Associazione Italiana Radioterapia e Oncologia clinica

Società Italiana di Radiobiologia

Radioterapia nella malattia oligometastatica multifocale: limite numerico o tecnico?

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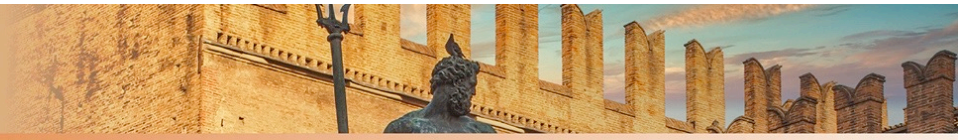
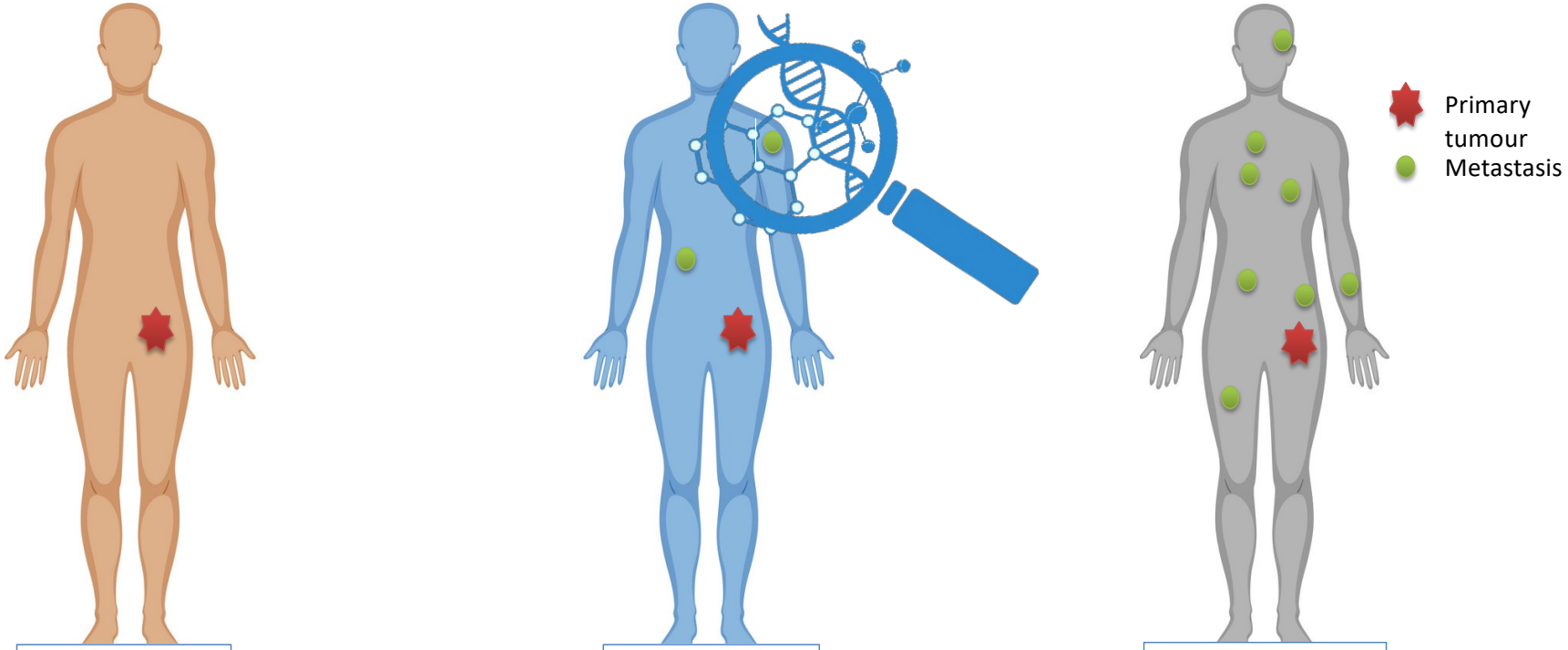


DICHIARAZIONE

Relatore: Ciro Franzese

Come da nuova regolamentazione della Commissione Nazionale per la Formazione Continua del Ministero della Salute, è richiesta la trasparenza delle fonti di finanziamento e dei rapporti con soggetti portatori di interessi commerciali in campo sanitario.

- Posizione di dipendente in aziende con interessi commerciali in campo sanitario **(NIENTE DA DICHIARARE)**
- Consulenza ad aziende con interessi commerciali in campo sanitario **(IPSEN, ASTELLAS)**
- Fondi per la ricerca da aziende con interessi commerciali in campo sanitario **(NIENTE DA DICHIARARE)**
- Partecipazione ad Advisory Board **(NIENTE DA DICHIARARE)**
- Titolarità di brevetti in compartecipazione ad aziende con interessi commerciali in campo sanitario **(NIENTE DA DICHIARARE)**
- Partecipazioni azionarie in aziende con interessi commerciali in campo sanitario **(NIENTE DA DICHIARARE)**
- Altro



Localized disease

Oligometastatic disease

Polymetastatic disease

The four aces

Prognostic factor	Common definitions
Young age	Usually defined as <65 or <70, or analyzed as a continuous variable
Patient fitness	Karnofsky performance status ≥70
Slow-growing cancers	Metachronous presentation of oligometastases
	Longer disease-free interval between original tumor and development of metastases
Minimal disease burden	Presence of fewer metastatic sites
	Single-organ oligometastases
	Lack of extracranial disease

Palma et al. Clin Cancer Res; 21(23) December 1, 2015

Consensus

Defining oligometastatic disease from a radiation oncology perspective: An ESTRO-ASTRO consensus document

Yolande Lievens [a,*], Matthias Guckenberger [b], Daniel Gomez [c], Morten Hoyer [d], Puneeth Iyengar [e], Isabelle Kindts [f], Alejandra Méndez Romero [g], Daan Nevens [h], David Palma [i], Catherine Park [j], Umberto Ricardi [k], Marta Scorsetti [l], James Yu [m], Wendy A. Woodward [c]

While **significant heterogeneity** exists in the current OMD definitions in the literature, consensus was reached on multiple key questions.

Based on available data, OMD can to date be defined as **1–5 metastatic lesions**, a controlled primary tumor being optional, but where **all metastatic sites must be safely treatable**.

Stereotactic ablative body radiotherapy in patients with oligometastatic cancers: a prospective, registry-based, single-arm, observational, evaluation study

Anastasia Chalkidou, Thomas Macmillan, Mariusz T Grzeda, Janet Peacock, Jennifer Summers, Saskia Eddy, Bola Coker, Hannah Patrick, Helen Powell, Lee Berry, Gareth Webster, Peter Ostler, Peter D Dickinson, Matthew Q Hatton, Ann Henry, Stephen Keevil, Maria A Hawkins, Nick Slevin, Nicholas van As

Between 2015 and 2019, **1422 patients** were recruited from 17 hospitals in England.

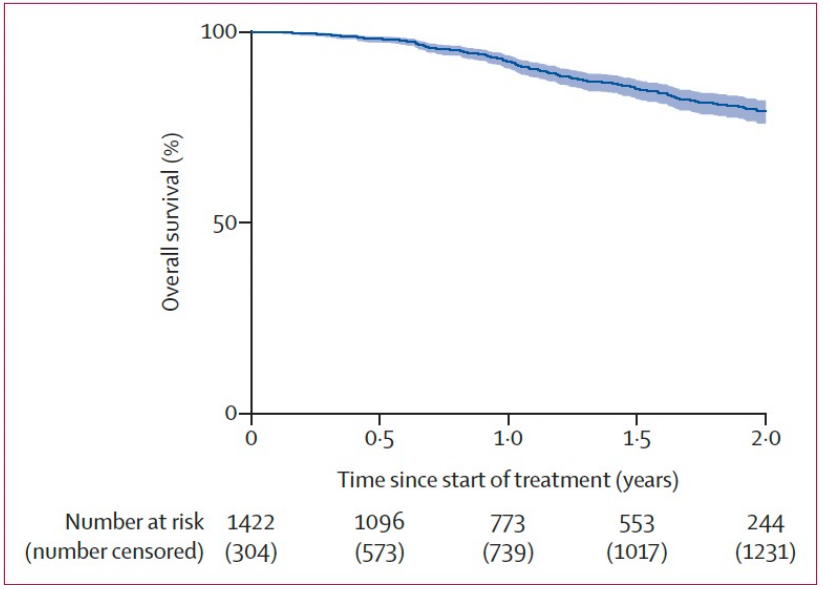
The most common primary tumour was prostate cancer (28·6% patients)

About 75% of patients treated on 1 metastasis, less than 5% on 3 metastases

Primary tumour diagnosis	
Prostate cancer	406 (28·6%)
Colorectal cancer	397 (27·9%)
Renal cancer	143 (10·1%)
Breast cancer	78 (5·5%)
Lung cancer	64 (4·5%)
Melanoma	58 (4·1%)
Other†	276 (19·4%)
Known site of first treated metastases	
Yes	1404 (98·5%)
Missing	18 (1·5%)
Site of first treated metastases (n=1404)	
Lung	411 (29·3%)
Spine	132 (9·4%)
Bone	169 (12·0%)
Adrenal	41 (2·9%)
Liver	135 (9·6%)
Lymph nodes	439 (31·3%)
Other‡	77 (5·5%)
Known number of metastases	
Yes	1421 (99·9%)
Missing*	1 (0·1%)
Number of metastases (n=1421)	
1	1074 (75·6%)
2	279 (19·6%)
3	68 (4·8%)

(Table 1 continues in next column)

Lancet Oncol 2021 Jan;22(1):98-106

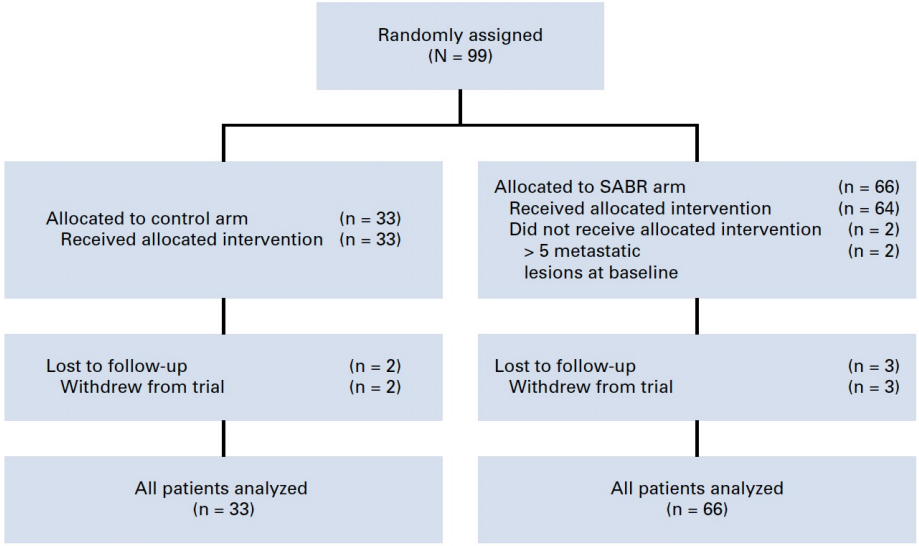


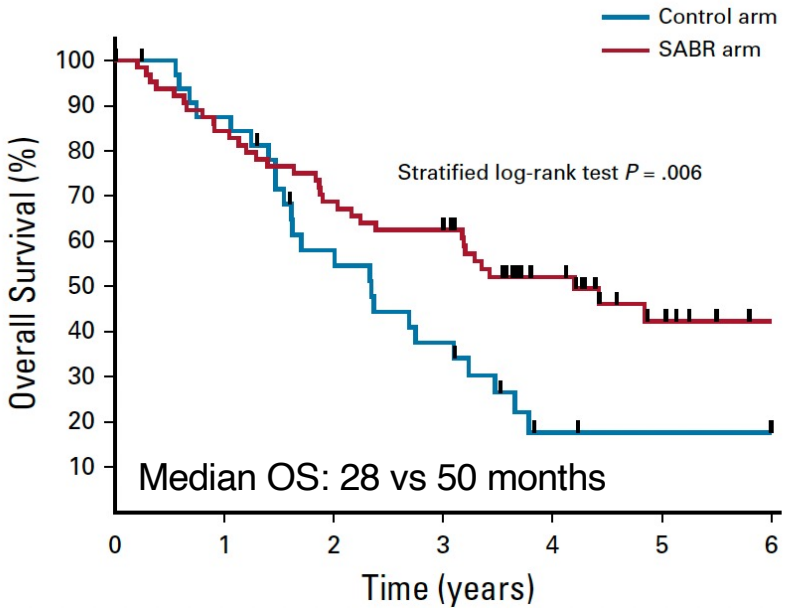
Number of metastases had no effect on Overall survival

Number of metastases					
1	1,068 (75.1%)	144	2.453	0.113	0.751
2	278 (19.6%)	41	2.576	0.128	
3	68 (4.8%)	6	2.428	0.078	
No of subjects used in analysis	1422				

Lancet Oncol 2021 Jan;22(1):98-106

Stereotactic Ablative Radiotherapy for the Comprehensive Treatment of Oligometastatic Cancers: Long-Term Results of the SABR-COMET Phase II Randomized Trial



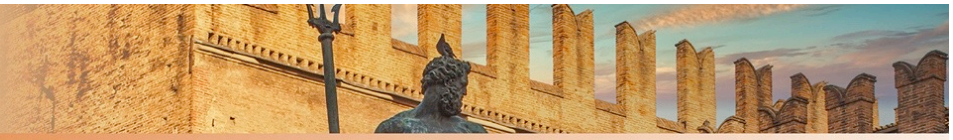


Palma et al, JCO 2020

SABR was generally well tolerated, with a 29% rate of grade 2 or higher toxicity

More than 90% of patients enrolled had 1–3 metastases

	Arm, No. (%)	
	Control	SABR
No. of metastases		
1	12 (36)	30 (46)
2	13 (40)	19 (29)
3	6 (18)	12 (18)
4	2 (6)	2 (3)
5	0 (0)	3 (5)
Location of metastases (n = 191 lesions)		
Adrenal	2 (3)	7 (6)
Bone	20 (31)	45 (35)
Liver	3 (5)	16 (13)
Lung	34 (53)	55 (43)
Other[a]	5 (8)	4 (3)



At present, there is **no biological evidence supporting the maximal number of metastases**, or the maximal lesion size, that can be treated to provide clinical benefit.

The possibility to **safely deliver** curative intent metastasis-directed radiation therapy determines the **maximum number.**

Lievens et al. Rad & Oncol 2020

Are we ready to treat multiple oligometastases?

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

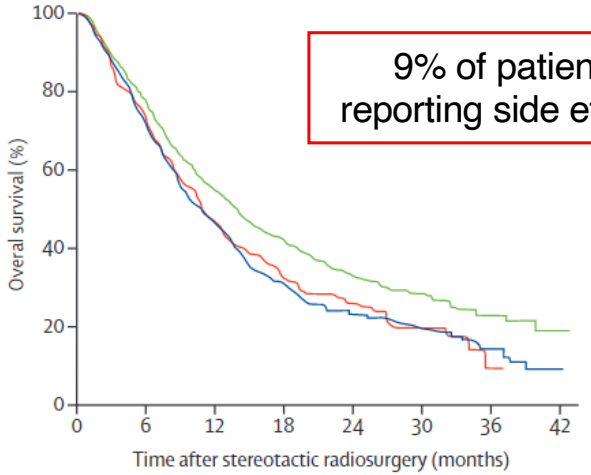
Masaaki Yamamoto, Toru Serizawa*, Takashi Shuto, Atsuya Akabane, Yoshinori Higuchi, Jun Kawagishi, Kazuhiro Yamanaka, Yasunori Sato, Hidefumi Jokura, Shoji Yomo, Osamu Nagano, Hiroyuki Kenai, Akihito Moriki, Satoshi Suzuki, Yoshihisa Kida, Yoshiyasu Iwai, Motohiro Hayashi, Hiroaki Onishi, Masazumi Gondo, Mitsuya Sato, Tomohide Akimitsu, Kenji Kubo, Yasuhiro Kikuchi, Toru Shibasaki, Tomoaki Goto, Masami Takanashi, Yoshimasa Mori, Kintomo Takakura, Naokatsu Saeki, Etsuo Kunieda, Hidefumi Aoyama, Suketaka Momoshima, Kazuhiro Tsuchiya*

	Univariable		Multivariable	
	HR (95% CI)	p value	HR (95% CI)*	p value
Age, years (≥65 vs <65)	1·412 (1·229–1·622)	<0·0001	1·351 (1·174–1·554)	<0·0001
Sex (male vs female)	1·427 (1·242–1·655)	<0·0001	1·377 (1·179–1·608)	<0·0001
KPS (≤70 vs ≥80)	2·079 (1·729–2·500)	<0·0001	1·529 (1·240–1·886)	<0·0001
Number of tumours				
2–4 vs 1	1·313 (1·131–1·525)	0·0001	1·328 (1·141–1·546)	0·0003
5–10 vs 2–4	0·974 (0·806–1·177)	0·78	0·993 (0·819–1·204)	0·94
Maximum diameter of largest tumour (≥1·6 cm vs <1·6 cm)	1·431 (1·249–1·638)	<0·0001	1·006 (0·771–1·314)	0·92
Cumulative tumour volume (≥1·9 mL vs <1·9 mL)	1·503 (1·313–1·721)	<0·0001	1·172 (0·899–1·530)	0·24
Primary tumour category				
Breast vs lung	0·743 (0·584–0·945)	0·014	0·881 (0·673–1·153)	0·36
GI vs lung	1·750 (1·373–2·231)	<0·0001	1·407 (1·087–1·822)	0·0094
Renal cell vs lung	1·063 (0·718–1·573)	0·76	0·964 (0·648–1·434)	0·13
Others vs lung	1·572 (1·096–2·255)	0·021	1·333 (0·922–1·927)	0·86
Extracerebral disease status (not controlled vs controlled)	1·385 (1·200–1·589)	<0·0001	1·272 (1·101–1·469)	0·0011
Neurological symptoms (yes vs no)	1·779 (1·541–2·053)	<0·0001	1·334 (1·117–1·594)	0·0013

Clinical factors were measured before stereotactic surgery. HR=hazard ratio. KPS=Karnofsky performance status. GI=gastrointestinal. *HR adjusted for all clinical factors listed in this table.

***Table 2*: Clinical factors affecting survival after stereotactic radiosurgery**

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

9% of patients reporting side effects

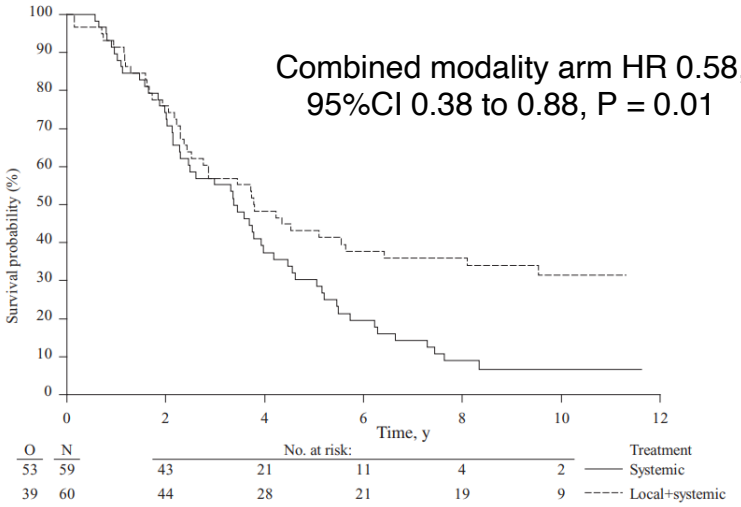
Lancet Oncol 2014; 15: 387–95

Local Treatment of Unresectable Colorectal Liver Metastases: Results of a Randomized Phase II Trial

119 patients with colorectal liver metastases **(< 10 mets and no extrahepatic disease**) received **systemic treatment alone** or **systemic treatment plus radiofrequency ablation +- resection**

70% 3 - 9 mets
40% 5 – 9 mets

Patient and tumor characteristics	Local plus systemic treatment (n = 60) No. (%)	Systemic treatment (n = 59) No. (%)
No. of liver metastases		
1	15 (25.0)	7 (11.9)
2	6 (10.0)	4 (6.8)
3	8 (13.3)	7 (11.9)
4	9 (15.0)	8 (13.6)
5	6 (10.0)	10 (16.9)
6	3 (5.0)	9 (15.3)
7	6 (10.0)	8 (13.6)
8	3 (5.0)	2 (3.4)
9	4 (6.7)	4 (6.8)
Median	4.0	5.0



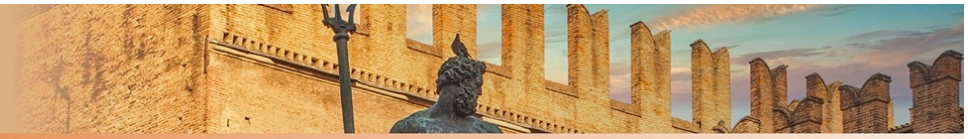
Combined modality arm HR 0.58, 95%CI 0.38 to 0.88, P = 0.01

Ruers et al. JNCI J Natl Cancer Inst (2017) 109(9)

Dose to OARs

Number of mets

- Advanced RT techniques
- Minimum IGRT requirements
- Organ motion control
- Appropiate dose
- Established dose constraints



Planning Trade-offs for SABR in Patients With 4 to 10 Metastases: A Substudy of the SABR-COMET-10 Randomized Trial

Samaher Ashram, MD,* Houda Bahig, MD, PhD,† Aisling Barry, MD,†,‡ Denise Blanchette, MRT(T),¶ Anders Celinksi, MRT(T),* Peter Chung, MBChB,†,‡ Johnson Darko, PhD,‖ David Donath, MD,† Robert Doucet, PhD,† Abigail Erickson, Nat.Dip (RT),* Meredith Giuliani, MBBS, MEd, PhD,†,‡ Darin Gopaul, MD,‖ Scott Hipwell, BA, CMD,* Joanna Javor, MHSc,†,‡ Joda Kuk, MD,‖ Patricia Lindsay, PhD,†,‡ Barbara Millman, MRT(T), BSc,* Michael Oliver, PhD,¶ Andrew Pearce, MD,¶ Catherine Russell,# Sashendra Senthi, MD, PhD,# Toni Vu, MD,† Andrew Warner, MSc,* Stewart Gaede, PhD,* and David A. Palma, MD, PhD*

IJROBP 2022

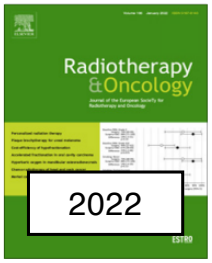
SABR planning was **achievable without compromise** of the PTV in a large majority of patients, with **only 3%** of targets covered with a **D95 <95%**

Compromise most commonly required for vertebral and lymph node targets

Conformality parameters such as R50, R100, and D2cm were **not met in fewer than 10% of lesions**

Table 3 Tumor characteristics and dosimetry metrics stratified by location of metastases for all patients

Characteristic	N	All lesions (n = 332)	Bone (n = 32)	Brain (n = 2)	Liver (n = 26)	Lung (n = 181)	Lymph node (n = 83)	Spine (n = 8)	*P* value
PTV size (cm^3), median (IQR)	296	9.0 (5.3, 24.3)	30.3 (12.9, 62.2)	3.6 (3.3, 4.0)	50.3 (16.5, 103.4)	9.1 (6.2, 18.9)	4.7 (2.7, 8.5)	14.0 (4.2, 49.7)	**< .001**
Dose fractionation, n (%)									
16-18 Gy in 1 fraction	332	2 (0.6)	1 (3.1)	1 (50.0)	-	-	-	-	-
20-24 Gy in 1 fraction		111 (33.4)	4 (12.5)	-	-	107 (59.1)	-	-	
24-27 Gy in 3 fractions		11 (3.3)	-	1 (50.0)	-	6 (3.3)	2 (2.4)	2 (25.0)	
25-28 Gy in 5 fractions		14 (4.2)	2 (6.3)	-	-	3 (1.7)	9 (10.8)	-	
30-33 Gy in 3 fractions		51 (15.4)	5 (15.6)	-	5 (19.2)	19 (10.5)	21 (25.3)	1 (12.5)	
30-40 Gy in 5 fractions		143 (43.1)	20 (62.5)	-	21 (80.8)	46 (25.4)	51 (61.4)	5 (62.5)	
Maximum PTV dose 0.03 cm^3 (%), median (IQR)	332	124.2 (117.1, 129.8)	124.3 (116.5, 129.8)	131.1 (126.5, 135.6)	118.3 (106.4, 123.4)	127.1 (122.8, 131.6)	113.0 (108.5, 123.0)	130.3 (120.9, 132.9)	**< .001**
Coverage D95 (%), median (IQR)	332	100.3 (100.0, 101.1)	100.3 (100.1, 100.9)	100.3 (100.0, 100.6)	100.5 (98.7, 101.7)	100.2 (100.0, 100.9)	100.5 (99.6, 101.5)	100.0 (84.6, 100.5)	.556
Coverage D95 (%), n (%)									
<95	332	11 (3.3)	0 (0)	0 (0)	1 (3.8)	1 (0.5)	7 (8.4)	2 (25.0)	**< .001**
≥95		321 (96.7)	32 (100)	2 (100)	25 (96.2)	180 (99.5)	76 (91.6)	6 (75.0)	
Coverage D95 (%), n (%)									
<100	332	70 (21.1)	4 (12.5)	0 (0)	7 (26.9)	33 (18.2)	23 (27.7	3 (37.5)	.210
≥100		262 (78.9)	28 (87.5)	2 (100)	19 (73.1)	148 (81.8)	60 (72.3)	5 (62.5)	
R50 status, n (%)									
Pass/acceptable	284	260 (91.6)	28 (100)	2 (100)	19 (95.0)	151 (96.2)	54 (76.1)	6 (100)	**< .001**
Fail		24 (8.5)	0 (0)	0 (0)	1 (5.0)	6 (3.8)	17 (23.9)	0 (0)	
R100 status, n (%)									
Pass/acceptable	293	271 (92.5)	27 (100)	2 (100)	18 (90.0)	159 (96.4)	59 (80.8)	6 (100)	**.002**
Fail		22 (7.5)	0 (0)	0 (0)	2 (10.0)	6 (3.6)	14 (19.2)	0 (0)	
D_{2cm} status, n (%)									
Pass/acceptable	285	267 (93.7)	27 (96.4)	2 (100)	18 (90.0)	144 (91.1)	70 (98.6)	6 (100)	.246
Fail		18 (6.3)	1 (3.6)	0 (0)	2 (10.0)	14 (8.9)	1 (1.4)	0 (0)	
All organs at risk meet constraints, n (%)									
Yes	62	59 (95.2)	6 (100)	-	4 (100)	35 (100)	14 (82.4)	-	.075
No		3 (4.8)	0 (0)	-	0 (0)	0 (0)	3 (17.7)	-	



Single-isocenter versus multiple-isocenters for multiple lung metastases: Evaluation of lung dose

Janita E. van Timmeren [a,*], Stefanie Ehrbar [a], Madalyne Chamberlain [a], Michael Mayinger [a], Mischa S. Hoogeman [b], Nicolaus Andratschke [a], Matthias Guckenberger [a], Stephanie Tanadini-Lang [a]

15 NSCLC patients with **2 or 3 lesions** previously treated with SBRT was subjected to treatment planning with a **multiple-isocenter technique** and a **single-isocenter technique**.

2 margin approaches were evaluated:
1) identical margins for each internal target volume (ITV), assuming an average registration for all lesions in CBCT positioning verification
2) a smaller margin for the largest lesion, assuming an optimal registration for that lesion.

MLD was 4.9 ± 1.9 Gy for multiple-isocenters and 5.4 ± 2.1 Gy and 5.3 ± 2.2 Gy for single-isocenter approach 1 and 2, respectively.

V20Gy was 5.5 ± 3.7%, 5.5 ± 3.2% and 5.4 ± 3.3%

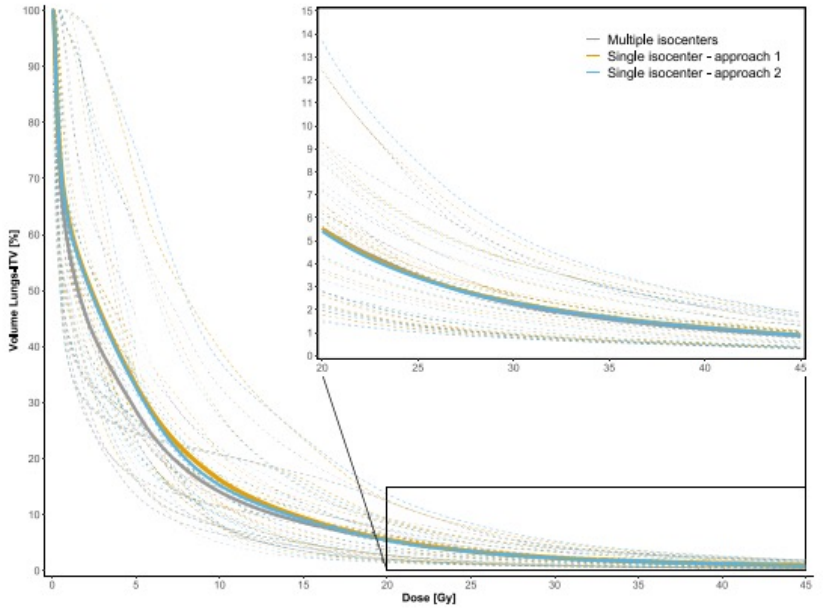


Fig. 2. Dose-volume histograms (DVHs) for all patients and all plans generated with full arcs, with the population-mean DVHs represented in bold.

JAMA Oncology | Original Investigation

Evaluation of Safety of Stereotactic Body Radiotherapy for the Treatment of Patients With Multiple Metastases

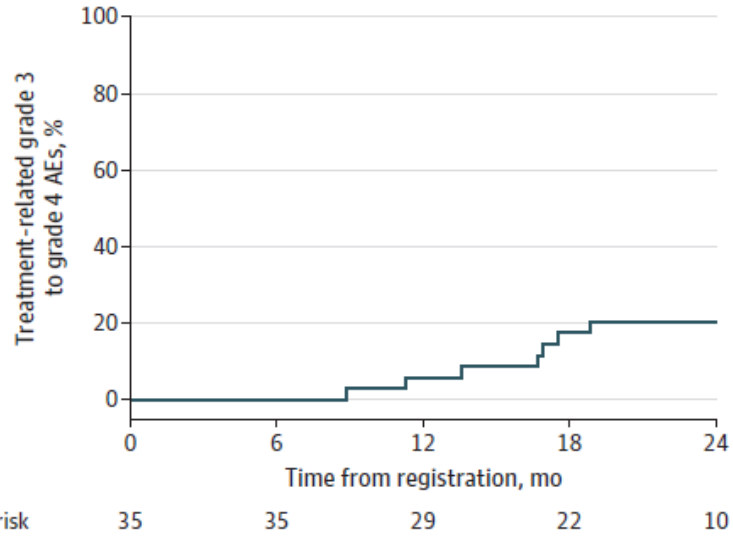
Findings From the NRG-BR001 Phase 1 Trial

Steve Chmura, MD, PhD; Kathryn A. Winter, MS; Clifford Robinson, MD; Thomas M. Pisansky, MD; Virginia Borges, MD; Hania Al-Hallaq, PhD; Martha Matuszak, PhD; Sean S. Park, MD; Sun Yi, MD; Yasmin Hasan, MD; Jose Bazan, MD; Philip Wong, MD; Harold A. Yoon, MD; Janet Horton, MD; Gregory Gan, MD; Michael T. Milano, MD, PhD; Elin Ruth Sigurdson, MD; Jennifer Moughan, MS; Joseph K. Salama, MD; Julia White, MD

42 patients enrolled, with **3 to 4 metastases** or 2 metastases in close proximity to each other

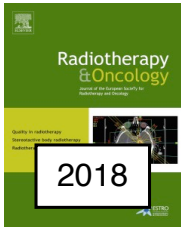
8 instances of **grade 3 AEs**, most likely related to protocol therapy, occurred approximately 125 to 556 days from SBRT initiation in **7 patients**

Figure 1. Time to Treatment-Related Grade 3 to Grade 4 Adverse Events (AEs) Occurring Greater Than 180 Days After the Start of Stereotactic Body Radiation Therapy for All Evaluable Patients



Stereotactic body radiotherapy (SBRT) for multiple pulmonary oligometastases: Analysis of number and timing of repeat SBRT as impact factors on treatment safety and efficacy

R.J. Klement [a], J. Hoerner-Rieber [b,c], S. Adebahr [d,e,f], N. Andratschke [g], O. Blanck [h], J. Boda-Heggemann [i], M. Duma [j], M.J. Eble [k], H.C. Eich [l], M. Flentje [m], S. Gerum [n], P. Hass [o], C. Henkenberens [p], G. Hildebrandt [q], D. Imhoff [r], K.H. Kahl [s], N.D. Klass [t], R. Krempien [u], F. Lohaus [e,f,v,w], C. Petersen [x], E. Schrade [y], T.G. Wendt [z], A. Wittig [aa], M. Guckenberger [g,*]



145 patients were treated for **multiple (2 – 6) pulmonary metastases**; 88 patients received all SBRT treatments within one month whereas 57 patients were treated with repeat SBRT

No significant association between 3-month and 6-month **death rates** and the **number of pulmonary metastases**, no grade 4 or grade 5 toxicity was observed in these patients.

Death rates of the different patient groups.

Group	3-Month death count (rate)	*p*-Value	6-Month death count (rate)	*p*-Value
Single SBRT	26 (6.0%)	1	62 (14.4%)	0.7221
Multiple SBRT	8 (6.3%)		16 (12.6%)	
Synchronous SBRT	3 (3.9%)	0.2729	9 (12.0%)	0.6896
Metachronous SBRT	3 (7.7%)		4 (11.1)	
Synchronous followed by metachronous SBRT	2 (11.8%)		3 (18.8%)	

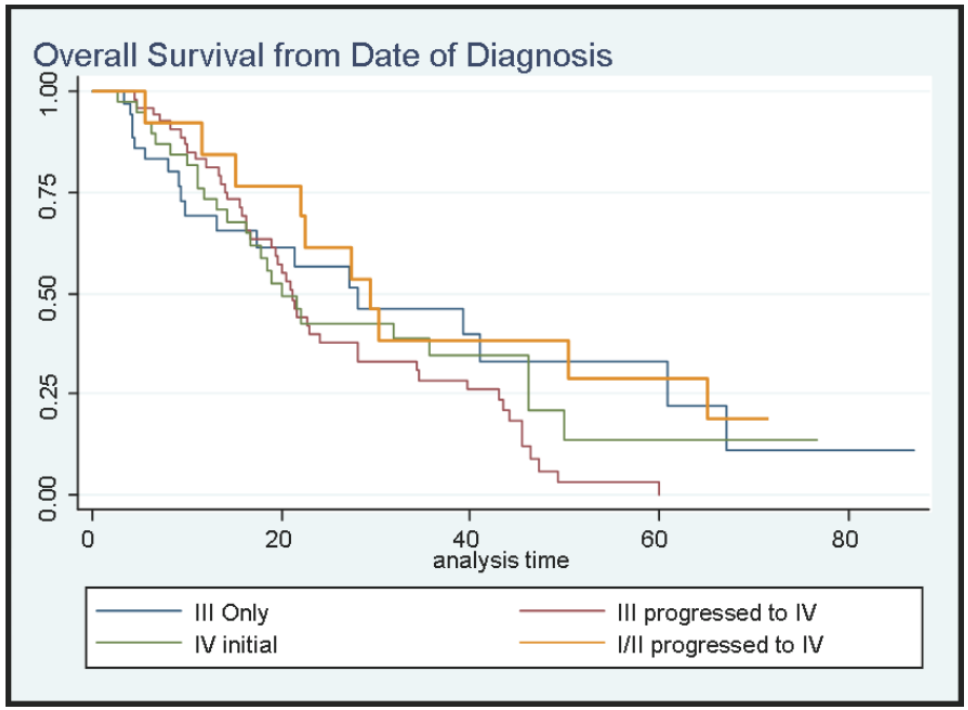
Median OS was 23.5 months and **OS was not influenced by the number of SBRT treatments** or the number and timing of repeat SBRT courses

146 NSCLC patients (stage III and IV) treated with **curative-intent radiotherapy**

All stage IV NSCLC patients treated with SBRT had **≤ 8 lesions.**

5-year OS was superior ($p < 0.01$) for those with limited metastases (≤ 8 lesions) versus stage III patients who developed extensive metastases not amenable to SBRT (14% vs 0%)

No significant difference among patients with ≤ 5 metastases versus 6-8 ($p = 0.94$)



Cheruvu et al. Radiation Oncology 2011, 6:80

Predictors of Early Polymetastatic Relapse After SABR for up to 5 Oligometastases: A Secondary Analysis of the Phase II SABR-5 Trial

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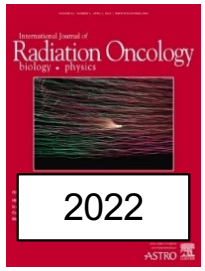
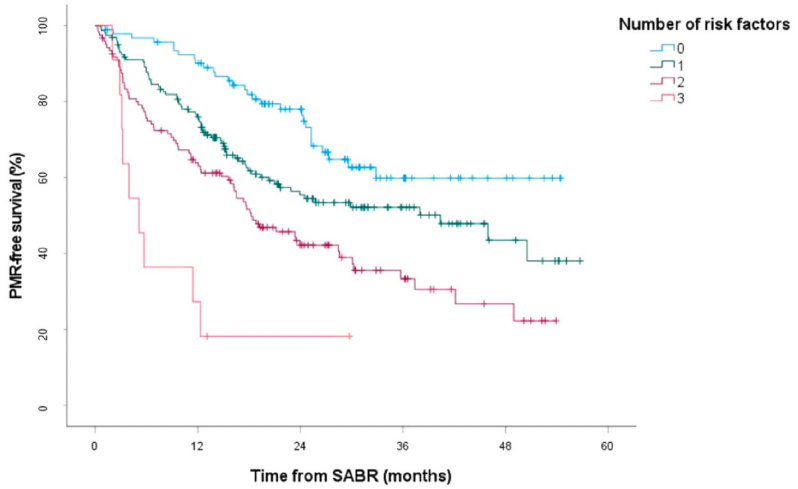




- Worse performance status (HR = 2.01,P = .018)
- Non-prostate/breast histology (HR = 3.64, P <.001)
- Oligoprogression (HR = 3.84, P <.001)

3-year OS were :

- 0% Group 1
- 53% Group 1
- 77% Group 3
- 93% Group 4

Stereotactic ablative radiotherapy (SABR) for the treatment of patients with multiple oligometastases: evaluation of safety and the impact of dose on survival.

C Franzese, V Vernier, D Franceschini, T Comito, P Navarria, E Clerici, MA Teriaca, M Massaro, L Di Cristina, B Marini, C Galdieri, P Mancosu, S Tomatis, M Scorsetti.
Humanitas Research Hospital IRCSS
Humanitas University

136 patients were treated from 2012 to 2020 on **450 oligometastases**.

102 (75.0%) → 3 oligometastases
26 (19.1%) → 4 oligometastases
8 (5.9%) → 5 oligometastases

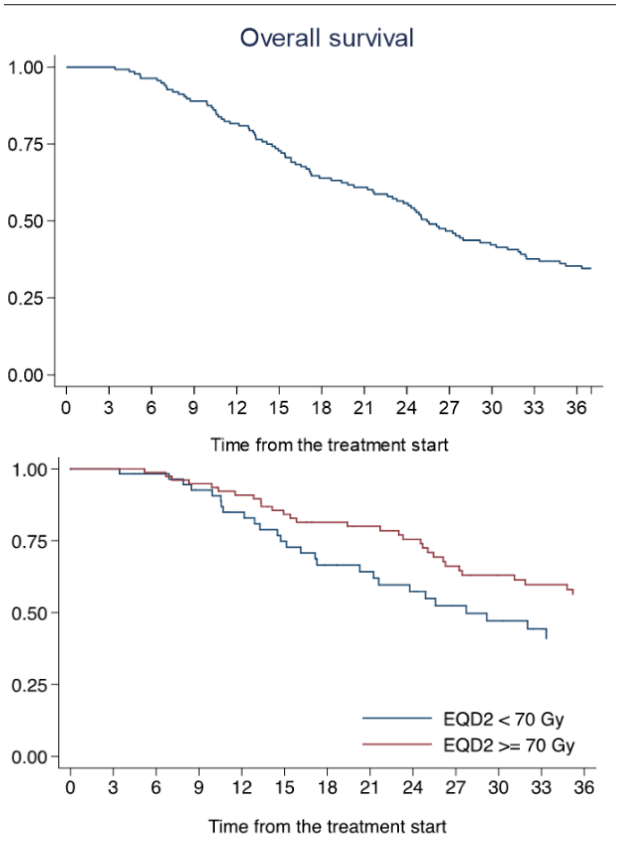
Rad & Onc, Under review

OS rates at 1 and 2 years were 81.6% and 55.7%

Performance status (p=0.022) and **minimum dose EQD2** (p=0.032) were **significant for OS**

Median OS:

- 27.7 months with EQD2 < 70 Gy
- 47.5 months with EQD2 ≥ 70 Gy



Rad & Onc, Under review

In terms of toxicity, in the acute setting we observed **26 (21.0%) patients and 11 (8.9%) patients** reporting **grade 1 and grade 2** side effect, respectively.

In the late setting, 8 (6.4%) patients reported grade 1 toxicity, and 3 (2.4%) patients reported grade 2 side effects, in the form of cough (5 instances) and dyspnea (5 instances).

No grade 3 or higher toxicity was reported both in the acute and late settings.

Rad & Onc, Under review

Lung multiple oligometastases – Clinical case 1

69 yo female, No comorbidities, non smoker

Jun 2018: surgical resection fo rectal adenocarcinoma, pT3pN0

Oct 2018: appearance of at least 6 liver lesions

Oct 2018 - Apr 2019 **systemic therapy with FOLFOX + Panitumumab** with partial response

May 2019 surgical resection of the liver lesions

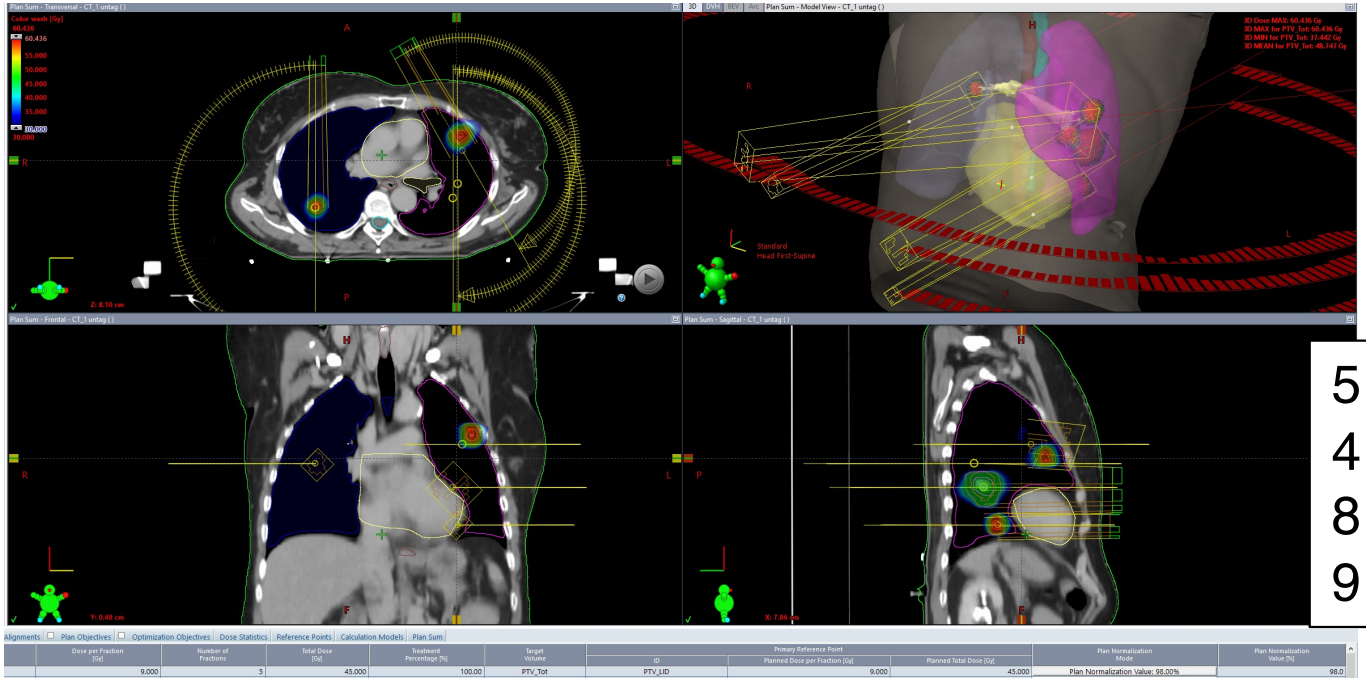
Jun 2019 - Sep 2019 **systemic therapy with FOLFOX + Panitumumab** with bed tolerance

Nov 2020 appearance of 2 small suspicious nodules in the left lung

Mar 2021 increase of the left nodules and appearance of right lung nodule

Suggested activation of II line systemic therapy that the patient refused

May 2021 **SBRT on 2 nodules in the upper left lung, 2 nodules in lower left lung, 1 nodule in right lung**



5 lesions
4 Isocenters
8 arcs
9 Gy x 5fr

Liver multiple oligometastases – Clinical case

74 yo female

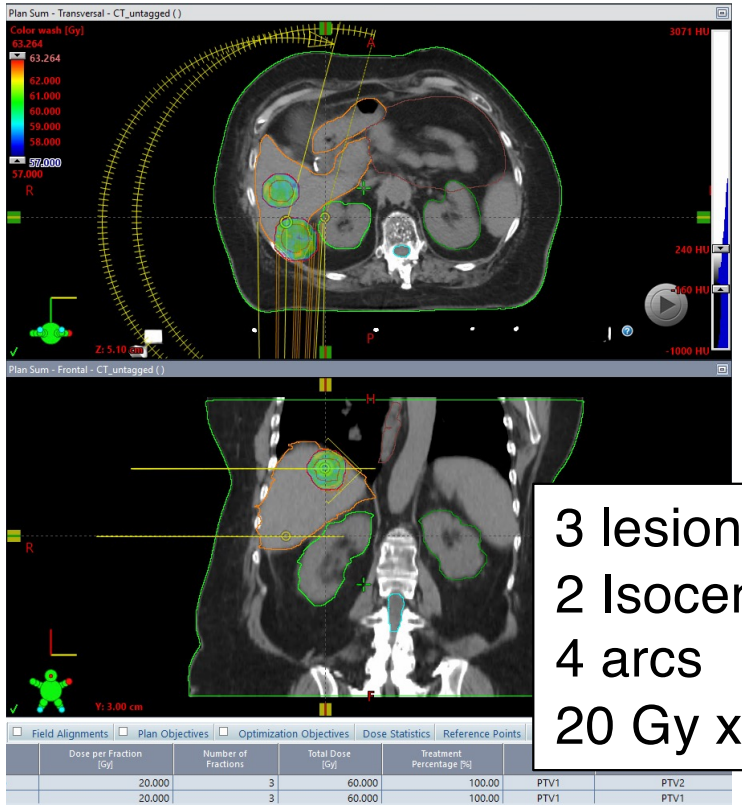
2017 Diagnosis of right breast cancer treated with surgery, CHT and OT

2019 Appearance of 3 liver metastases

Oct 2019 – December 2020 systemic therapy with scarse tolerance

Suggested surgery or RFA refused by the patient

March 2021: **SBRT on the 3 liver metastases in S6, S7 and S7-8**

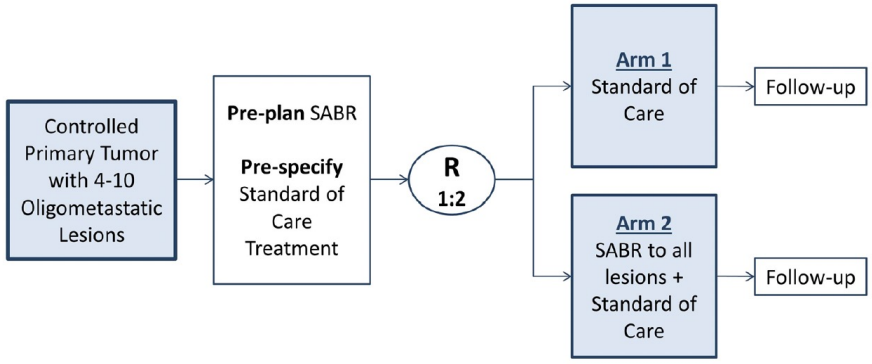


3 lesions
2 Isocenters
4 arcs
20 Gy x 3 fr

STUDY PROTOCOL Open Access

Stereotactic ablative radiotherapy for the comprehensive treatment of 4–10 oligometastatic tumors (SABR-COMET-10): study protocol for a randomized phase III trial

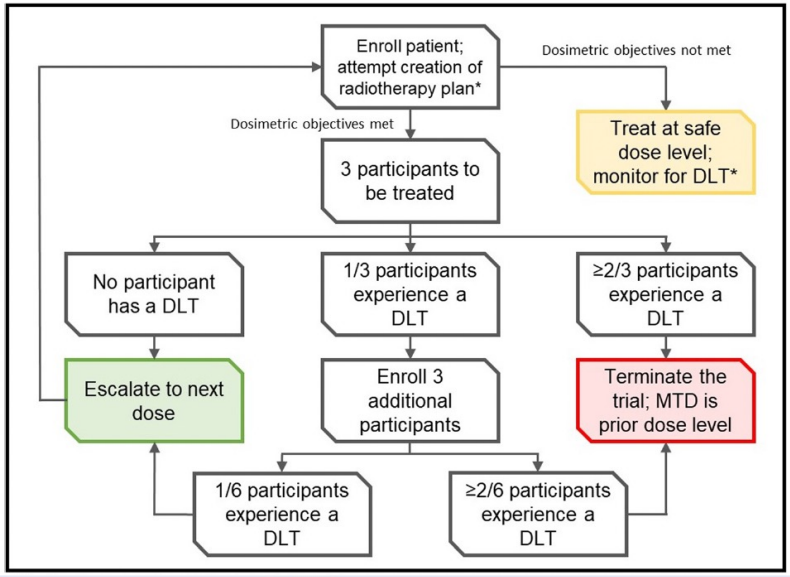
David A. Palma[1*], Robert Olson[2], Stephen Harrow[3], Rohann J. M. Correa[1], Famke Schneiders[4], Cornelis J. A. Haasbeek[4], George B. Rodrigues[1], Michael Lock[1], Brian P. Yaremko[1], Glenn S. Bauman[1], Belal Ahmad[1], Devin Schellenberg[2], Mitchell Liu[2], Stewart Gaede[1], Joanna Laba[1], Liam Mulroy[5], Sashendra Senthi[6], Alexander V. Louie[7], Anand Swaminath[8], Anthony Chalmers[9], Andrew Warner[1], Ben J. Slotman[4], Tanja D. de Gruijl[4], Alison Allan[1] and Suresh Senan[4]

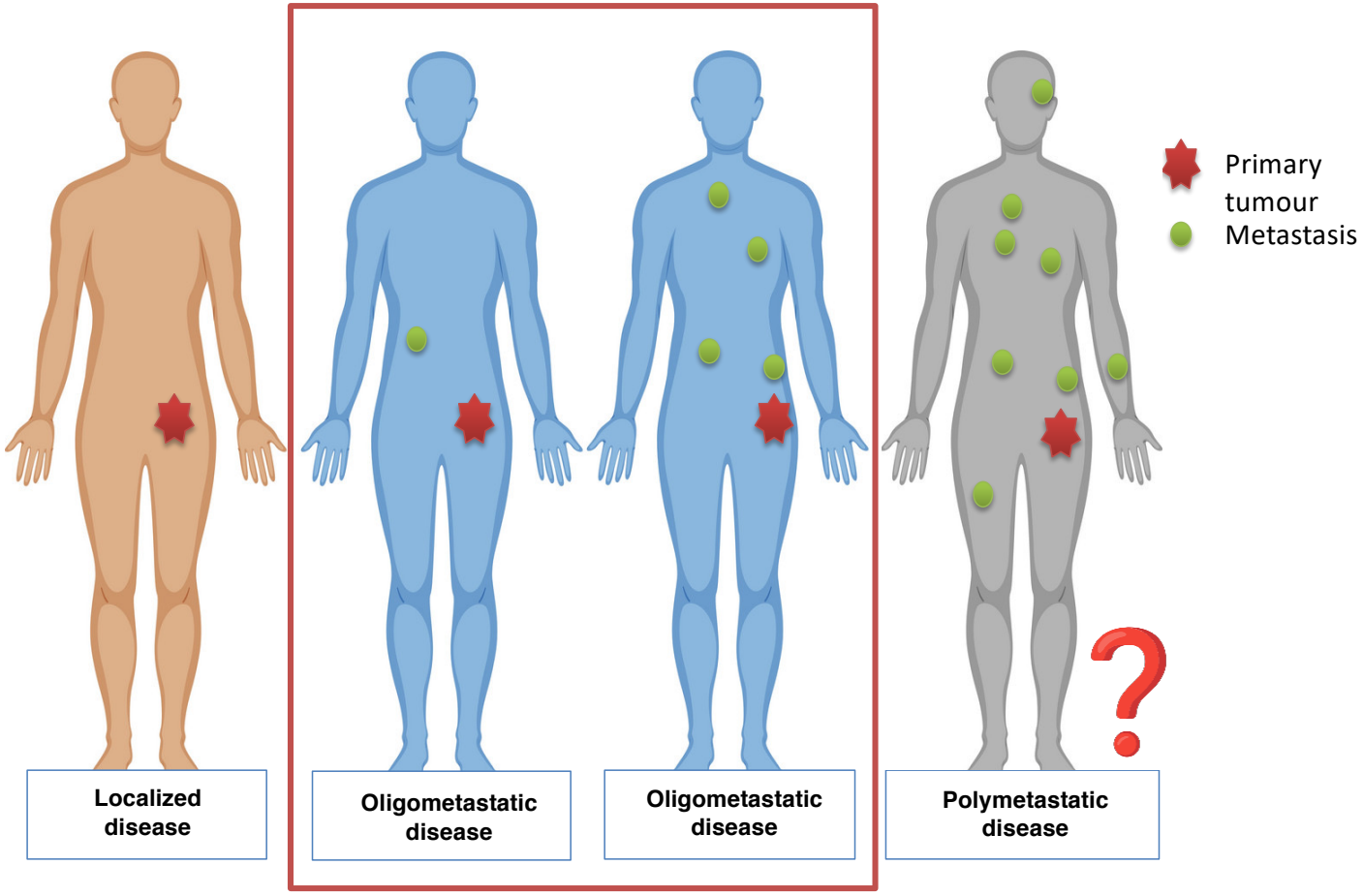


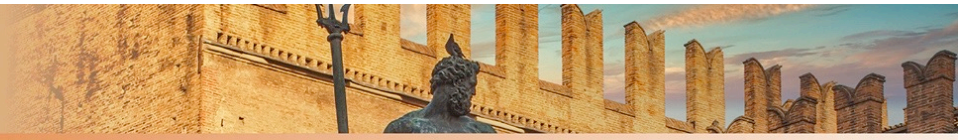
STUDY PROTOCOL Open Access

Ablative radiation therapy to restrain everything safely treatable (ARREST): study protocol for a phase I trial treating polymetastatic cancer with stereotactic radiotherapy

Glenn S. Bauman[1*], Mark T. Corkum[1], Hatim Fakir[2], Timothy K. Nguyen[1] and David A. Palma[1]




Primary tumour
Metastasis
Localized disease
Oligometastatic disease
Oligometastatic disease
Polymetastatic disease



Conclusions

- Oligometastatic setting includes a wide spectrum of disease, with a common consensus on a maximum number of 5 metastases
- Majority of published trials include patients treated with SBRT on a single lesions, few patients with 2 to 3 metastases
- Modern radiotherapy may potentially increase the number of safely treatable oligometastases with an acceptable risk of side effects
- Prospective trials are evaluating the safety and efficacy of SBRT on polymetastatic patients compared to systemic therapy alone

Thank you

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