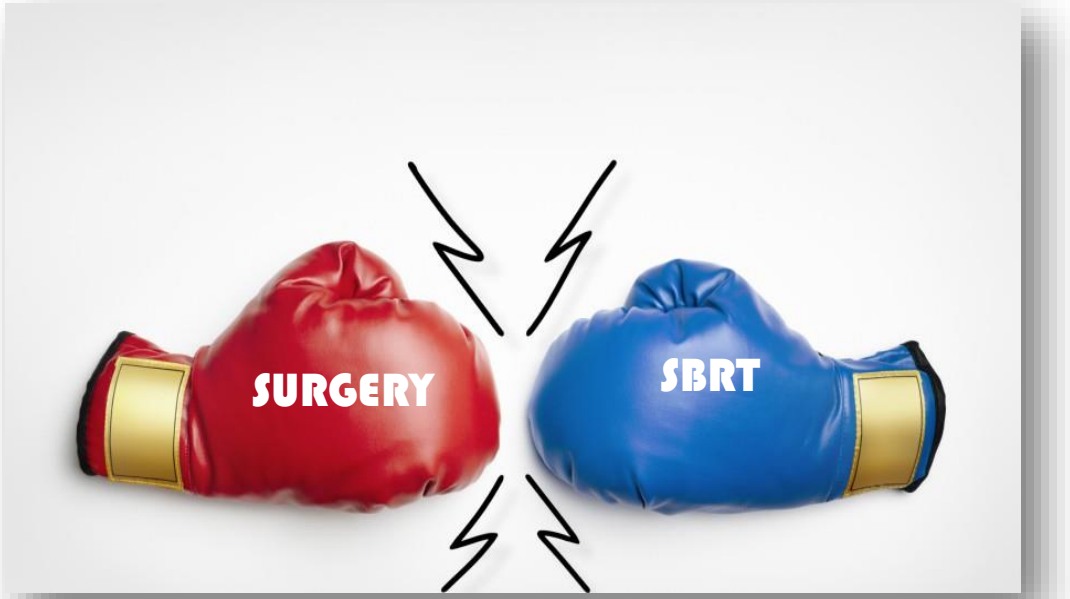
To SABR or Not to SABR? Indications and Contraindications for Stereotactic Ablative Radiotherapy in the Treatment of Early-Stage, Oligometastatic, or Oligoprogressive Non–Small Cell Lung Cancer

David Benjamin Shultz, MD, PhD,[*,†] Maximilian Diehn, MD, PhD,[*,†,‡] and Billy W. Loo Jr, MD, PhD[*,†]

- The concept of Oligomestastatic disease was proposed nearly 20 years ago.
- SABR is quite effective than surgery for controlling pulmunary metastases

Shulz et al. Seminars in Radiat Oncol . 2015

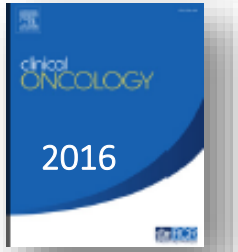
STEREOTACTIC BODY RT(SBRT):
LUNG OLIGOMTS: WHAT ABOUT SBRT VS SURGERY?



NO RANDOMIZED STUDIES

In the absence of randomized studies, it is necessary to compare retrospectives

STEREOTACTIC BODY RT(SBRT):
LUNG OLIGOMTS: WHAT ABOUT SBRT VS SURGERY



Exploratory Analysis on Overall Survival after Either Surgery or Stereotactic Radiotherapy for Lung Oligometastases from Colorectal Cancer

A.R. Filippi *, F. Guerrera †, S. Badellino *, M. Ceccarelli ‡, A. Castiglione ‡, A. Guarneri *, R. Spadi §, P. Racca §, G. Ciccone ‡, U. Ricardi *, E. Ruffini †

* *Department of Oncology, Radiation Oncology, University of Torino, Italy*

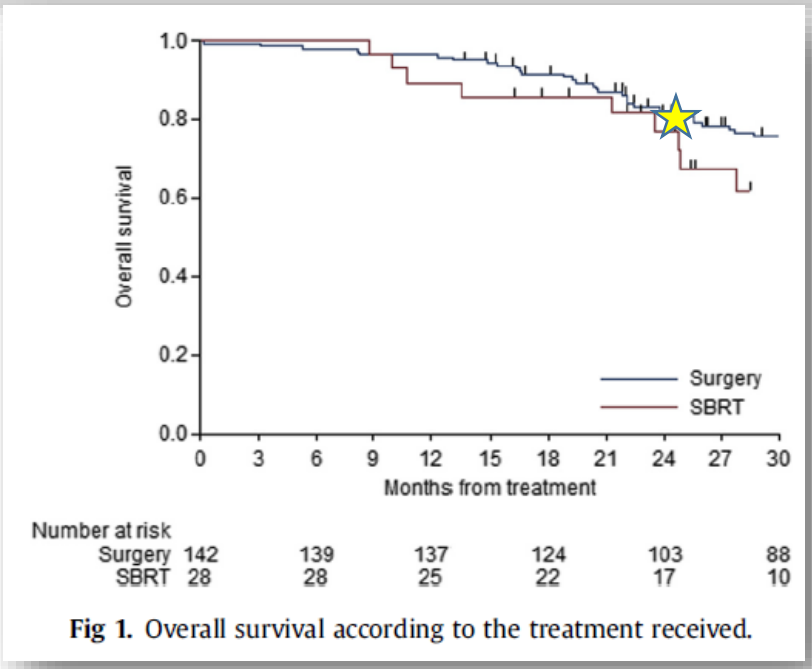


Fig 1. Overall survival according to the treatment received.

Conclusion: With limitations consisting in the retrospective observational design and different sample sizes, the results of this explorative analysis indicate that overall survival probability after SBRT is similar to surgery for the first 2 years from treatment. This finding supports the need for high-quality trials comparing different treatment modalities for lung oligometastases from CRC.

LUNG OLIGOMETASTASES:

.. THE ROLE OF SABR

Stereotactic Ablative Radiotherapy for Pulmonary Oligometastases and Oligometastatic Lung Cancer

David Benjamin Shultz, MD, PhD, Andrea Riccardo Filippi, MD,† Juliette Thariat, MD,‡ Francoise Mornex, MD, PhD,‡ Billy W. Loo Jr, MD, PhD,* and Umberto Ricardi, MD†*

Journal of Thoracic Oncology® • Volume 9, Number 10, October 2014

TABLE 1. Clinical Trials of Stereotactic Ablative Radiotherapy for Pulmonary Oligometastatic Disease

Reference	No. of Patients	No. of Targets	Radiation Dose	Median Follow-Up (Months)	Outcomes
Fractionated/Single Fraction SABR					
Onimaru et al.[27]	20	32	48 Gy/8 fx, 60 Gy/8 fx	18	48% 2-yr OS, 69.6% 3-yr LC for 48 Gy, 100% 3-yr LC for 60 Gy
Yoon et al.[26]	53	80	30 Gy/3 fx, 40 Gy/4 fx, 48 Gy/4 fx	14	70% LC for 30 Gy, 77% for 40 Gy, 100% LC for 48 Gy, 51% all 2-yr OS
Okunieff et al.[28]	50	125	50 Gy/10 fx, 48 Gy/6 fx, 57 Gy/3 fx	18.7	91% 3-yr LC, 50% 2-yr OS
Norihisa et al.[18]	34	43	48 Gy/4 fx		90% 2-yr LC, 84% 2-yr OS
Brown et al.[25]	35	69	5 Gy/1 fx		77% crude LC, 72.5% 2-yr OS
Rusthoven et al.[12]	38	63	60 Gy/3 fx		96% 2-yr LC, 39% 2-yr OS
Wulf et al.[24]	41	51	30 Gy/3 fx		80% 1-yr LC, 33% 2-yr OS
Ricardi et al.[23]	61	77	45 Gy/3 fx, 26 Gy/1 fx at 80%	20.4	89% 2-yr LC, 66.5% 2-yr OS
Single Fraction SABR Only					
Hof et al.[30]	61	71	12 to 30 Gy at isocenter	14	65.1% 2-yr OS
Filippi et al.[29]	67	90	26 Gy at 80%	24	88.1% 2-yr LC, 70.5% 2-yr OS

- Total doses :24-60 Gy in 1 or 4 fr,
- 1–3 years LC: 70%–100%
- 1–2 years OS 48%– 84%

LUNG OLIGOMETASTASES:
.. THE ROLE OF SABR

Stereotactic Ablative Radiotherapy for Pulmonary Oligometastases and Oligometastatic Lung Cancer

David Benjamin Shultz, MD, PhD, Andrea Riccardo Filippi, MD,† Juliette Thariat, MD,‡ Francoise Mornex, MD, PhD,‡ Billy W. Loo Jr, MD, PhD,* and Umberto Ricardi, MD†*

Journal of Thoracic Oncology™ • Volume 9, Number 10, October 2014

TABLE 2. Ongoing Clinical Trials Examining the Role for Surgery or SABR for Oligometastatic Cancer

Study	Design	Eligibility	Intervention	Primary Endpoint
PulMICC[38]	Randomized phase II	Pulmonary metastases from colorectal cancer	Active monitoring vs. pulmonary metastasectomy	Feasibility/survival
SABR-COMET[39]	Randomized phase II	All treatable metastatic sites; maximum of three tumors to any single organ system; controlled primary tumor	Palliative-scheme radiation as clinically indicated vs. stereotactic ablative radiation to multiple sites	Overall survival
SAFRON II[40]	Randomized phase II	A maximum of three metastases to the lung from any nonhematological malignancy	Stereotactic multifraction SABR vs. radiosurgery	Toxicity
NCT01185639[41]	Phase II	NSCLC with ≤5 metastatic sites, involving lung, liver, adrenal, or spinal lesions; if primary untreated, must have three mets	SBRT to affected sites, delivered in three or five fractions	Progression-free survival
NCT01725165[72]	Randomized phase II	Three or less metastases from NSCLC	Consolidative radiotherapy and/or surgery vs. systemic therapy or observation	Progression-free survival

LUNG OLIGOMETASTASES:
.. THE ROLE OF SABR

Based on published studies, the **patient who could benefit** most from SBRT is the patient with:

- ✓ Disease free interval ≥ 12 months,
- ✓ Control of primary tumor,
- ✓ Small lesions,
- ✓ Limited number of lesions (up to three)
- ✓ High dose of radiation delivered (BED> 100 Gy).

Salama, et al Cancer 2011
Wersall, et al Radiother Oncol 2005
Ricardi, et al Lung Cancer 2012
Louie, et al Int J Radiat Oncol Biol Phys (Suppl) 2014

LUNG OLIGOMETASTASES:
.. THE ROLE OF SABR

Review

TJ Tumori Journal

Tumori Journal
1–9

DOI: 10.1177/0300891618766820
journals.sagepub.com/home/tmj
SAGE

Stereotactic body radiotherapy for lung oligometastases: Literature review according to PICO criteria

Filippo Alongi[1,2], Rosario Mazzola[1], Vanessa Figlia[1] and Matthias Guckenberger[3]

In summary, SBRT allows a major benefit for lung oligometastatic patients with noncolorectal histology, DFI >24 months, when controlling the primary tumor site, small lesions, and limited number of lesions.

STEREOTACTIC BODY RT(SBRT):
LUNG OLIGOMTS & PET AS PREDICTIVE

ORIGINAL ARTICLE

IASLC

Stereotactic Ablative Radiation Therapy for Lung Oligometastases: Predictive Parameters of Early Response by ^{18}FDG-PET/CT

Rosario Mazzola, MD,[a,*] Alba Fiorentino, MD,[a] Gioacchino Di Paola, MSc,[b] Niccolò Giaj Levra, MD,[a] Francesco Ricchetti, MD,[a] Sergio Fersino, MD,[a] Umberto Tebano, MD,[c] Stefano Pasetto, MS,[d] Ruggero Ruggieri, MS,[a] Matteo Salgarello, MD,[d] Filippo Alongi, MD[a]

[a]*Radiation Oncology, Sacro Cuore Don Calabria Cancer Care Center, Negrar-Verona, Italy*
[b]*Statistic Sciences Faculty, University of Palermo, Palermo, Italy*
[c]*Radiation Oncology School, University of Padua, Padua, Italy*
[d]*Nuclear Medicine, Sacro Cuore Don Calabria Cancer Care Center, Negrar-Verona, Italy*

Table 3. Correlations between Pre-SABR Metabolic Parameters with Local Failure, Distant Metastatic Progression, and Lung Metastasis Response

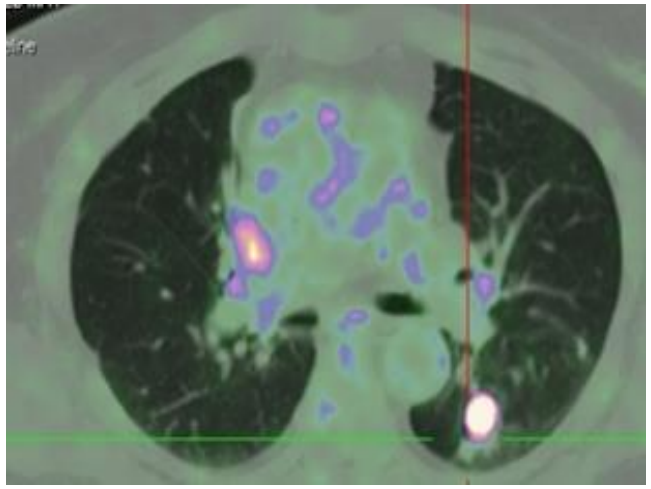
	Local Failure (In-Field)			Distant Metastatic Progression			Lung Metastasis Complete Response (6 mo after SABR)		
Parameter	OR	95% CI	*p* Value	OR	95% CI	*p* Value	OR	95% CI	*p* Value
SUV_{max} (for values $\geq$5)	2.93	0.52-5.11	0.219	1.98	0.66-5.91	0.221	0.313	0.09-0.99	**0.05**
SUV_{mean} (for values $\geq$ 5)	1.06	0.22-5.16	0.936	1.85	0.61-5.68	0.281	0.237	0.06-0.84	**0.026**
MTV	1.01	0.89-1.14	0.855	1.04	0.96-1.14	0.281	1.01	0.91-1.11	0.946
TLG	1.01	0.97-1.02	0.897	1.01	0.99-1.02	0.294	0.99	0.97-1.02	0.791

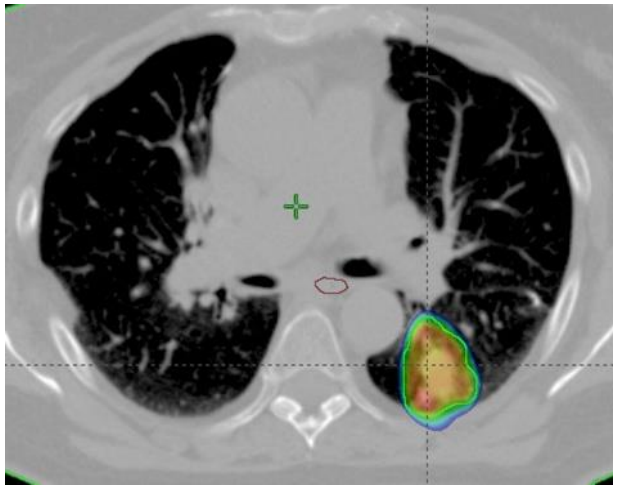
Note: Boldface indicates statistically significant *p* values.
SABR, stereotactice ablative radiotherapy; CI, confidence interval; SUV_{max}, maximum standardized fludeoxyglucose F 18 uptake value; SUV_{mean}, mean standardized fludeoxyglucose F 18 uptake value; MTV, metabolic tumor volume, defined as total volume with a standardized uptake value of 2.5 or greater; TLG, total lesion glycolysis.

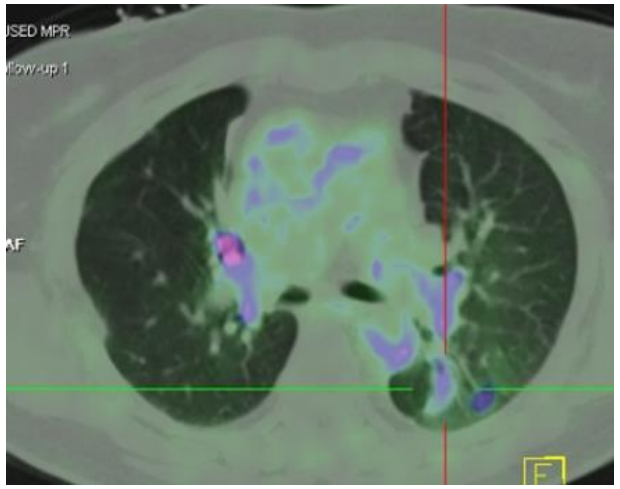
Conclusions: In the current analysis, complete response from lung metastasis at 6 months after stereotactic body radiation therapy was significantly associated with both the maximum and mean values of pre-SABR ^{18}FDG-PET/CT SUV. Longer-term trials are strongly advocated to improve the personalization of the monitoring of tumor response in patients with lung oligometastases and, consequently, monitoring of the cost-effectiveness of the health care.

STEREOTACTIC BODY RT(SBRT):
LUNG OLIGOMTS

TRUEBEAM treatment for rectum lung
central metastases







PET/CT before SBRT

60 Gy/8 fr. with FFF beams

CR @ 60 days

LUNG OLIGOPROGRESSIVE LESIONS:

.. A NEW INDICATION FOR SABR???

ELSEVIER

Seminars in RADIATION ONCOLOGY

Semin Radiat Oncol 25:78-86 © 2015

To SABR or Not to SABR? Indications and Contraindications for Stereotactic Ablative Radiotherapy in the Treatment of Early-Stage, Oligometastatic, or Oligoprogressive Non–Small Cell Lung Cancer

David Benjamin Shultz, MD, PhD,[*,†] Maximilian Diehn, MD, PhD,[*,†,‡] and Billy W. Loo Jr, MD, PhD[*,†]

Strahlenther Onkol (2015) 191:453–455
DOI 10.1007/s00066-015-0826-2

LITERATUR KOMMENTIERT

Oligoprogression

Eine innovative Indikation für die Körperstereotaxie bei metastasierten Tumorsituationen

Matthias Guckenberger

Online publiziert: 5. März 2015

Can SABR Be Used to Treat Oligoprogressive Disease Occurring in the Setting of Targeted Therapy?

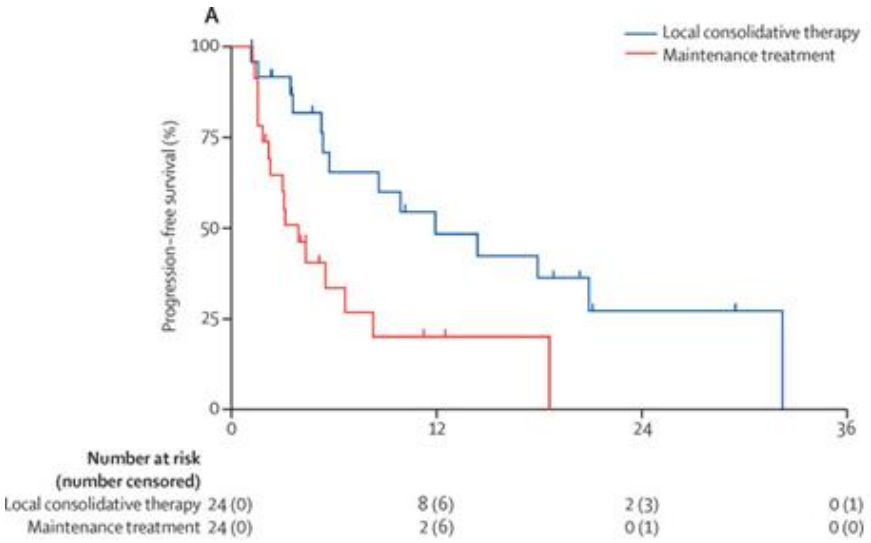
Patients with NSCLC who were treated with targeted agents eventually develop progression owing to the emergence of drug-resistant clones. Because most cancer may retain a drug-sensitive genotype, it has been hypothesized that, in this clinical scenario, patients should be maintained on the same targeted therapy and that the resistant clones, which are phenotypically distinguished as oligoprogressive tumors, should be treated with surgery, CFRT, or SABR. Studies in which SRS or SABR was used to treat patients with oligoprogressive NSCLC that was either intracranial only[113] or intracranial and systemic [114,115] while being maintained on a targeted agent have been reported. Weickhardt et al reported their retrospective experience of using SABR, CFRT, and surgery with the goal of prolonging the effectiveness of targeted therapy in patients with NSCLC. Overall, 25 patients with *ALK* rearranged or *EGFR* mutation-driven tumors were included in the study, and sites of oligoprogression were classified as being

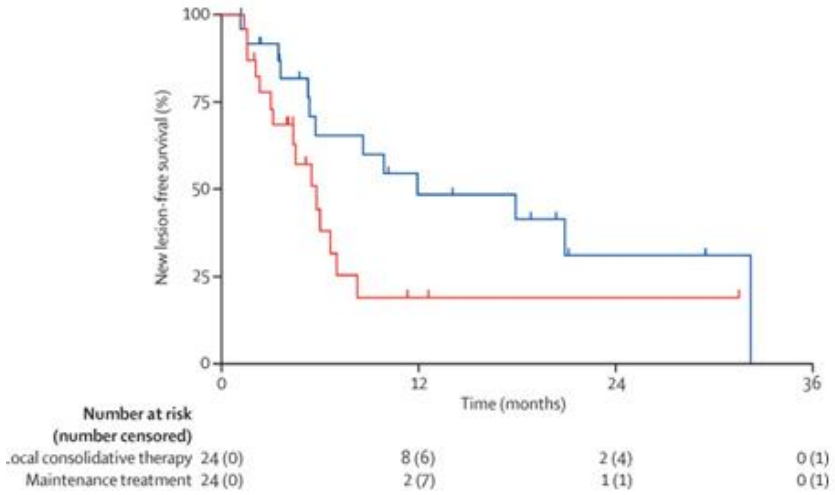
NEW INDICATIONS:

SABR AS LOCAL CONSOLIDATIVE THERAPY?

Local consolidative therapy versus maintenance therapy or observation for patients with oligometastatic non-small-cell lung cancer without progression after first-line systemic therapy: a multicentre, randomised, controlled, phase 2 study

Daniel R Gomez, George R Blumenschein Jr, J Jack Lee, Mike Hernandez, Rong Ye, D Ross Camidge, Robert C Doebele, Ferdinandos Skoulidis, Laurie E Gaspar, Don L Gibbons, Jose A Karam, Brian D Kavanagh, Chad Tang, Ritsuko Komaki, Alexander V Louie, David A Palma, Anne S Tsao, Boris Sepesi, William N William, Jianjun Zhang, Qiuling Shi, Xin Shelley Wang, Stephen G Swisher, John V Heymach**





Lancet Oncol 2016; 17: 1672–82

SABR AS LOCAL CONSOLIDATIVE THERAPY : *WHICH BED?*

Consolidative local therapy in oligometastatic patients

question arises: which biologically effective dose would the investigators recommend to reproduce similar findings in actual practice? In the local consolidative therapy group, patients were treated with hypofractionated regimens, as well as stereotactic body radiotherapy, without any specific details in terms of biologically effective dose or schedules of total dose or dose per fraction. Could clinicians assume that a regimen of 30 Gy in ten fractions, as often used for palliation,[2] is as effective as ablative radiotherapy doses? If so, the real impact of the biologically effective dose and dose–effectiveness relationships should be totally revised with readers taking a more sceptical view. In the

Filippo Alongi, Rosario Mazzola, Francesco Ricchetti
rosariomazzola@hotmail.it

Radiation Oncology, Sacro Cuore Don Calabria Cancer Care Center, Negrar, Italy

Lancet Oncol 2016; 17: 1672–82

SABR AS LOCAL CONSOLIDATIVE THERAPY :

UPDATE FROM ASTRO

Consolidative local therapy in oligometastatic patients

ASTRO
TARGETING CANCER CARE

Aggressive treatment for some stage IV lung cancer patients can dramatically improve overall survival

Adding radiation therapy or surgery to systemic therapy for stage IV lung cancer patients whose cancer has spread to a limited number of sites can extend overall survival time significantly, according to new results from a multicenter, randomized, controlled phase II study. Researchers previously reported encouraging results for progression-free survival (PFS), which were published in *Lancet Oncology* in 2016. These new results were presented as the abstract, *Local consolidative therapy (LCT) improves overall survival (OS) compared to maintenance therapy/observation in oligometastatic non-small cell lung cancer (NSCLC): Final results of a multicenter, randomized, controlled phase 2 trial* by Daniel Gomez, MD, Associate Medical Director of radiation oncology at the University of Texas MD Anderson Cancer Center in Houston.

NEW INDICATIONS:

SABR AS LOCAL CONSOLIDATIVE THERAPY?

JAMA Oncology
View Article

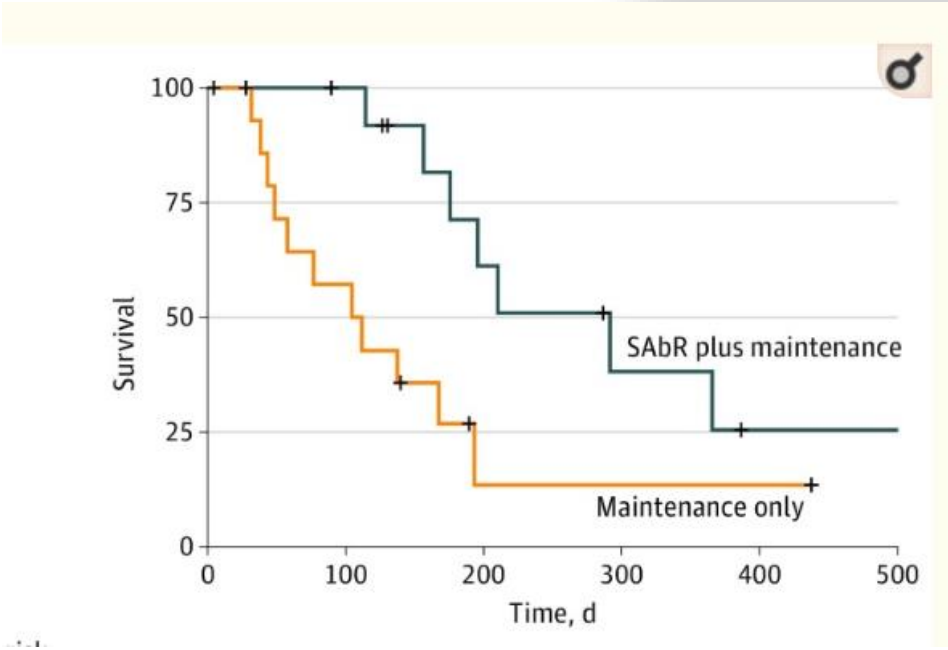
JAMA Oncol. 2018 Jan; 4(1): e173501.
Published online 2017 Sep 24. doi: 10.1001/jamaoncol.2017.3501
PMCID: PMC5833648
PMID: 28973074

Consolidative Radiotherapy for Limited Metastatic Non–Small-Cell Lung Cancer

A Phase 2 Randomized Clinical Trial

Puneeth Iyengar, MD, PhD,[✉1] Zabi Wardak, MD,[1] David E. Gerber, MD,[2] Vasu Tumati, MD,[1] Chul Ahn, PhD,[3] Randall S. Hughes, MD,[2] Jonathan E. Dowell, MD,[2] Naga Cheedella, MD,[2] Lucien Nedzi, MD,[1] Kenneth D. Westover, MD, PhD,[1] Suprabha Pulipparacharuvil, PhD,[1] Hak Choy, MD,[1] and Robert D. Timmerman, MD[1]

Author information ▶ Article notes ▶ Copyright and License information ▶ Disclaimer



Consolidative SABR prior to maintenance chemotherapy appeared beneficial, nearly tripling PFS in patients with limited metastatic NSCLC compared with maintenance chemotherapy alone, with no difference in toxic effects.

SABR BEFORE TO DELAY NEW LINE OF SYSTEMIC THERAPY : *A NEW INDICATION?*

Medical Oncology (2018) 35:121
https://doi.org/10.1007/s12032-018-1190-8

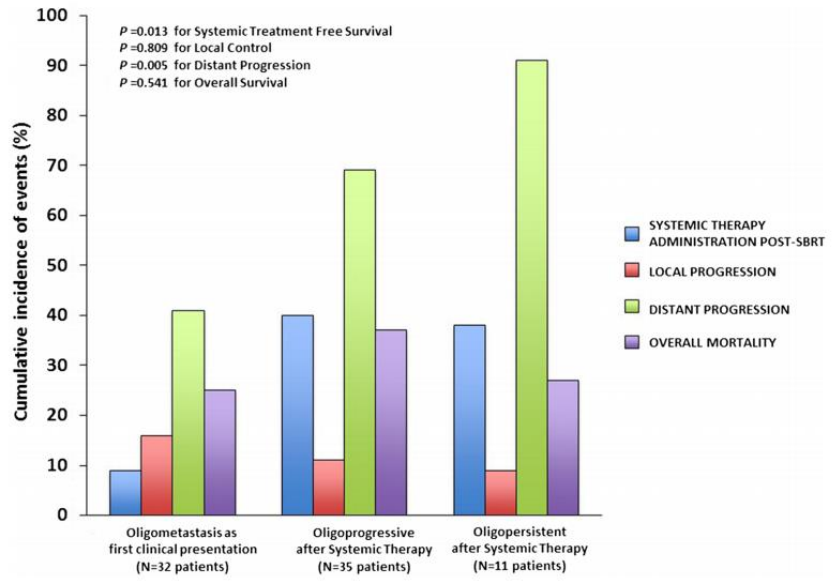
ORIGINAL PAPER

Stereotactic body radiotherapy for lung oligometastases impacts on systemic treatment-free survival: a cohort study

Rosario Mazzola[1] · Sergio Fersino[1] · Giuseppe Ferrera[2] · Giovanni Targher[3] · Vanessa Figlia[1] · Luca Triggiani[4] · Nadia Pasinetti[4] · Antonio Lo Casto[5] · Ruggero Ruggieri[1] · Stefano Maria Magrini[4] · Filippo Alongi[1,6]

- Seventy-eight patients and 114 lung metastases were analyzed (oligorecurrence, oligoprogressive disease, oligopersistent disease).
- In the present experience, SBRT allowed to delay the administration of systemic treatments in several settings of lung oligometastasis.

Fig. 1 Cumulative incidence rates of the endpoints of the study for each group of patients analyzed



SBRT LUNG OLIGOMETASES/OLIGOPROGRESSIVE:
CONCLUSIONS

- The perfect candidate to Local treatment in case of oligometasases is to establish

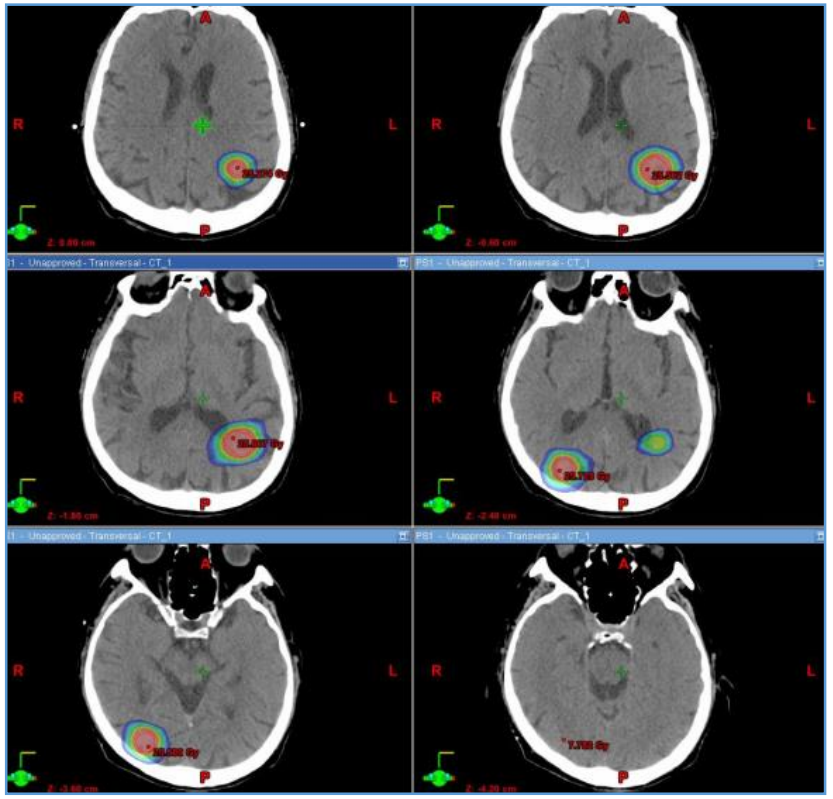
- Results suggest that SABR for LUNG metastases may provide durable in-field control.

- These outcome results appear equivalent to those achievable with surgery.

- In Selected oligoprogressive setting, local therapy, including SBRT could add impact on outcome compared to drug maintaince alone.

BRAIN METASTASIS: A CHALLENGING ISSUE IN CANCER TREATMENT STRATEGY

- ✓ Given systemic therapy advancements, patients live longer and approximately **20-40% of new cancer patients will develop brain metastases**.
- ✓ In brain solitary metastasis, or oligometastatic setting, **SRS has been considered a primary option** as well as surgery.
- ✓ **For multiple metastases**(>3-4), **WBRT has been considered the standard of care** and it can only increase survival between 3 and 6 months.



Kirkpatrick et al, Neuro-oncology 2017

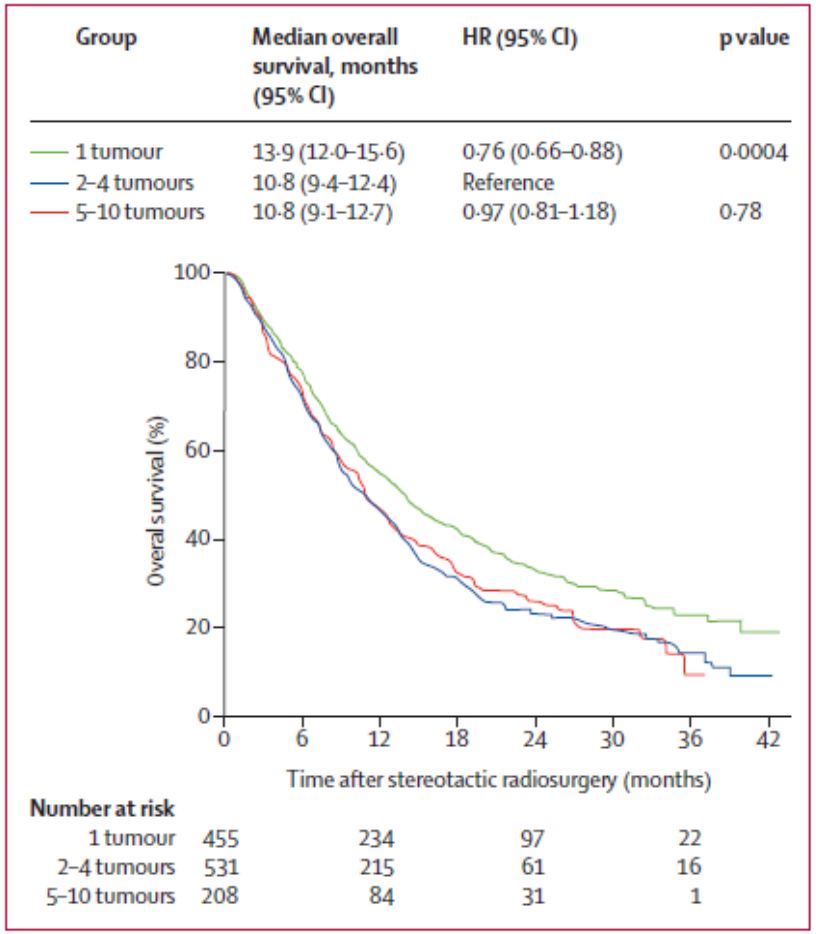
NEW «*CLINICAL*» OPTIONS FOR INTRACRANIAL RADIOSURGERY?

WBRT is really the optimal choice for >3-4 mts??

Stereotactic radiosurgery for patients with multiple brain metastases (JLGK0901): a multi-institutional prospective observational study

Lancet Oncol 2014; 15: 387–95

- ***M&M:*** *1194 pts treated with SRS (1 → 10 brain mets)*
- ***RESULTS:*** *Overall survival → 2-4 BM= 5-10 BM*



Group	Median overall survival, months (95% CI)	HR (95% CI)	p value
1 tumour	13·9 (12·0–15·6)	0·76 (0·66–0·88)	0·0004
2–4 tumours	10·8 (9·4–12·4)	Reference	
5–10 tumours	10·8 (9·1–12·7)	0·97 (0·81–1·18)	0·78

Number at risk				
1 tumour	455	234	97	22
2–4 tumours	531	215	61	16
5–10 tumours	208	84	31	1

Figure: **Kaplan-Meier curves of overall survival**
HR=hazard ratio.

Interpretation Our results suggest that stereotactic radiosurgery without WBRT in patients with five to ten brain metastases is non-inferior to that in patients with two to four brain metastases. Considering the minimal invasiveness of stereotactic radiosurgery and the fewer side-effects than with WBRT, stereotactic radiosurgery might be a suitable alternative for patients with up to ten brain metastases.

Yamamoto et al. Lancet 2014

Sacro Cuore Don Calabria
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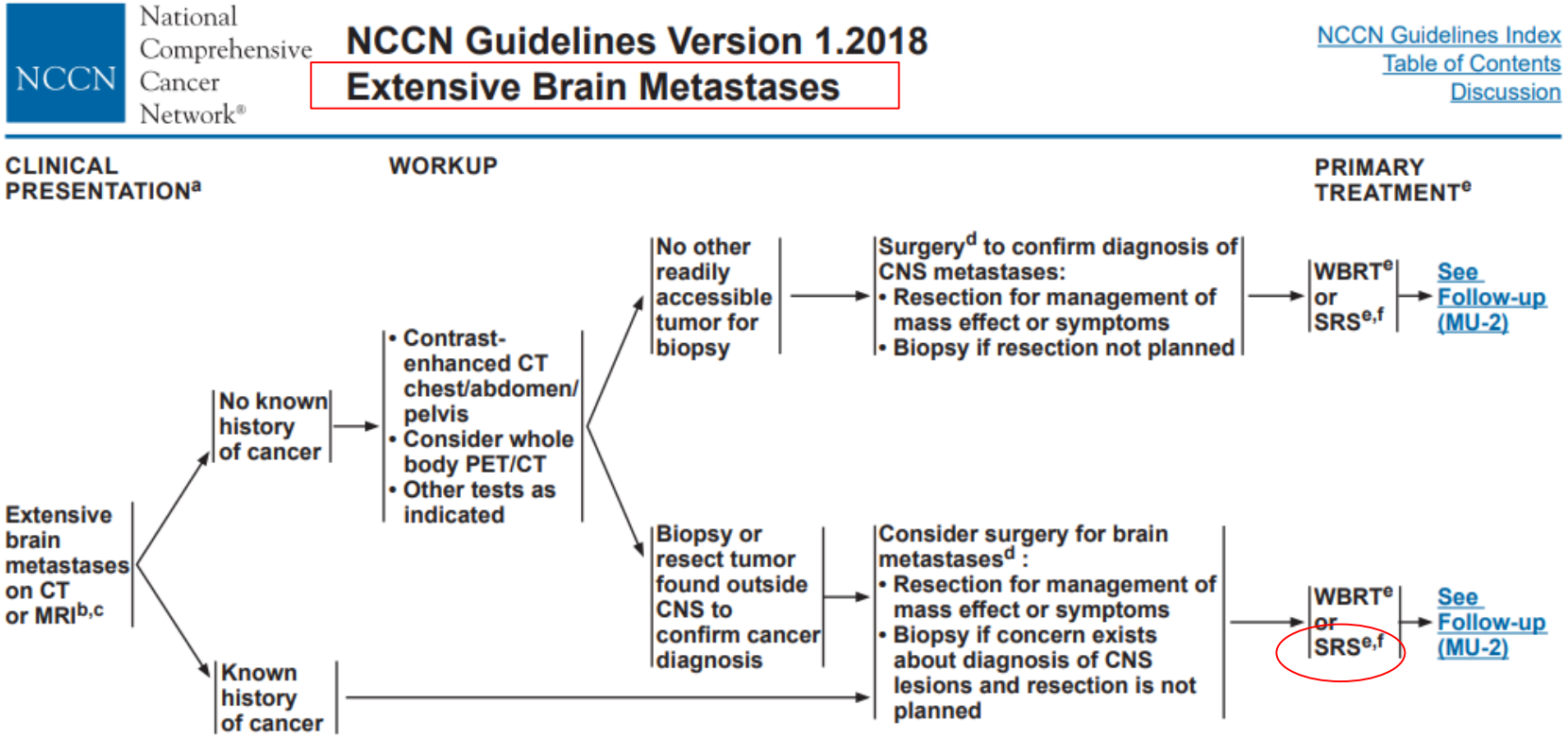
Negrar - Verona

NEW «*CLINICAL*» OPTIONS FOR INTRACRANIAL RADIOSURGERY



[e]See Principles of Brain and Spinal Cord Tumor Radiation Therapy (BRAIN-C).

[f]SRS can be considered for patients with good performance and low overall tumor volume and/or radioresistant tumors such as melanoma. (Yamamoto M, Serizawa T, Shuto T, et al. Stereotactic radiosurgery for patients with multiple brain metastases (JLGK0901): a multi-institutional prospective observational study. Lancet Oncol 2014;15:387-395.)

UNIVERSITAS STUDIORUM BRIXIAE

CONVENTIONAL «*TECHNOLOGICAL*» OPTIONS FOR INTRACRANIAL RADIOSURGERY

Stereotactic radiosurgery for intracranial metastases: linac-based and gamma-dedicated unit approach

Filippo Alongi, Alba Fiorentino, Pietro Mancosu, Pierina Navarria, Niccolò Giaj Levra, Rosario Mazzola & Marta Scorsetti

- ✓ Due to the recent LINAC technologic advancement, the choice of SRS dedicated unit is not necessarily so exclusive.
- ✓ Moreover LINAC offers shorter time frame for SRS(FFF, etc).

Table 1. Difference from GK and Linac.

	GK	Linac
Sites treated	Intracranial only	Intracranial and extracranial
On-board image	No: for A,B, C, PFX models Yes: for Icon model	Yes
Immobilization	Frame: for A, B, C, PFX models Frameless: for Icon model	Frame and frameless
SRS time	30–60 min	20–30 min for conical collimator 10–15 min for flattening filter delivered <2 min for flattening filter Free delivered
Fractionated therapy	Available only with GK Icon models	Yes
Field shaping	Conical collimators	Conical collimators and MLC
Multipurpose machine	Intracranial SRS only	SRS, SRT, 3D RT, IMRT, IGRT, electron RT, gated RT, conformal arc therapy

MLC: Multi-leaf collimator; GK: Gamma Knife; SRS: stereotactic radiosurgery; SRT: stereotactic radiotherapy; Linac: linear accelerator.

Alongi et al et al. Expert review anticancer Therapy 2016

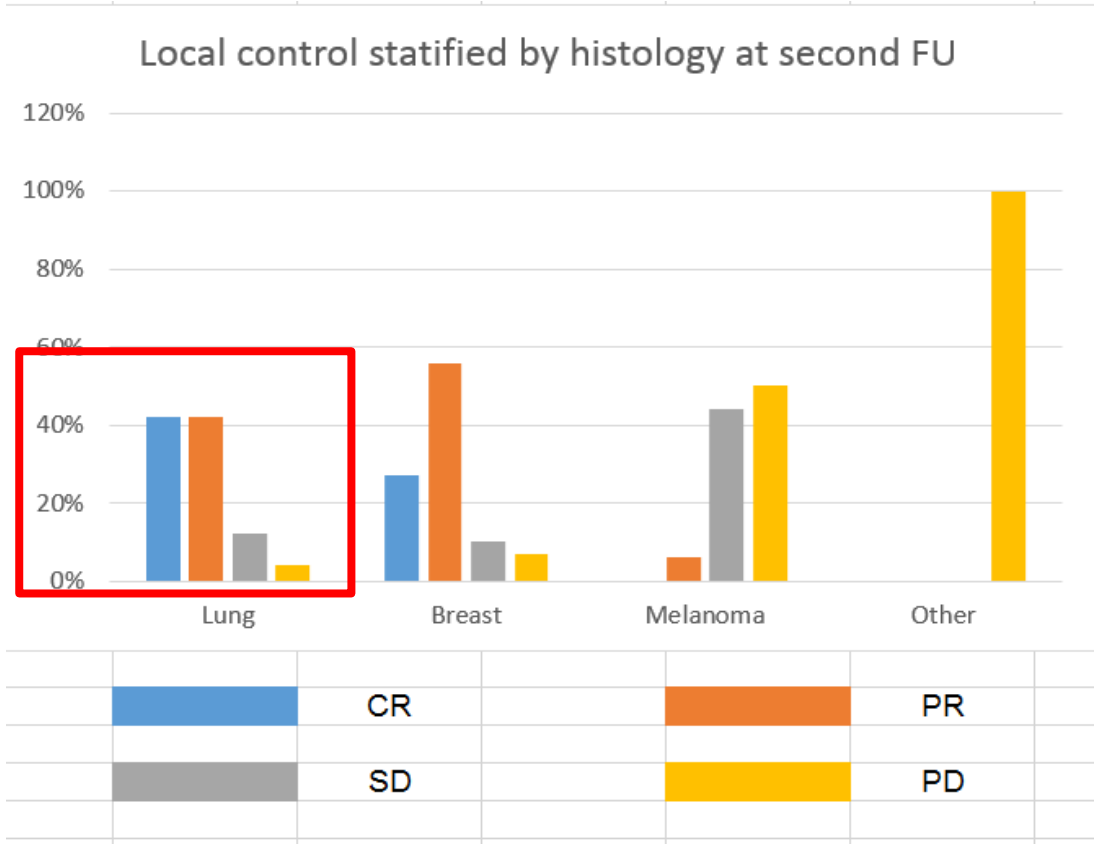
SRS/SFRT for multiple brain metastases:
First worldwide experience and clinical results using HyperArc:
EVALUATION@ 6 Months OF THE FIRST 43 PTS (246 LESIONS)

Results

PREDICTOR FACTOR for Local Control

Analysis of predictor factors for LC by histology

Histology	CR	PR	SD+PD	P value
Lung cancer	16%	49%	35%	
Breast cancer	30%	43%	27%	***0.0001***
Melanoma	0%	32%	68%	
Other	18%	30%	52%	



SBRT LUNG OLIGOMETASES/OLIGOPROGRESSIVE:
WHAT ABOUT NEW DRUGS INTERACTIONS?

EXPERT REVIEW OF ANTICANCER THERAPY 2017

From chemotherapy to target therapies associated with radiation in the treatment of NSCLC: a durable marriage?

Filippo Alongi, Stefano Arcangeli, Sara Ramella, Niccolò Giaj-Levra, Paolo Borghetti, Rolando D'Angelillo, Francesco Ricchetti, Marta Maddalo, Rosario Mazzola, Marco Trovò, Elvio Russi & Stefano Maria Magrinion the behalf of Associazione Italiana Radioterapia Oncologica (AIRO)

In the setting of oligometastatic and oligoprogressive disease, new molecules demonstrated to be safe and effective, opening to a promising and emerging application of the best interaction between new drugs and new modalities of radiotherapy with the goal to postpone an alternative chemotherapy line, but clinical trials are necessary.

FUTURE OR….COMING SOON IN PRACTICE:

PROTON THERAPY?HEAVY IONS?

BIOLOGICAL PROFILING BEFORE RT?

WHICH INTERACTIONS WITH NEW DRUGS??