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LUNG

SBRT LIVER

SBRT PROSTATE

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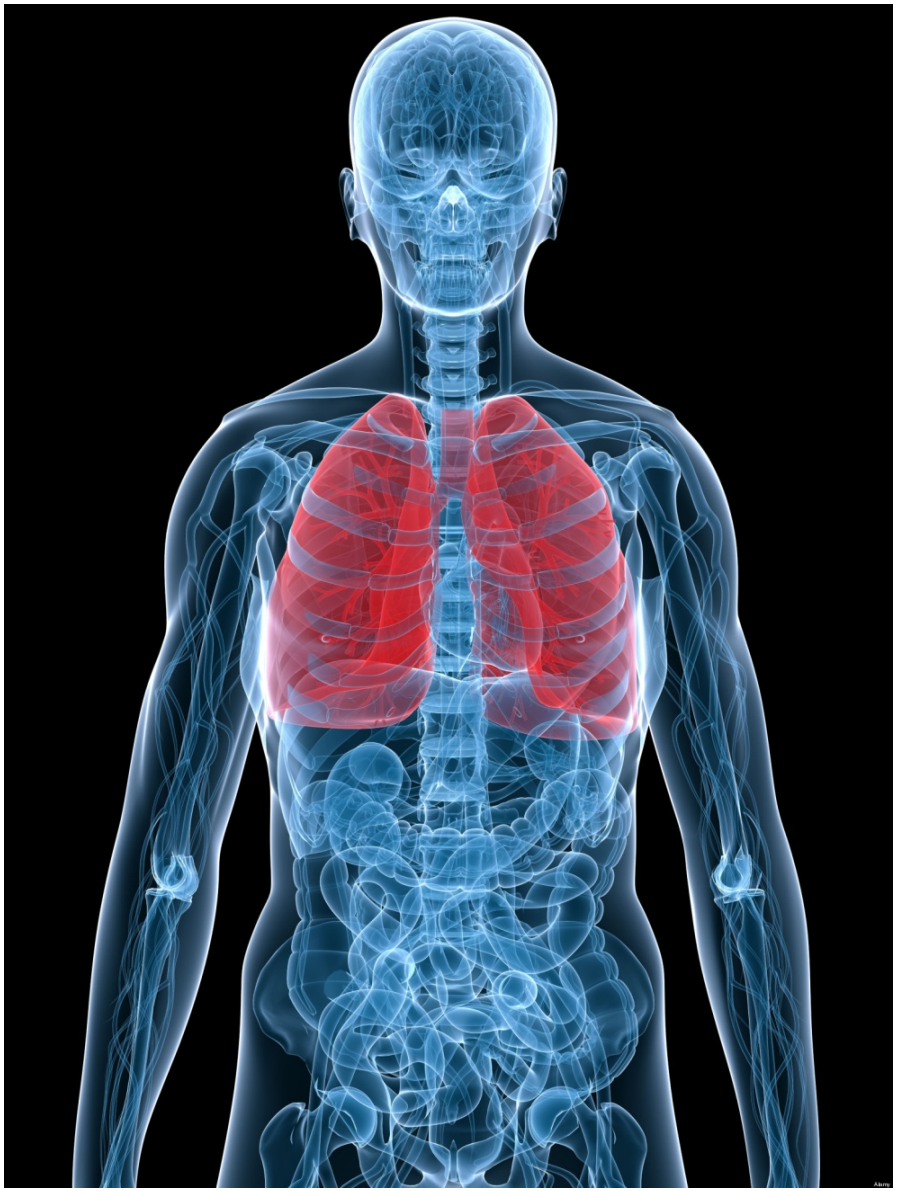

A. NSCLC

1. Early stage lung tumor:
   - Inoperable
   - Operable

2. Locally advanced lung tumor

3. Oligometastatic NSCLC patients

B. SCLC

EARLY STAGE NSCLC

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Treatment of Stage I and II Non-small Cell Lung Cancer

Diagnosis and Management of Lung Cancer, 3rd ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines

John A. Howington, MD, FCCP; Matthew G. Blum, MD, FCCP; Andrew C. Chang, MD, FCCP; Alex A. Balekian, MD, MSHS; and Sudish C. Murthy, MD, PhD, FCCP

General Approach

• For patients with clinical stage I and II non-small cell lung cancer (NSCLC) and **no medical contraindications to operative intervention, surgical resection is recommended (Grade 1B)**

• For patients with clinical stage I and II NSCLC, it is suggested that they be evaluated by a **thoracic surgical oncologist or a multidisciplinary team** even if the patients are considered for non surgical therapies such as percutaneous ablation or stereotactic body radiation therapy (Grade 2C)

• For patients with clinical stage I or II NSCLC and who are medically fit, it is recommended that they be treated by a **board certified thoracic surgeon** with a focus on lung cancer

Non resectional Treatment Approaches

• For patients with clinical stage I NSCLC who **cannot tolerate a lobectomy or segmentectomy**, **stereotactic body radiation therapy** (SBRT) and **surgical wedge resection are suggested** over no therapy (Grade 2C)

Adjuvant Therapy

• For patients with **completely resected** pathologic stage **IA,B** NSCLC, it is recommended that **postoperative chemotherapy not be used** (outside of a clinical trial) (Grade 1B)

• For patients with **completely resected** pathologic stage **IIA,B**(**N1**) NSCLC and **good performance status**, **postoperative platinum-based chemotherapy is recommended** (Grade 1A)

Adjuvant Therapy

• For patients with **completely resected** pathologic **stage I** NSCLC, it is recommended that **postoperative radiation therapy should not be used** (Grade 1A)

• For patients with **completely resected** pathologic **stage II** NSCLC, it is suggested that **postoperative radiation therapy should not be used** (Grade 2A)

• For patients with **stage I and II** NSCLC and a positive bronchial margin (**R1 resection**), **postoperative radiation therapy is suggested** (Grade 2C)

EARLY STAGE NSCLC: CENTRAL LESIONS

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Systematic review

Outcomes of stereotactic ablative radiotherapy for central lung tumours: A systematic review

Sashendra Senthi*, Cornelis J.A. Haasbeek, Ben J. Slotman, Suresh Senan

Department of Radiation Oncology, VU University Medical Center, Amsterdam, The Netherlands

Stereotactic ablative radiotherapy (SABR) has improved the survival for medically inoperable patients with peripheral early-stage non-small cell lung cancer (NSCLC). We performed a systematic review of outcomes for **central lung tumours**.

Twenty publications met the inclusion criteria, reporting outcomes for 563 central lung tumours, including 315 patients with early-stage NSCLC.

There was heterogeneity in the planning, prescribing and delivery of SABR and the common toxicity criteria used to define toxicities (versions 2.0–4.0).

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Tumour location (central versus peripheral) did **not impact overall survival**.

Local control rates were ≥ 85% when the prescribed biologically equivalent tumour dose was **≥100 Gy.**

Treatment-related mortality was 2.7% overall, and 1.0% when the biologically equivalent normal tissue dose was **≤210 Gy**. Grade 3 or 4 toxicities may be more common following SABR for central tumours, but occurred in less than 9% of patients.

Conclusions: Post-SABR survival for early-stage NSCLC is not affected by tumour location. **SABR achieves high local control with limited toxicity when appropriate fractionation schedules are used** for central tumours.

EARLY STAGE NSCLC: OPERABLE PATIENTS

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Stereotactic Body Radiotherapy (SBRT) Versus Sublobar Resection for High-Risk Patients With Early Stage Non-Small Lung Cancer (NSCLC)

This study is currently recruiting participants.

Verified January 2013 by Mayo Clinic

Sponsor:
Mayo Clinic

Information provided by (Responsible Party):
Dennis Wigle, Mayo Clinic

ClinicalTrials.gov Identifier:
NCT01622621

First received: June 15, 2012
Last updated: January 17, 2013
Last verified: January 2013
History of Changes

Arms	Assigned Interventions
Active Comparator: Randomized **Sublobar Resection** Randomized by computer to receive a **sublobar resection**.	Procedure: **Sublobar Resection** Undergo surgery which removes a **sublobar resection** of the lung
Active Comparator: Randomized **SBRT** Randomized by computer to receive Stereotactic Body Radiotherapy (**SBRT**).	Radiation: Stereotactic Body Radiotherapy (**SBRT**) 54 Gy in 3 fractions
Active Comparator: Observation **Sublobar Resection** Patient decides with doctor to undergo a **sublobar resection**.	Procedure: **Sublobar Resection** Undergo surgery which removes a **sublobar resection** of the lung
Active Comparator: Observation **SBRT** Patient decides with doctor to undergo **SBRT**.	Radiation: Stereotactic Body Radiotherapy (**SBRT**) 54 Gy in 3 fractions

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Radical Resection Vs. Ablative Stereotactic Radiotherapy in Patients With Operable Stage I NSCLC (POSTILV)

This study is ongoing, but not recruiting participants.

Sponsor:
Radiation Therapy Oncology Group

Collaborator:
Varian Medical Systems

Information provided by (Responsible Party):
Radiation Therapy Oncology Group

ClinicalTrials.gov Identifier:
NCT01753414

First received: December 17, 2012
Last updated: June 3, 2013
Last verified: June 2013
History of Changes

Full Text View | Tabular View | No Study Results Posted | Disclaimer | How to Read a Study Record

Purpose

Rationale: Surgery remains the standard of care for stage 1 (T1-2a N0)non-small cell lung cancer. Stereotactic body radiation therapy is a newer radiation treatment that gives fewer but higher and possibly more effective doses of radiation than standard radiation. This technique may be able to send x-rays directly to the tumor and cause less damage to normal tissue. It is not yet known whether stereotactic body radiation therapy is more effective than surgery in treating non-small cell lung cancer.

Purpose: The primary aim of this randomized phase II trial is to determine if the efficacy of SBRT is comparable to that of standard surgical interventions for patients with T1N0 non-small cell lung cancer.

VS

LOCALLY ADVANCED NSCLC

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Treatment of Stage III Non-small Cell Lung Cancer

Diagnosis and Management of Lung Cancer, 3rd ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines

Nithya Ramnath, MD; Thomas J. Dilling, MD; Loren J. Harris, MD, FCCP; Anthony W. Kim, MD, FCCP; Gaetane C. Michaud, MD, FCCP; Alex A. Balekian, MD, MSHS; Rebecca Diekemper, MPH; Frank C. Detterbeck, MD, FCCP; and Douglas A. Arenberg, MD, FCCP

• In patients with **infiltrative stage III (N2,3) NSCLC and performance status 0-1** being considered for **curative-intent treatment**, combination platinum-based **chemotherapy and radiotherapy (60-66 Gy) are recommended** (Grade 1A)

Remark: *Dose escalation of radiotherapy is not recommended* (except in a clinical trial)

Remark: *For patients with stage IIIB NSCLC, once* daily thoracic radiotherapy plus platinum-based doublet chemotherapy is recommended

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RTOG 0617

A Randomized Phase III Comparison of Standard-Dose (60 Gy) Versus High-Dose (74 Gy) Conformal Radiotherapy with Concurrent and Consolidation Carboplatin/Paclitaxel +/- Cetuximab In Patients with Stage IIIA/IIIB Non-Small Cell Lung Cancer (NSCLC)

Presenting Author: Jeffrey D. Bradley, MD

NCI Sponsored Cooperative Groups:
RTOG, NCCTG, CALGB

Jeffrey D Bradley, Rebecca Paulus, Ritsuko Komaki, Gregory A. Masters, Kenneth Forster, Steven E. Schild, Jeffrey Bogart, Yolanda I. Garces, Samir Narayan, Vivek Kavadi, Lucien A Nedzi, Jeff M. Michalski, Douglas Johnson, Robert M MacRae, Walter J Curran, and Hak Choy

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STRATIFY	RANDOMIZE	Concurrent Treatment	Consolidation Treatment
RT Technique 1. 3D-CRT 2. IMRT **Zubrod** 1. 0 2. 1 **PET Staging** 1. No 2. Yes **Histology** 1. Squamous 2. Non-Squamous		**Arm A** Concurrent chemotherapy* RT to **60 Gy**, 5 x per wk for 6 wks	Arm A Consolidation chemotherapy*
		Arm B Concurrent chemotherapy* RT to **74 Gy**, 5 x per wk for 7.5 wks	Arm B Consolidation chemotherapy*
		Arm C Concurrent chemotherapy* and **Cetuximab** RT to **60 Gy**, 5 x per wk for 6 wks	Arm C Consolidation chemotherapy* and Cetuximab
		Arm D Concurrent chemotherapy* and **Cetuximab** RT to **74 Gy**, 5 x per wk for 7.5 wks	Arm D Consolidation chemotherapy* and Cetuximab

*Carboplatin and paclitaxel

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Pretreatment Characteristics

	60 Gy (n=213)	74 Gy (n=206)
Age (median)	64	64
Gender		
Male	125 (58.7%)	120 (58.3%)
Female	88 (41.3%)	86 (41.7%)
Race		
Other	26 (12.2%)	29 (14.1%)
White	187 (87.8%)	177 (85.9%)
RT Technique		
3DCRT	**115 (53.9%)**	**109 (52.9%)**
IMRT	**98 (46.1%)**	**97 (47.1%)**
PET Staging	**91.1%**	**88.8%**
Histology		
Adenocarcinoma	**84 (39.4%)**	**71 (34.5%)**
Squamous	**89 (41.8%)**	**97 (47.1%)**
NSCLC NOS	**40 (18.7%)**	**38 (18.4%)**
AJCC Stage		
Stage IIIA	**143 (67.1%)**	**131 (63.6%)**
Stage IIIB	**70 (32.9%)**	**75 (36.4%)**

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RTOG 0617: Dosimetric Data Distribution

	60 Gy (n=203) Mean (Median)	74 Gy (n=197) Mean (Median)
GTV Volume (cc)	124.7 (92.2)	128.5 (96.4)
Heart V5 (%)	47.4 (45.7)	45.6 (46.1)
Heart V50 (%)	7(4.2)	11(5.6)
Lung V20 (%)	28.7 (28.8)	30.9 (31.9)
Esophagus Dose (Gy)	24.7 (25.1)	29.8 (28.9)
Esophagus V60 (%)	15 (13)	25.6 (25.7)
Mean Margin CTV to PTV (mm)	7.9 (6.6)	7.7 (6.6)

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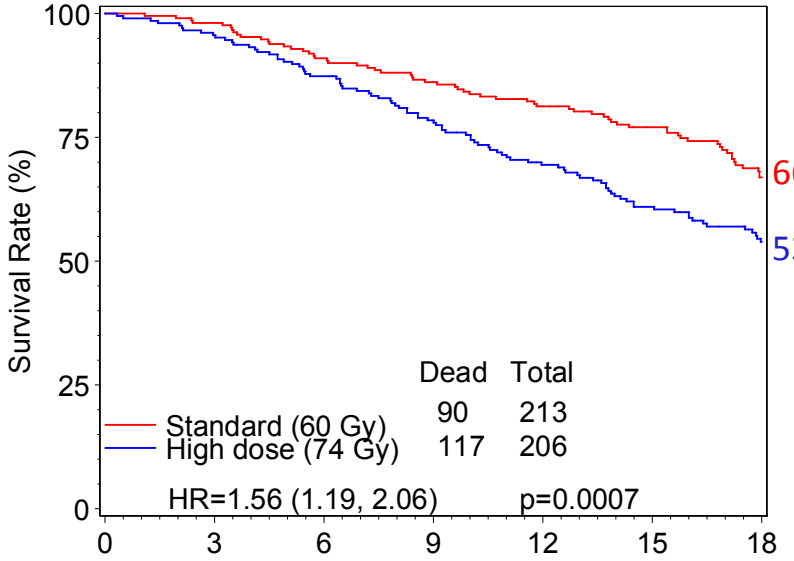
RTOG 0617
Definitely, Probably, or Possibly Related to Treatment
(Using CTCAE Version 3.0)

	Standard Dose: 60 Gy (n=213) Grade			High Dose: 74 Gy (n=206) Grade		
	3	4	5	3	4	5
Worst non-hematologic	98 (46%)	21 (9.9%)	2 (0.9%)	95 (46.1%)	23 (11.2%)	10 (4.9%)
Worst overall	99 (46.5%)	57 (26.8%)	2 (0.9%)	86 (41.7%)	65 (31.6%)	10 (4.9%)
Grade 5 Events	(n=2)			(n=10)		
-As scored by institution -No significant difference	1 Pulmonary 1 Sudden death			2 Pulmonary 1 Thrombosis 1 Upper GI Hemorrhage 1 Pulmonary Hemorrhage 1 Pneumonia NOS 1 Esophageal 1 TE fistula 1 Sepsis 1 Death NOS		

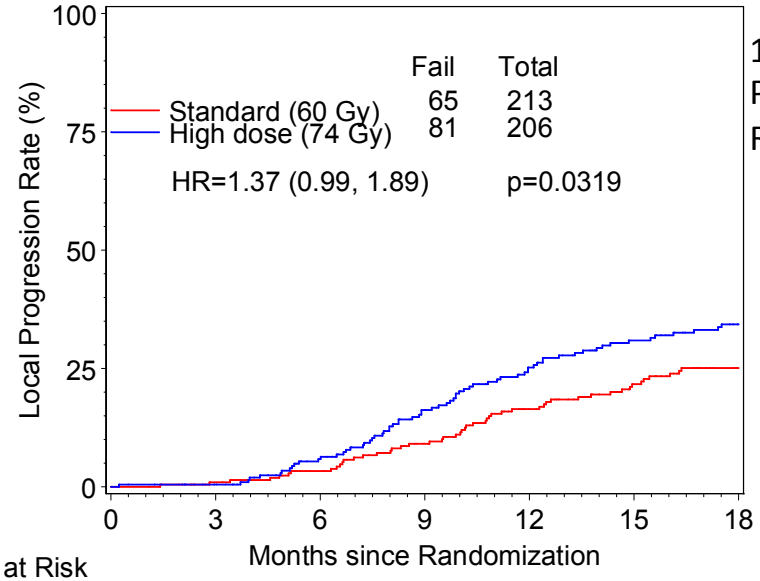


18-Month Survival Rate

66.9%

53.9%

Patients at Risk							
Standard	213	207	190	177	161	141	108
High dose	206	197	178	159	135	112	87



18-Month Local Progression Rate

34.3%

25.1%

Patients at Risk							
Standard	213	205	187	165	137	113	85
High dose	206	197	170	134	105	80	62

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RTOG 0617: Results

- **Median survival**: 28.7 months (95% CI:22.0, NR) and 19.5 months (95% CI:22.0, NR) for the 60 Gy and 74 Gy arms, respectively.

- **PFS** and **Local Relapse** also inferior with 74 Gy

- Increased rate of **severe esophagitis** associated with the 74 Gy arm (21% versus 7%)

- **Grade 5 toxicity**: 2 pts in 60 Gy arm vs 10 pts in 74 Gy arm

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RTOG 0617: Conclusion

- The high dose arm experienced **higher local failure** rates.

- No clear reason for the **poorer survival** on the high dose arms. Possible explanations are unreported toxicities, increased heart dose, extended therapy duration, Grade 5 events, or likely a combination of these factors.

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Treatment of Stage III Non-small Cell Lung Cancer

Diagnosis and Management of Lung Cancer, 3rd ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines

Nithya Ramnath, MD; Thomas J. Dilling, MD; Loren J. Harris, MD, FCCP; Anthony W. Kim, MD, FCCP; Gaetane C. Michaud, MD, FCCP; Alex A. Balekian, MD, MSHS; Rebecca Diekemper, MPH; Frank C. Detterbeck, MD, FCCP; and Douglas A. Arenberg, MD, FCCP

• In patients with **infiltrative stage III (N2,3) NSCLC, performance status 0-1, and minimal weight loss** being considered for **curative-intent treatment**, **concurrent chemoradiotherapy** is recommended over sequential chemoradiotherapy (Grade 1A)

• In patients with **a complete response after treatment with concurrent chemoradiotherapy**, we suggest that **prophylactic cranial irradiation should not be given** (outside of a clinical trial) (Grade 2C)

• Treatment with neoadjuvant (**induction**) chemotherapy **or chemoradiotherapy followed by surgery is not recommended** (Grade 1C)

• In patients with **infiltrative stage III (N2,3) NSCLC and performance status 2** or those with **substantial weight loss (> 10%**), concurrent chemoradiotherapy is suggested but with **careful consideration** of the **potential risks and benefits** (Grade 2C)

Discrete Mediastinal Node Involvement

• In patients with discrete N2 involvement by NSCLC identified preoperatively **(IIIA),** we recommend the treatment plan should be made with the input from a **multidisciplinary team** (Grade 1C) **.**

• **either definitive chemoradiation therapy or induction therapy followed by surgery is recommended** over either surgery or radiation alone (Grade 1A) .

• **primary surgical resection followed by adjuvant therapy is not recommended** (except as part of a clinical trial) (Grade 1C) .

Discrete Mediastinal Node Involvement: Adjuvant Therapy

• In patients with **resected NSCLC (R0)** who were found to have incidental **(occult) N2** disease (**IIIA**) despite thorough preoperative staging and who have good performance status, **adjuvant platinum-based chemotherapy is recommended** (Grade 1A) .

• **sequential adjuvant radiotherapy is suggested** when concern for a local recurrence is high (Grade 2C) .

• In patients with NSCLC who were found to have incidental **(occult) N2 disease (IIIA)** despite thorough preoperative staging and were **incompletely resected (R1,2), combined postoperative concurrent chemotherapy and radiotherapy is suggested** (Grade 2C) .

OLIGOMETASTATIC NSCLC PATIENTS

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Is there an oligometastatic state in non-small cell lung cancer? A systematic review of the literature

Allison Ashworth, George Rodrigues, Gabriel Boldt, David Palma*

Department of Radiation Oncology, London Regional Cancer Program, London, Canada

Better overall survival (OS) for patients :

- KPS score >80
- GTV ≤124 cm^3
- Adenocarcinoma
- No history of respiratory disease
- Radiation dose

Conclusion: Radical treatment of selected NSCLC patients presenting with 1–3 synchronous metastases can result in **favorable 2-year survivals**.
Future **prospective clinical trials**, ideally randomized, should evaluate radical treatment strategies in such patients.

Radical treatment of synchronous oligometastatic non-small cell lung carcinoma (NSCLC): Patient outcomes and prognostic factors

Gwendolyn H.M.J. Griffioen[a,*], Daniel Toguri[b], Max Dahele[a], Andrew Warner[b], Patricia F. de Haan[a], George B. Rodrigues[b], Ben J. Slotman[a], Brian P. Yaremko[b], Suresh Senan[a], David A. Palma[b]

LIMITED-DISEASE SCLC

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Phase III trial of concurrent thoracic radiotherapy with either first- or third-cycle chemotherapy for limited-disease small-cell lung cancer†

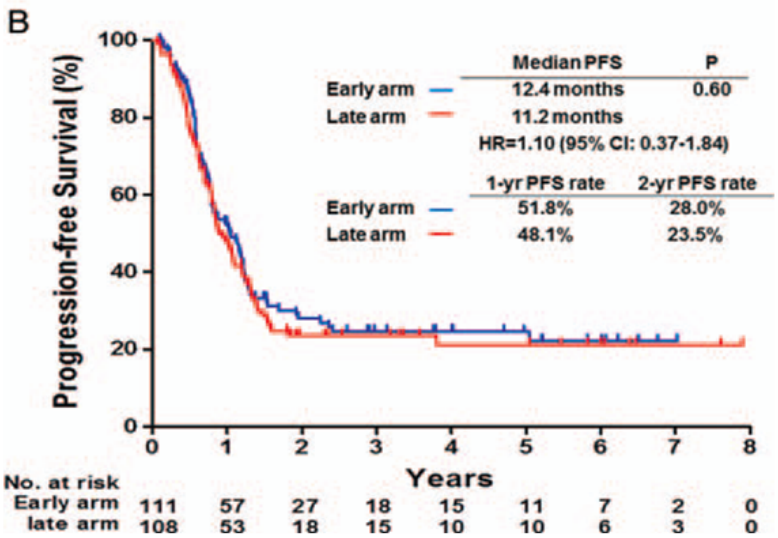
J.-M. Sun[1,‡], Y. C. Ahn[2,‡], E. K. Choi[3,‡], M.-J. Ahn[1], J. S. Ahn[1], S.-H. Lee[1], D. H. Lee[4], H. Pyo[2], S. Y. Song[3], S.-H. Jung[5], J. S. Jo[6], J. Jo[4], H. J. Sohn[4], C. Suh[4], J. S. Lee[4], S.-W. Kim[4,§] & K. Park[1,§*]

Departments of [1]Medicine; [2]Radiation Oncology, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul; Departments of [3]Radiation Oncology; [4]Oncology, Asan Medical Center, University of Ulsan College of Medicine, Seoul, South Korea; [5]Department of Biostatistics and Bioinformatics, Duke University, Durham, USA; [6]Cancer Research Institute, Research Institute for Future Medicine, Samsung Medical Center, Seoul, South Korea

Background: We compared **late thoracic radiotherapy (RT)** with **early RT** in the treatment of **limited-disease** small-cell lung cancer (LD-SCLC).

Patients and methods: Patients with LD-SCLC received four cycles of etoposide plus cisplatin every 21 days.
222 patients **were randomly assigned** to receive either RT administered concurrently with the first cycle (**early RT**) or the third cycle (**late RT**) of chemotherapy.

The primary end point was complete response rate.



Results:

No statistical difference was noted in complete response rate, progression-free survival (median, 12.4 versus 11.2 months) and **overall survival (**median, 24.1 versus 26.8 months)**.**

Conclusion: **In LD-SCLC treatment, RT starting in the third cycle of chemotherapy seemed to be non inferior to early RT**, and had a more favorable profile with regard to neutropenic fever.

Liver Metastases:
SBRT

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ORIGINAL ARTICLE

Multicentre results of stereotactic body radiotherapy for secondary liver tumours

Betul Berber[1], Rafael Ibarra[1], Laura Snyder[1], Min Yao[2], Jeffrey Fabien[2], Michael T. Milano[3], Alan W. Katz[3], Karyn Goodman[4], Kevin Stephans[5], Galal El-Gazzaz[6], Federico Aucejo[6], Charles Miller[6], John Fung[6], Simon Lo[2], Mitchell Machtay[2] & Juan Sanabria[1]

Departments of [1]Surgery, and [2]Radiation Oncology, University Hospitals Case Medical Center, Case Western Reserve University, Cleveland, OH, [3]Department of Radiation Oncology, University of Rochester Medical Center, Rochester, [4]Department of Radiation Oncology, Memorial Sloan-Kettering Cancer Center, New York, NY, Departments of [5]Radiation Oncology and [6]Surgery, Cleveland Clinic Foundation, Lerner College, Cleveland, OH, USA

Background: **Surgical resection** is the standard treatment for liver metastases, although for the **majority of patients this is not possible**. Stereotactic body radiotherapy (**SBRT**) is an alternative **local-regional therapy**. The purpose of this study was to evaluate the results of SBRT for secondary liver tumours from a combined multicentre database.

Methods: Variables from patients treated with SBRT from **four Academic Medical Centres were entered into a common database**. Local tumour control and 1-year survival rates were calculated.

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Results: In total, **153 patients** (91 women) 59 ± 8.4 years old with **363 metastatic liver** lesions were treated with SBRT.

The underlying primary tumour arose from gastrointestinal (GI), retroperitoneal and from extra-abdominal primaries in 56%, 8% and 36% of patients, respectively. Metastases, with a gross tumour volume (GTV) of 138.5 ± 126.8 cm3, were treated with a **total radiation dose of 37.5 ± 8.2 Gy in 5 ± 3 fractions.**

The **1-year overall survival was 51%** with an overall **local control rate of 62%** at a mean follow-up of 25.2 ± 5.9 months. A complete tumour response was observed in 32% of patients. Grade 3–5 adverse events were noted in 3% of patients.

Conclusion: Secondary liver tumours treated with SBRT had a high rate of local control with a low incidence of adverse events.

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2013

RADIATION ONCOLOGY

RESEARCH Open Access

Single-dose radiosurgical treatment for hepatic metastases - therapeutic outcome of 138 treated lesions from a single institution

Daniel Habermehl[1,3*], Klaus K Herfarth[1], Justo Lorenzo Bermejo[2], Holger Hof[1], Stefan Rieken[1], Sabine Kuhn[1], Thomas Welzel[1], Jürgen Debus[1] and Stephanie E Combs[1]

Background: This study presents results from **more than 10 years** of clinical experience and evaluates long-term outcome and efficacy of this therapeutic approach.

Patients and methods: From 1997 to 2009 a total of **138 intrahepatic tumors** of 90 patients were irradiated with **single doses of 17 to 30 Gy (median dose 24 Gy).**
Most frequent underlying tumor histologies were colorectal adenocarcinoma (70 lesions) and breast cancer (27 lesions). In 35 treatment sessions **multiple targets were simultaneously irradiated** (up to four lesions at once).
Local progression-free (PFS) and overall survival (OS) after treatment were investigated using uni- and multiple survival regression models.

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Results: Median overall survival of all patients was 24.3 months. **Local PFS was 87%, 70% and 59% after 6, 12 and 18 months**, respectively. Median time to local progression was 25.5 months.

Patients with a **single lesion** and **no further metastases** at time of RT **had a favorable median PFS of 43.1 months**.

The type of tumor showed a statistical significant influence on local PFS, with a **better prognosis for breast cancer histology than for colorectal carcinoma** in uni- and multiple regression analysis (p = 0.05).

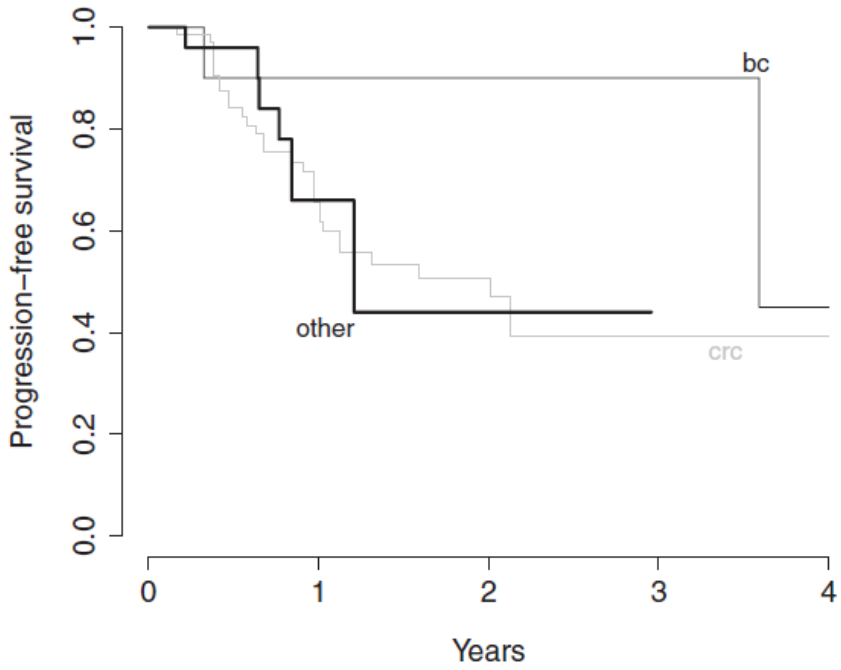

Figure 3 Local progression-free survival of patients with metastases from colorectal carcinoma (CRC) and adenocarcinoma of the breast (BC). Kaplan-Meier curve of PFS according to primary tumor site.

Conclusion: This study confirms **safety of SBRT in liver lesions**, with 6- and 12 months local control of 87% and 70%. The dataset represents the clinical situation in a large oncology setting, with many competing treatment options and heterogeneous patient characteristics.

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Stereotactic Body Radiotherapy for Colorectal Liver Metastases

2011

A Pooled Analysis

Daniel T. Chang, MD[1]; Anand Swaminath, MD[2]; Margaret Kozak, BA[1]; Julie Weintraub, MD[3]; Albert C. Koong, MD, PhD[1]; John Kim, MD[2]; Rob Dinniwell, MD[2]; James Brierley, MD[2]; Brian D. Kavanagh, MD, MPh[3]; Laura A. Dawson, MD[2]; and Tracey E. Schefter, MD[3]

Patients with **colorectal liver metastases** from 3 institutions were included if they had **1 to 4 lesions**, **received 1 to 6 fractions** of stereotactic body radiotherapy, and had radiologic imaging 3 months post-treatment.

Sixty-five patients with 102 lesions treated from August 2003 to May 2009 were retrospectively analyzed. Forty-seven (72%) patients had ≥1 **chemotherapy regimen before stereotactic body radiotherapy**, and 27 (42%) patients had ≥ 2 regimens.

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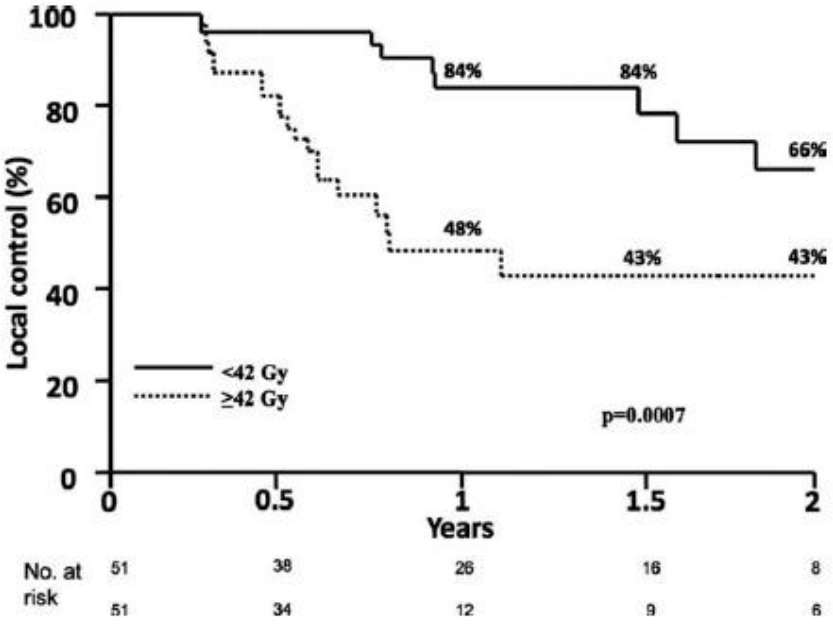

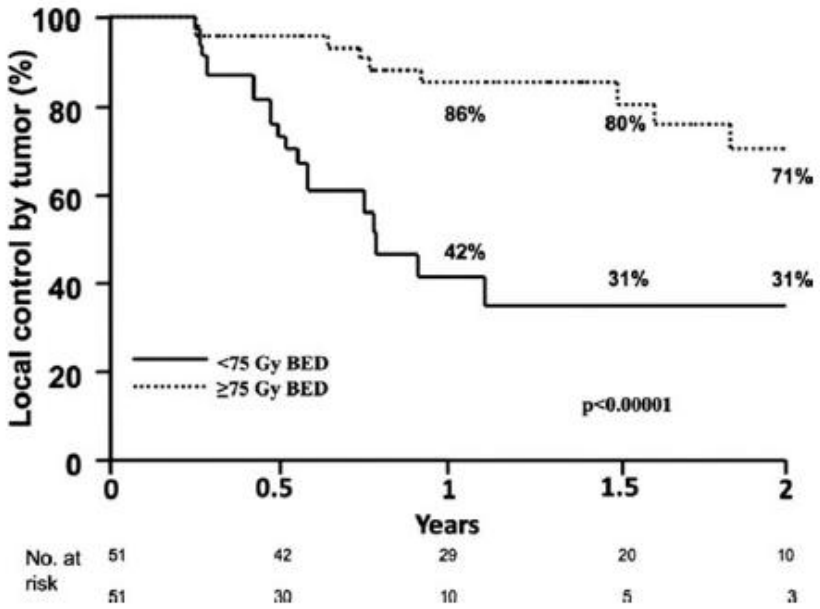

The median dose was 42 gray (Gy; range, 22-60 Gy). When evaluated separately by multivariate analysis, **total dose** (P ¼ .0015), **dose/fraction** (P ¼ .003), and **BED** (P ¼ .004) all **correlated with local control by lesion.**

For a 3-fraction regimen of stereotactic body radiotherapy, a **prescription dose of ≥ 48 Gy should be considered**, if normal tissue constraints allow.

Liver SBRT: our prospective study

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Is Stereotactic Body Radiation Therapy an Attractive Option for Unresectable Liver Metastases? A Preliminary Report From a Phase 2 Trial

Marta Scorsetti, MD,* Stefano Arcangeli, MD,* Angelo Tozzi, MD,* Tiziana Comito, MD,* Filippo Alongi, MD,* Pierina Navarria, MD,* Pietro Mancosu, MSc,* Giacomo Reggiori, MSc,* Antonella Fogliata, MSc,† Guido Torzilli, MD,† Stefano Tomatis, MSc,* and Luca Cozzi, PhD†

END POINTS:

PRIMARY: in-field local control

SECONDARY: toxicity and overall survival

INCLUSION CRITERIA:

- Inoperable or medically unsuitable for resection
- Maximum tumor diameter < 6cm
- ≤ 3 discrete lesions
- Performance status 0-2
- Good compliance to treatment

HUMANITAS EXPERIENCE 2010-2011
RapidArc - TrueBeam FFF

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Patients characteristics	Value
No. of patients	**61**
Age (y)	65 (range 39 – 87)
Sex (male:female)	26:35
Baseline KPS	> 90
Prior liver-directed therapy	46% (28 pts)
Primary site	29 Colon 11 Breast 7 Gyn 14 Other sites
Extrahepatic disease	34% (21 pts)

HUMANITAS EXPERIENCE 2010-2011
RapidArc - TrueBeam FFF

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Dose prescription	Lesions
Full dose 75 Gy	**62 (82 %)**
90%	**6 (8 %)**
80%	**4 (5 %)**
70%	**4 (5 %)**

Treatment charateristics	Value
No. of lesions	**76**
Diameter ≤ 3cm	45 (60%)
Diameter > 3cm	31 (40%)
No. of lesions per patient	1 for 48 pts (79%) 2 for 11 pts (18%) 3 for 2 pts (3%)

HUMANITAS EXPERIENCE: Local Control

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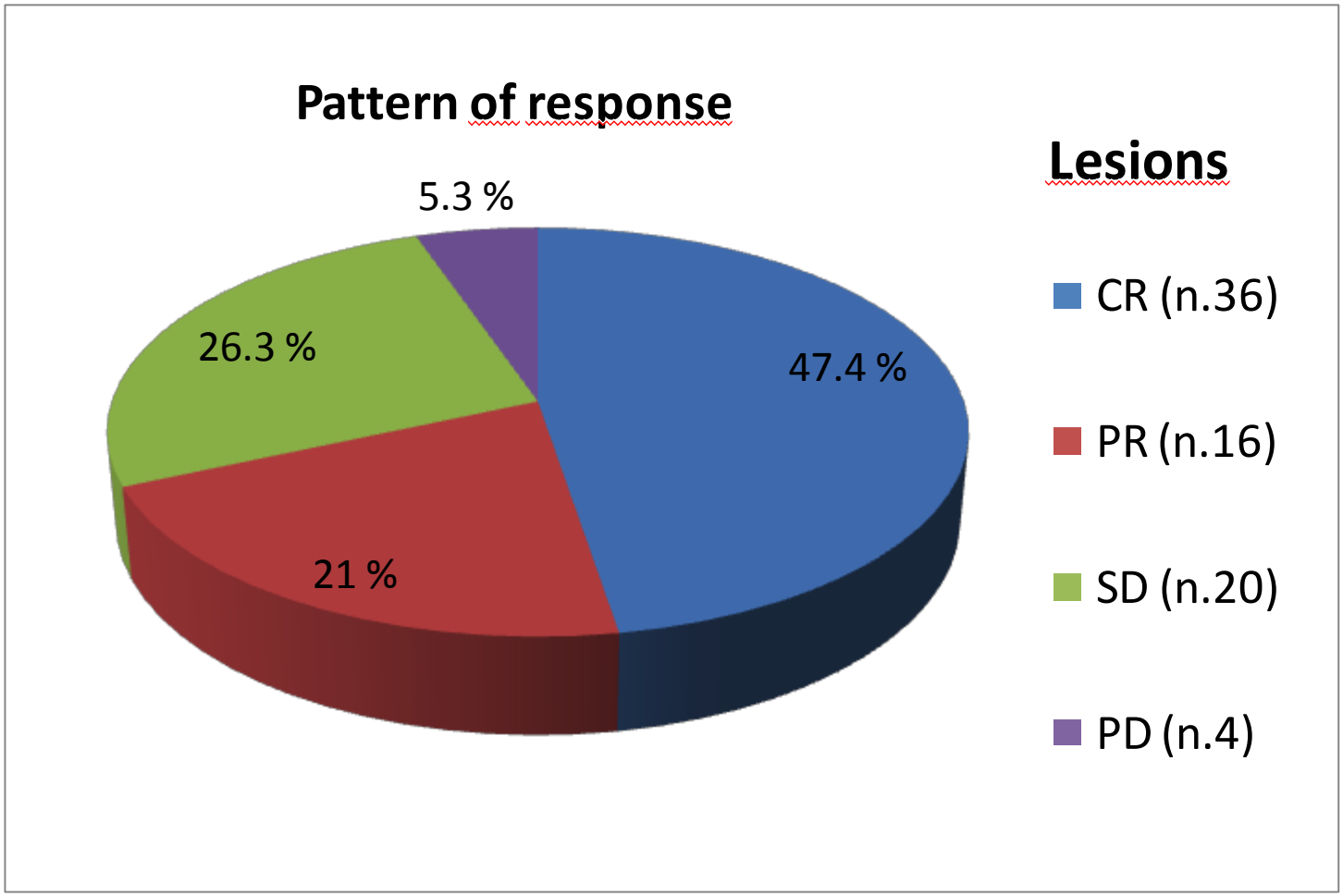
Median FU 12 months



HUMANITAS EXPERIENCE: Local Control

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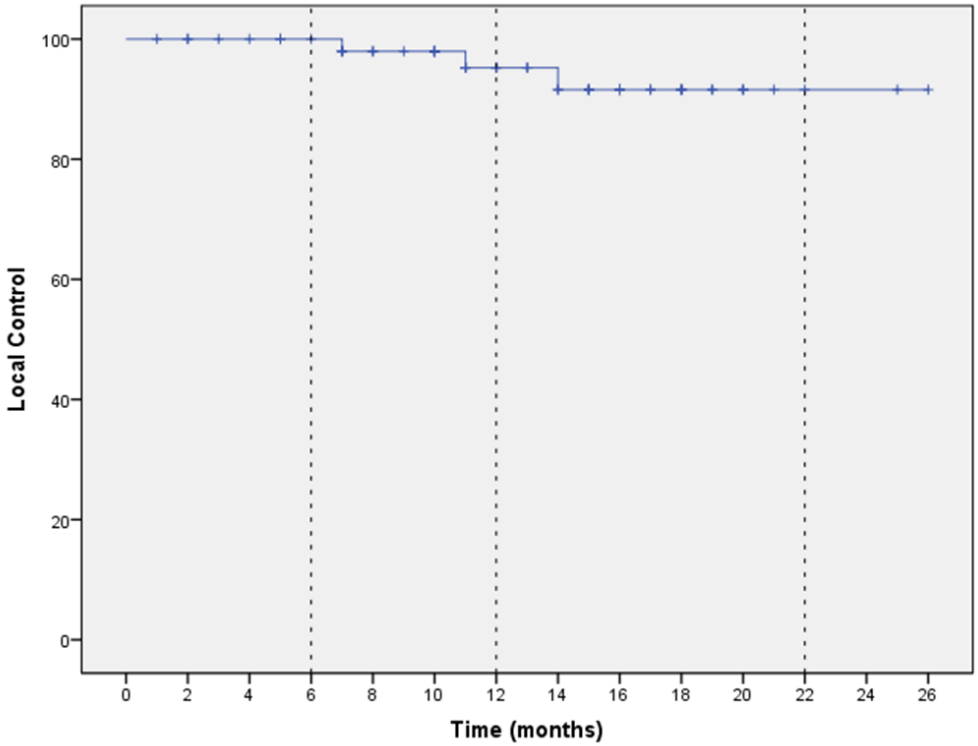
Median FU 12 months

Actuarial Local Control:

- **6 months=100%**
- **12 months=94%**
- **22 months =91%**



A subgroup analysis for lesions with diameter ≤ 3 cm compared with those > 3 cm revealed no statistical differences in local control rates (p=0.90)

HUMANITAS EXPERIENCE:
Overall Survival

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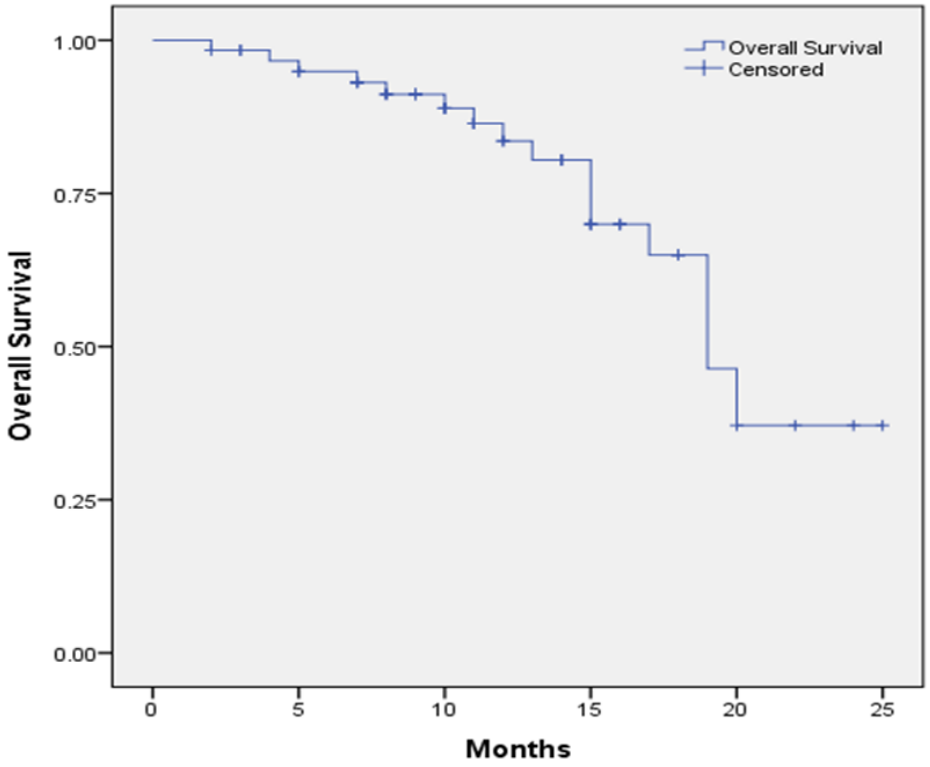
Actuarial OS

- **12 months= 84%**
- **18 months= 65%**



Median OS rate was 19 months

HUMANITAS EXPERIENCE:
Toxicity

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ACUTE TOXICITY:

- **G2 toxicity (vomiting, skin erythema and pain) 4%**
- **G2 transient transaminase increase 26%**
- **No G3-G4 or G5 toxicity observed**

LATE TOXICITY:

One case of G3 chronic chest wall pain

NO RILD

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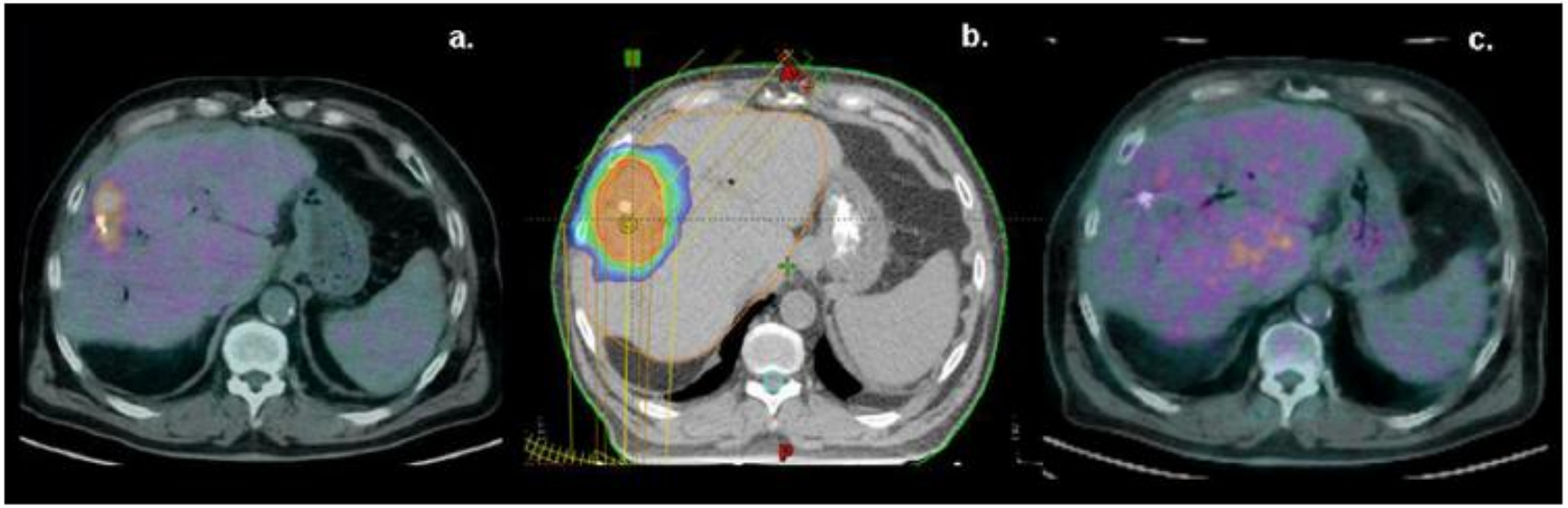

Fig. 2. Patient treated with stereotactic body radiation therapy for recurrence of liver metastasis after surgery. (a) Positron emission tomography (PET)—computed tomography (CT) pretreatment image showing the lesion in the region of the surgical bed, defined by metal surgical clips. (b) Visualization of dose distribution on the planning target volume. (c) PET-CT image at 3 months after radiation therapy, showing complete metabolic response.

CONCLUSIONS: SBRT for unresectable liver metastases can be considered an **effective, safe**, and **non-invasive** therapeutic option, with **excellent rates of local control** and a **low treatment-related toxicity.**

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Survival Efficacy Following Stereotactic Body Radiation Therapy for Limited Liver Metastases

B. Goodman, C. Calley, M. Maluccio, P. Helft, E. Chiorean, and H. Cardenes; *Indiana University, Indianapolis, IN*

Materials/Methods: 64 patients with 79 metastatic liver lesions were treated with SBRT at Indiana University. Eligible patients had either a **solitary tumor 6 cm or less** in diameter **or up to three lesions with the sum of diameters being less than or equal to 6 cm.**

The sites included: Colorectal (CRC) 66%, Non-colorectal gastrointestinal 14%, Breast 6%, Ovarian 5%, NSCLC 3%, and other 6%.

The mean GTV size was 37.3 (cc) (range, 3.4-144.8 cc). **The median dose was 5400 (cGy) (range, 3000-6000 cGy).**

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Results: The **median follow-up was 24.1 months**. The Kaplan-Meier estimate of **overall survival** for the entire series at **1, 2, and 3 years was 89%, 65%, and 41.1%**, respectively.

The **median survival** for the entire series was **33.6 months**.

The local control rate for the entire series was 94.2% with Kaplan-Meier estimate local control rates at 1, 2, and 3 years being 96.1%, 87.9%, and 87.9%, respectively.

The median progression-free survival for the entire series was 6.9 months.

Toxicities associated with treatment were mostly grade 1-2 with no grade 3 toxicity. There were two grade 4 toxicities and only one grade 5 toxicity.

Conclusions: **Stereotactic body radiation therapy is an effective treatment option for patients with hepatic oligometastases with a limited toxicity profile.**

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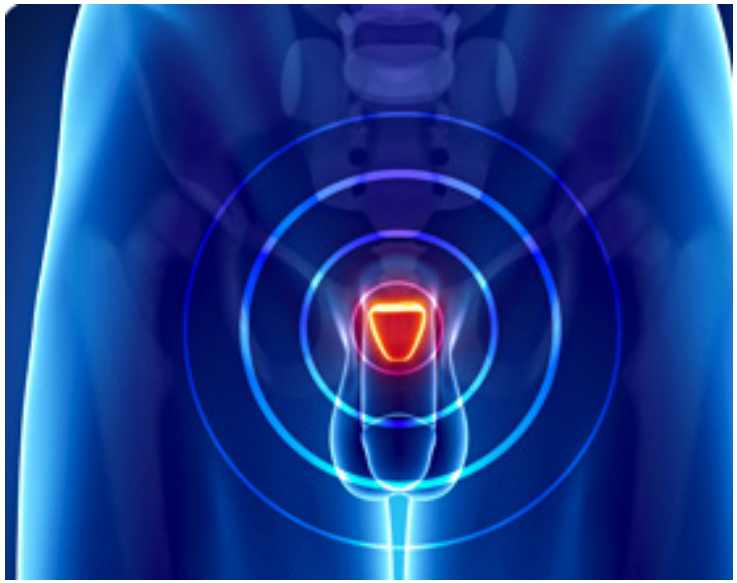

Prostate Tumor: SBRT

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Initial experience with stereotactic body radiation therapy for localized prostate cancer using helical tomotherapy

V. A. Macias · M. L. Blanco · L. A. Perez-Romasanta

8 fractions of 5.48 Gy (LR) or 5.65 Gy (IR, HR) on alternate days.

RADIATION ONCOLOGY

RESEARCH Open Access

Stereotactic Body Radiation Therapy (SBRT) for clinically localized prostate cancer: the Georgetown University experience

Leonard N Chen[1†], Simeng Suy[1†], Sunghae Uhm[1], Eric K Oermann[1], Andrew W Ju[1], Viola Chen[1], Heather N Hanscom[1], Sarah Laing[1], Joy S Kim[1], Siyuan Lei[1], Gerald P Batipps[2], Keith Kowalczyk[2], Gaurav Bandi[2], John Pahira[2], Kevin G McGeagh[2], Brian T Collins[1], Pranay Krishnan[3], Nancy A Dawson[4], Kathryn L Taylor[4], Anatoly Dritschilo[1], John H Lynch[2] and Sean P Collins[1*]

35 Gy in 5 fractions and 36.25 Gy in 5 fractions

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2013

RADIATION ONCOLOGY

RESEARCH Open Access

Stereotactic body radiotherapy for localized prostate cancer: disease control and quality of life at 6 years

Alan J Katz[1*], Michael Santoro[1], Fred Diblasio[2] and Richard Ashley[3]

Background: Stereotactic body radiotherapy (SBRT) may yield disease control for prostate cancer in a brief, hypofractionated treatment regimen without increasing treatment toxicity. Our report presents a **6-year update from 304 low- (n = 211), intermediate- (n = 81), and high-risk (n = 12) prostate cancer patients** who received CyberKnife SBRT.

Methods: The first 50 patients received a total dose of **35 Gy in 5 fractions of 7 Gy**. The subsequent 254 patients received a total dose of **36.25 Gy in 5 fractions of 7.25** Gy.

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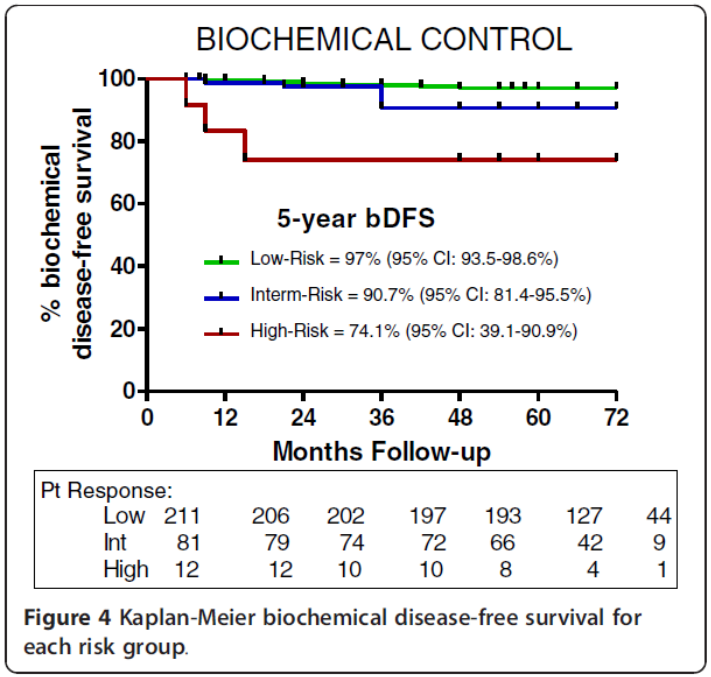

Figure 4 Kaplan-Meier biochemical disease-free survival for each risk group.

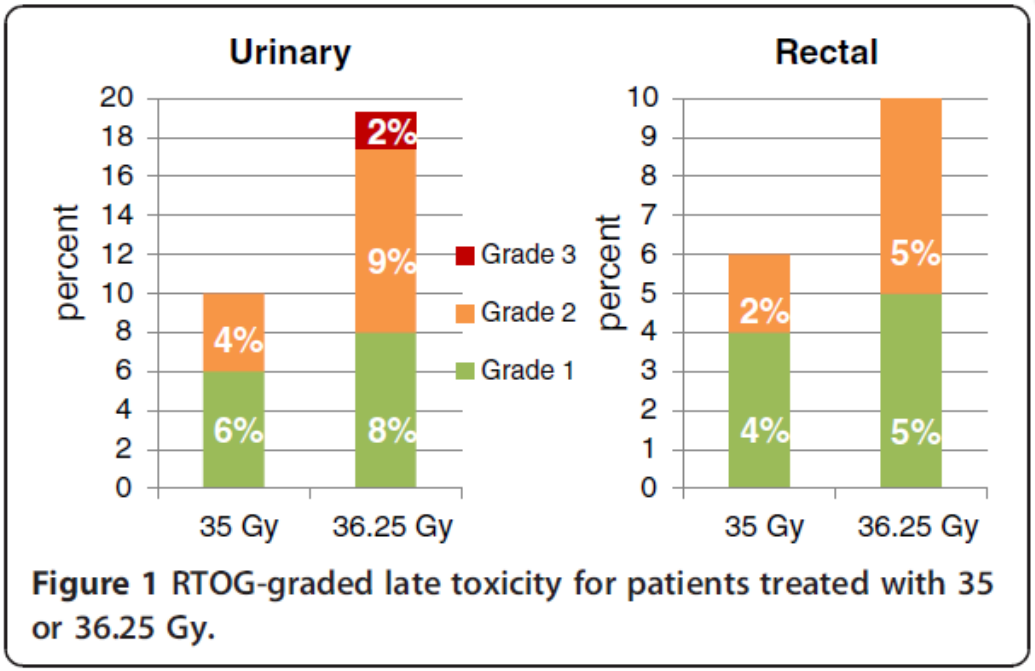

Figure 1 RTOG-graded late toxicity for patients treated with 35 or 36.25 Gy.

Conclusions: In this large series with long-term follow-up, we found **excellent biochemical control rates and low and acceptable toxicity**, outcomes consistent with those reported for from high dose rate brachytherapy (HDR BT).

Provided that measures are taken to account for prostate motion, **SBRT's distinct advantages over HDR BT** include its **non invasiveness and delivery to patients without anesthesia or hospitalization.**

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Alongi *et al. Radiation Oncology* 2013, **8**:171
http://www.ro-journal.com/content/8/1/171

RADIATION ONCOLOGY

Published on June 2013

RESEARCH Open Access

Linac based SBRT for prostate cancer in 5 fractions with VMAT and flattening filter free beams: preliminary report of a phase II study

Filippo Alongi[1,4*], Luca Cozzi[2], Stefano Arcangeli[1], Cristina Iftode[1], Tiziana Comito[1], Elisa Villa[1], Francesca Lobefalo[1], Pierina Navarria[1], Giacomo Reggiori[1], Pietro Mancosu[1], Elena Clerici[1], Antonella Fogliata[2], Stefano Tomatis[1], Gianluigi Taverna[3], Pierpaolo Graziotti[3] and Marta Scorsetti[1]

The first 40 patients analysis

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PATIENTS CHARACTERISTICS (40 pts):

N. of patients	40
Recruitment	From Feb 2012
Median Age [year]	70 [56, 80]
Median Initial PSA [ng/mL]	6.25 [0.50, 13.43]
Median Gleason Score	6 [6, 7]
NCCN Low Risk Class	26
NCCN Intermediate Risk Class	14
Median F-UP [months]	11[5-16]
N. of patients with SpaceOAR ™	8

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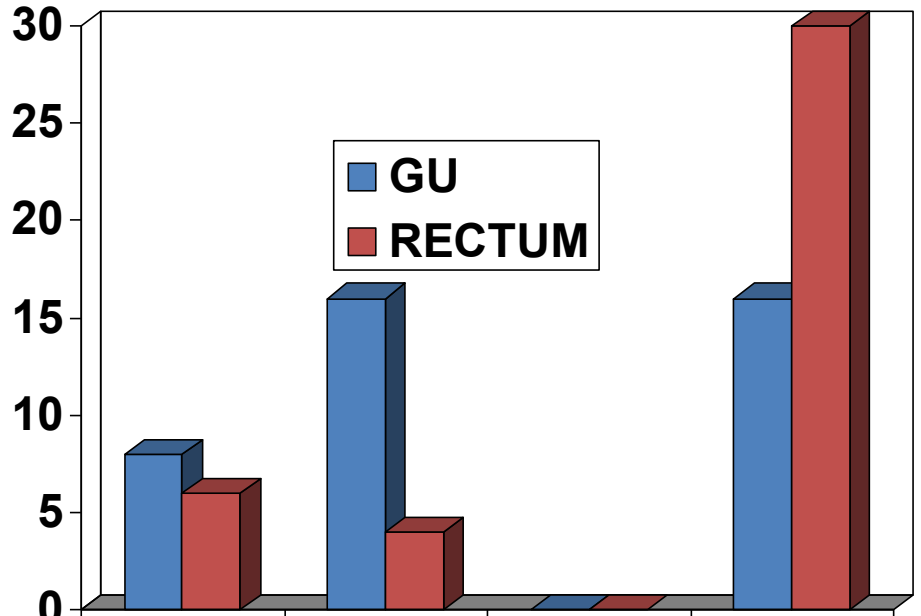
PRELIMINARY RESULTS (40 pts):

Acute Toxicity

- Dose: 35 Gy in 5 fractions
- Median follow-up: 11 months
- SpaceOAR: 8 pts



	G1	G2	G3	G0
GU	8	16	0	16
RECTUM	6	4	0	30

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