



STEREOTACTIC RADIOTHERAPY REIRRADIATION
FOR RECURRENT HGG:
A RETROSPECTIVE ANALYSIS.

Valentina Pinzi



**STEREOTACTIC RADIOTHERAPY REIRRADIATION
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A RETROSPECTIVE ANALYSIS.**

PRIMARY AIM

To evaluate the efficacy of reirradiation

In terms of overall survival

for recurrent high-grade gliomas

STEREOTACTIC RADIOTHERAPY REIRRADIATION FOR RECURRENT HGG: A RETROSPECTIVE ANALYSIS.

PATIENTS AND TREATMENTS

INCLUSION CRITERIA

Radiological diagnosis

KPS: 70 – 100

Time from first RT: 6 months at least

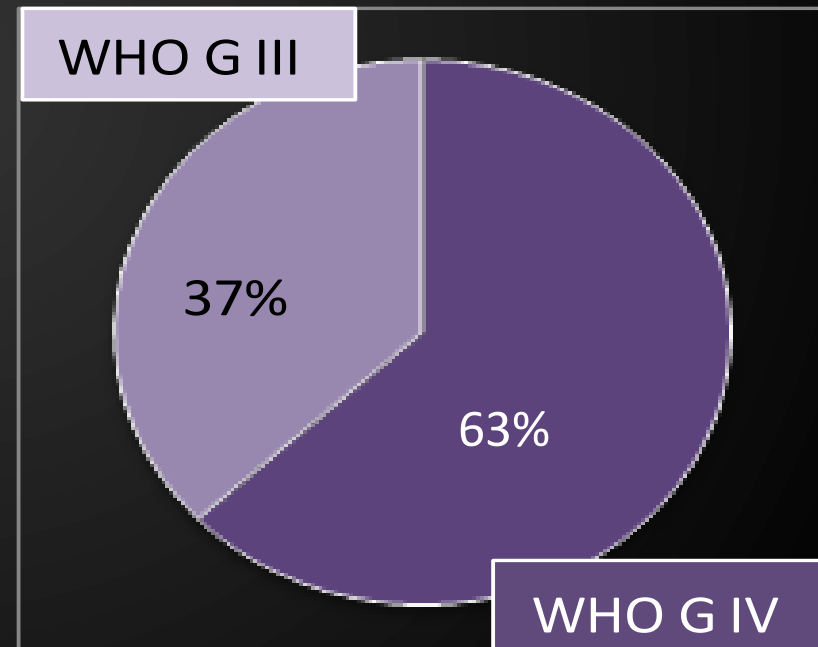
Max Diameter: 5 cm.

POPULATION

Patients: 128

Lesions: 158

Mean Age: 52 (18-84) years



**STEREOTACTIC RADIOTHERAPY REIRRADIATION
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PATIENTS AND TREATMENTS

1° RT:
3D-CRT (56-60Gy)



All patients
n. 128

1° - 2° RT interval:
range 6 - 157
months
median 12 months

2° RT:
CYBERKNIFE
STEREOTACTIC RT



FSRT
96 lesions

SRS
62 lesions

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PATIENTS AND TREATMENTS

Before Reirradiation:

Surgery 20 pts (16%)

Salvage chemotherapy 60 pts (47%)

After Reirradiation:

Surgery 17 pts (13%)

Salvage chemotherapy 29 pts (23%)

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PATIENTS AND TREATMENTS

REIRRADIATION

InField lesions: 74%

OutField lesions: 26%

N. OF TREATMENT

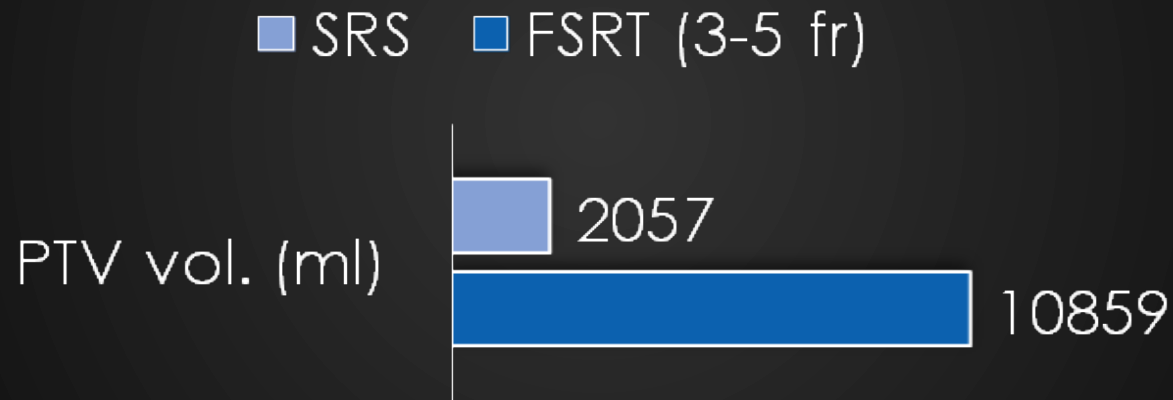
1 Time: 96 pts

2 Times: 25 pts

3 Times: 4 pts

**STEREOTACTIC RADIOTHERAPY REIRRADIATION
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DESCRIPTIVE ANALYSIS



Corresponding to
Near 1.5 and 3 cm
of diameter respectively

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DESCRIPTIVE ANALYSIS



SRS range 6-22 Gy
FSRT range 12-28 Gy in 2 to 5 fractions

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RESULTS

At time of analysis:

92 pts died for tumor progression

26 pts were alive

OS FROM FIRST DIAGNOSIS

32 months
(95% CI, range 25 - 43 months)

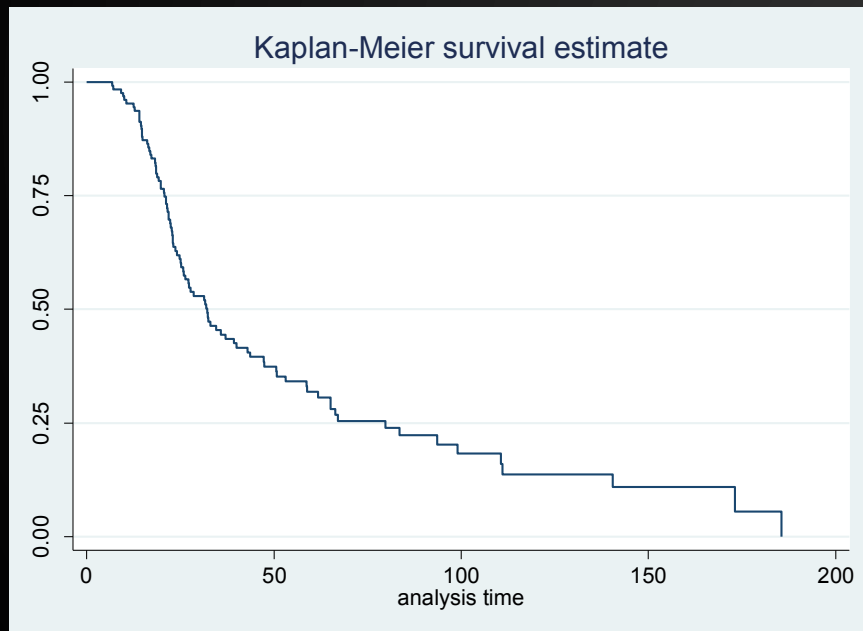
OS FROM REIRRADIATION

11,5 months
(95% CI, range 10-13 months)

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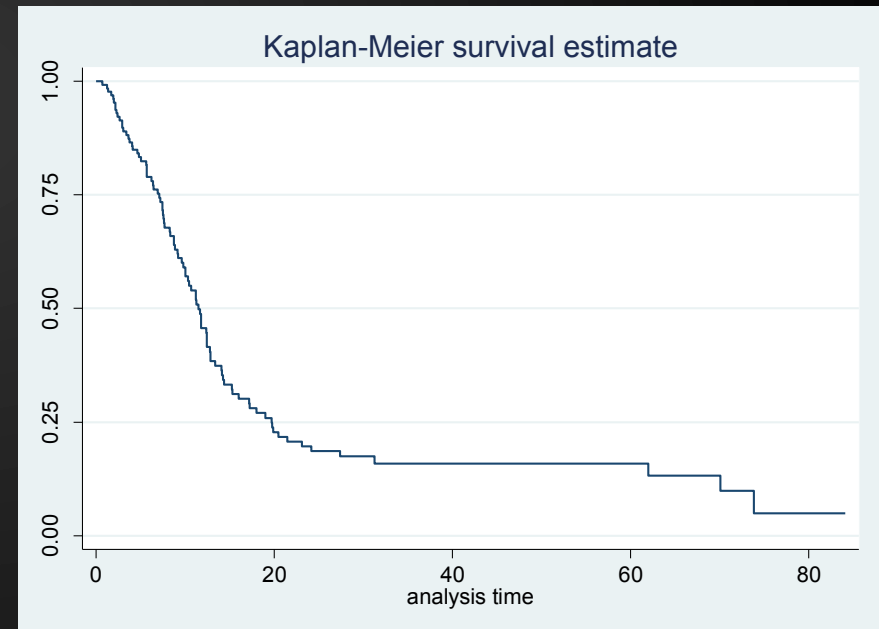
RESULTS

OS FROM FIRST DIAGNOSIS



32 months
(95% CI, range 25 - 43 months)

OS FROM REIRRADIATION

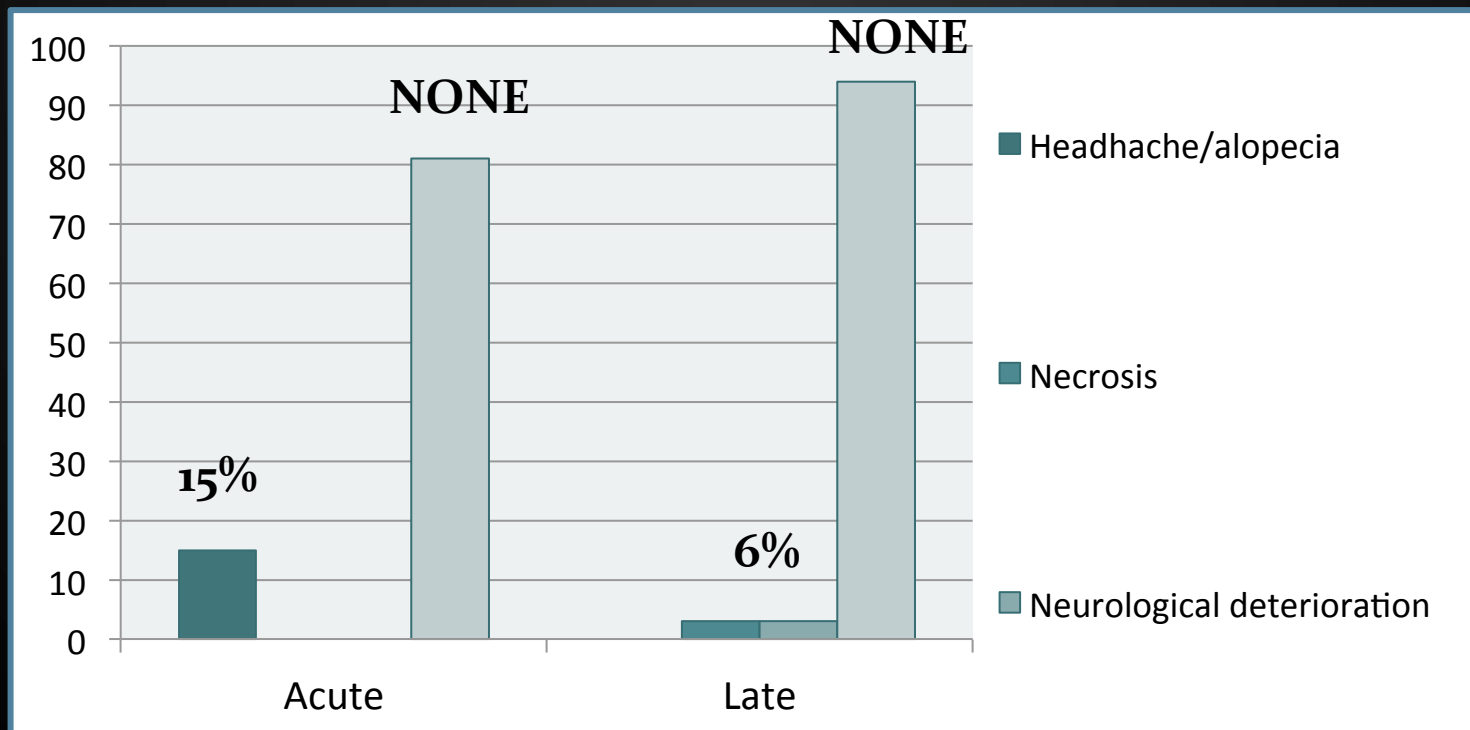


11,5 months
(95% CI, range 10-13 months)

STEREOTACTIC RADIOTHERAPY REIRRADIATION FOR RECURRENT HGG: A RETROSPECTIVE ANALYSIS.

RESULTS

TOXICITY



**STEREOTACTIC RADIOTHERAPY REIRRADIATION
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STATISTICAL ANALYSIS

SVV from Reirradiation

Univar. Analysis

Age < 40 aa
(p 0.046)

Non-GBM histology
(p 0.010)

Other treatment after FSRT/SRS
(p 0.030)

SVV from Reirradiation

Multiv. Analysis

Other treatment after FSRT/SRS
(p 0.043)

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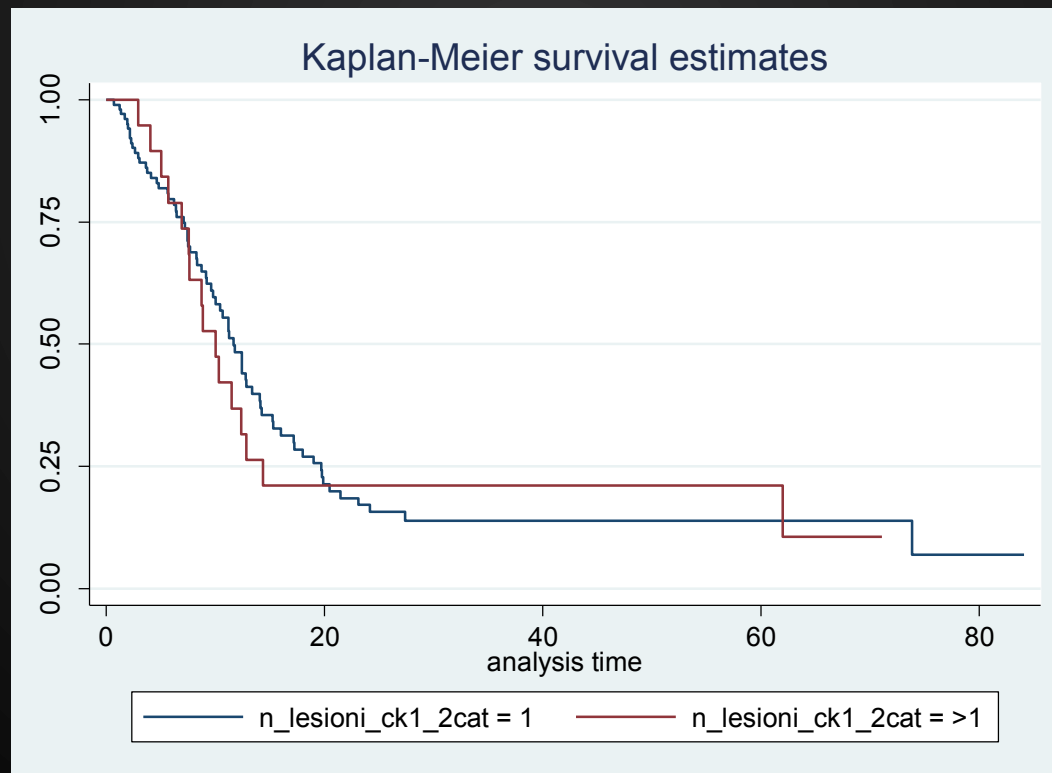
STATISTICAL ANALYSIS

Multivariate analysis
OS from SRS
NOT SIGNIFICANT

Younger age at SRS
Non GBM histology
Volume of lesions
N. Of treated lesions (1 vs >1)
TMZ therapy at first RT course
Sex, age, side, SRS dose

STEREOTACTIC RADIOTHERAPY REIRRADIATION FOR RECURRENT HGG: A RETROSPECTIVE ANALYSIS.

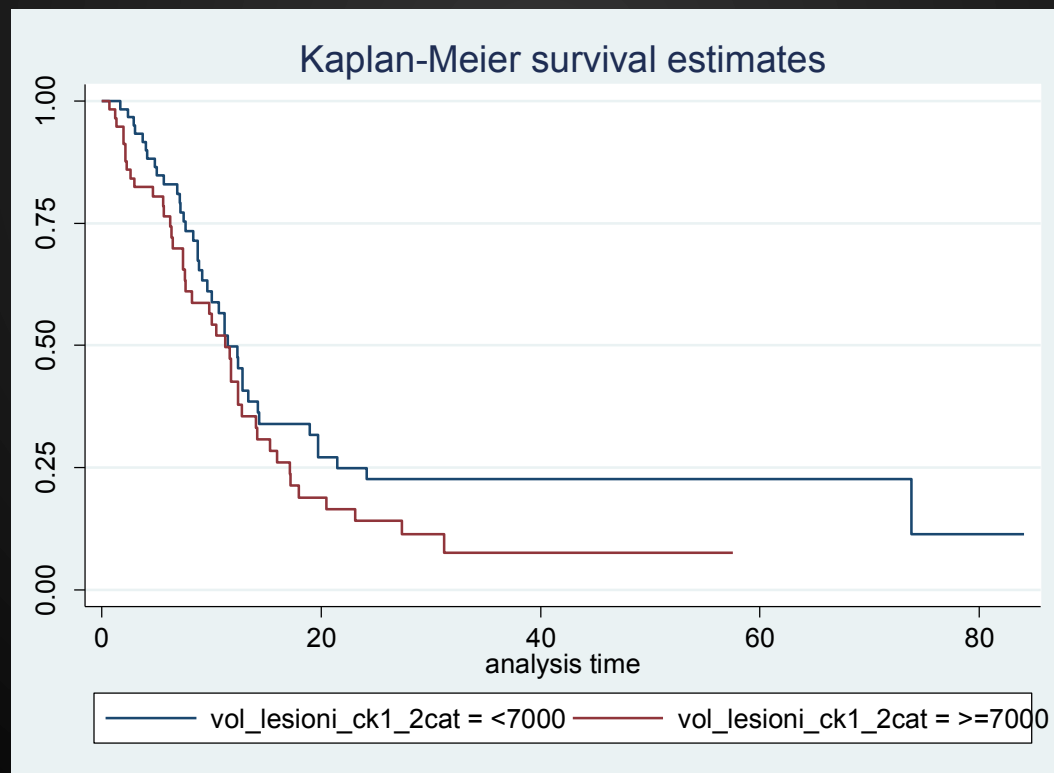
OS FROM REIRRADIATION
N. OF LESIONS



$p = 0.79$

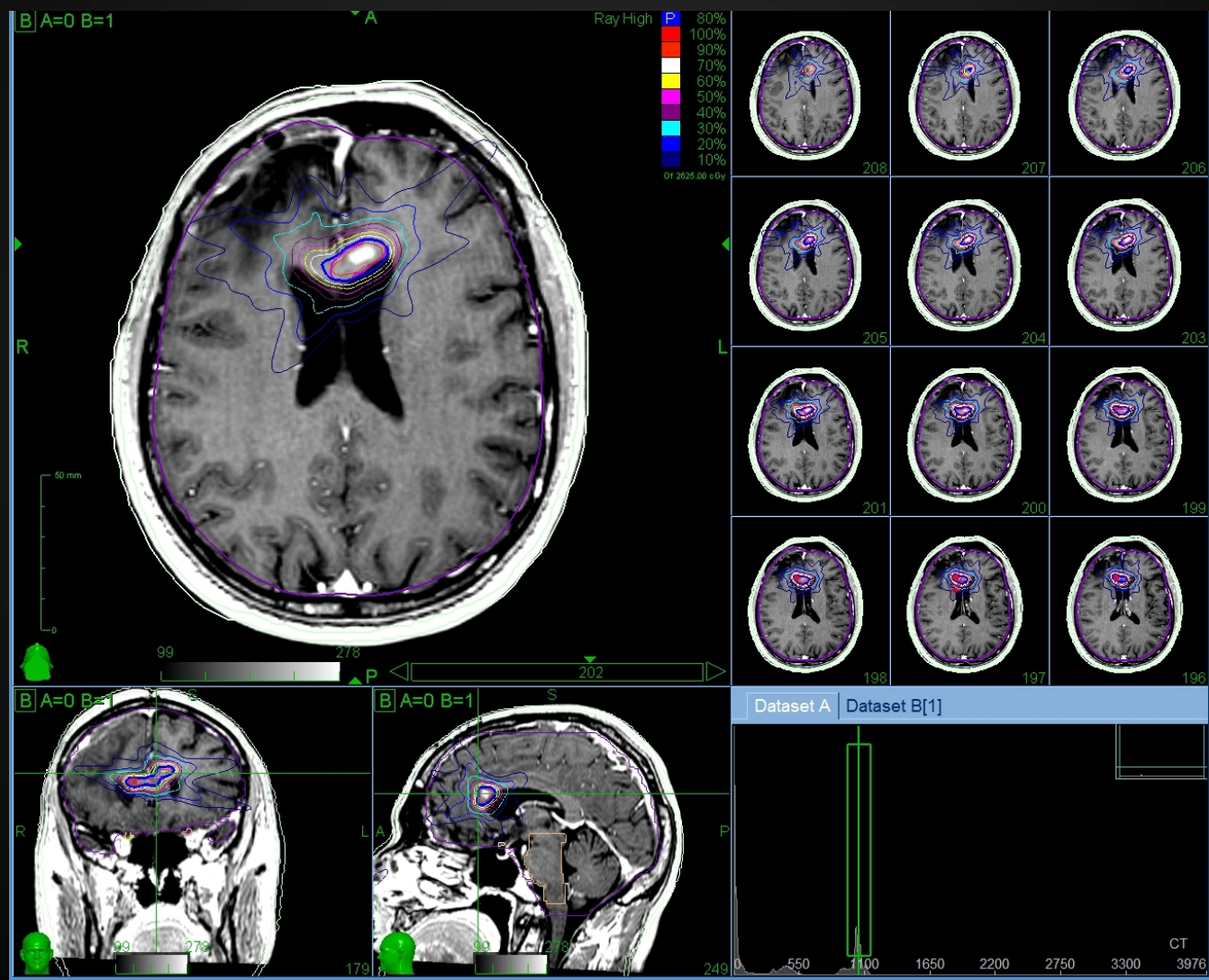
STEREOTACTIC RADIOTHERAPY REIRRADIATION FOR RECURRENT HGG: A RETROSPECTIVE ANALYSIS.

OS FROM REIRRADIATION
VOLUME OF OF LESIONS



p= 0.13

STEREOTACTIC RADIOTHERAPY REIRRADIATION FOR RECURRENT HGG: A RETROSPECTIVE ANALYSIS.



CLINICAL INVESTIGATION

Brain

REIRRADIATION TOLERANCE OF THE HUMAN BRAIN

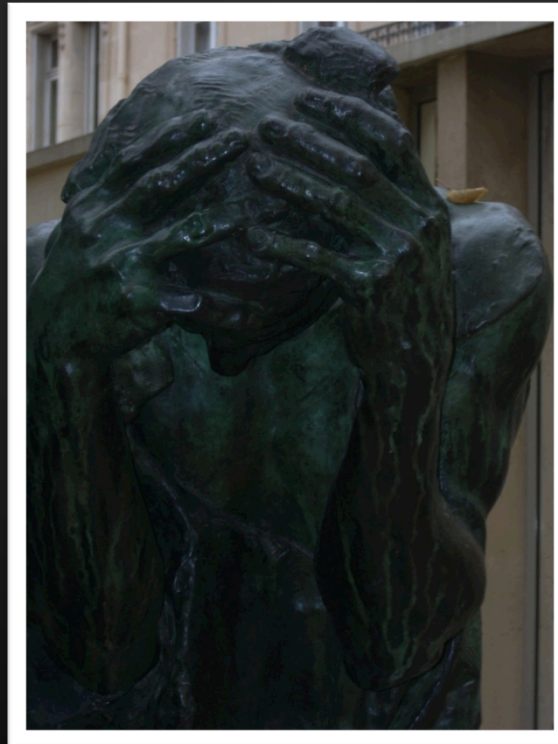
RAMONA MAYER, M.D., M.Sc.,* AND PETER SMINIA, Ph.D.†

Table 1. Clinical data on brain reirradiation by conventional radiotherapy: Physical dose, biologically effective dose (BED), normalized total dose in 2-Gy fractions (NTD), survival, and toxicity

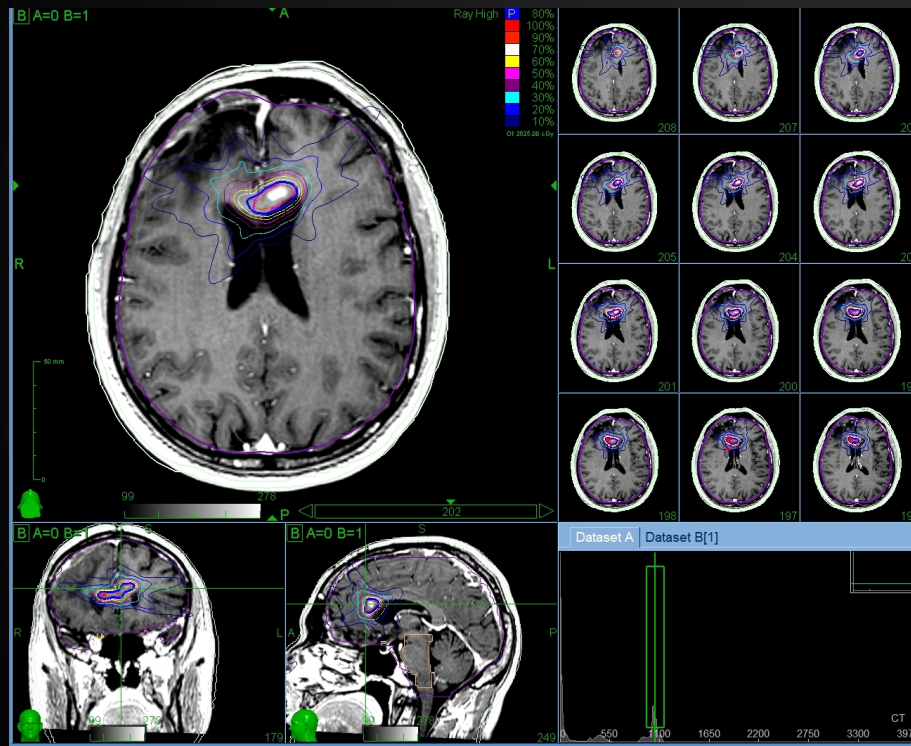
Authors (Reference)	n/Grade	First course		Interval (mo)	Reirradiation		Cumulative BED ₂ (Gy)	NTD (Gy)	Survival (mo)	Toxicity	
		Dose	BED ₂ (Gy)		Dose	BED ₂ (Gy)				Acute	Late
Kim <i>et al.</i> (17)	7 GM	59.4	112.9	38	36	68.4	181.3	90.7	9	Not severe	Not severe
	13 AA/LG	1.8			1.8						
Hayat <i>et al.</i> (18)	21 Glioma	45	95.6	31	30	67.5	163.1	81.6	22	Not severe	NA
		2.25			2.5						
Arcicasa <i>et al.</i> (19)	24 HG	60	120	14	34.5	60.4	180.4	90.2	13.7	Not severe	NA
		2			1.5					<i>n</i> = 4 Grade 3/4	
Nieder <i>et al.</i> (14)	21 GM	58.5	96.5	20	45.5 (<i>n</i> = 19)	75.1	171.6	85.8	8.5	9% Neurologic toxicity	6% Necrosis
	11 AA/other	1.3 (bid)			1.3 (b.i.d.)						
					45 (<i>n</i> = 13)	78.8	175.3	87.7			
					1.5 (b.i.d.)						
Veninga <i>et al.</i> (20)	29 Astrocytoma	50-60	109.9	33	46	92	197.5	98.8	6.9	1 Severe edema	1 Clinical necrosis
	10 OD	2	103.8	55	2	102.5	203.8	101.9	27.5		1 Cognitive decline
											Cumulative BED ₂ >204 Gy !!

Abbreviations: AA = anaplastic astrocytoma; GM = glioblastoma multiforme; NS = not stated.

**no cases of necrosis when
the total radiation dose was < 100 Gy
(NTD₂)**



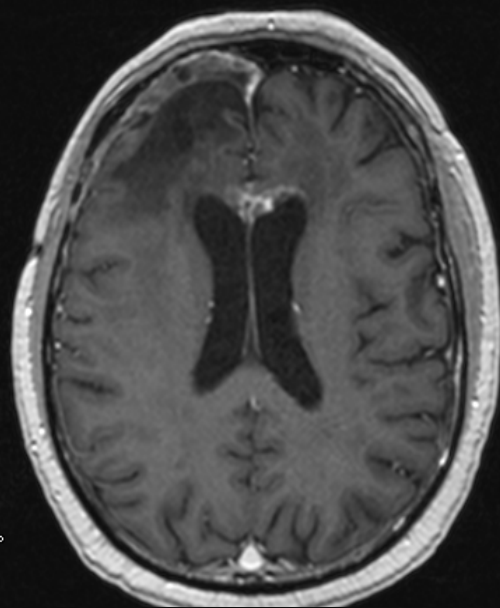
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$$\text{BED}(\alpha/\beta_2) = 220 \text{ Gy}$$
$$\text{BED}(\alpha/\beta_{9,3}) = 106 \text{ Gy}$$
$$\text{NTD} = 146 \text{ Gy}$$

20 months POST RE-RT

PRE REIRRADIATION

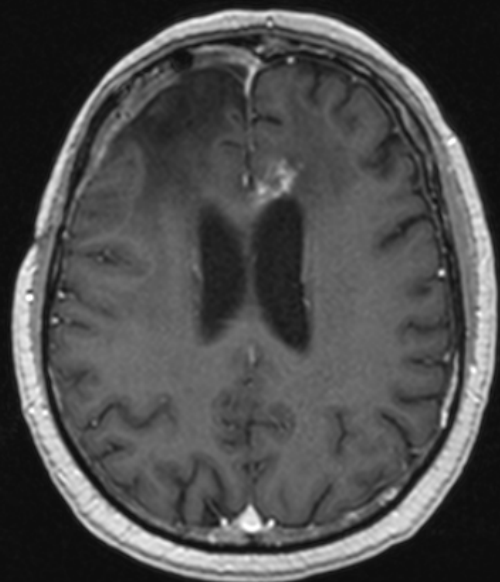
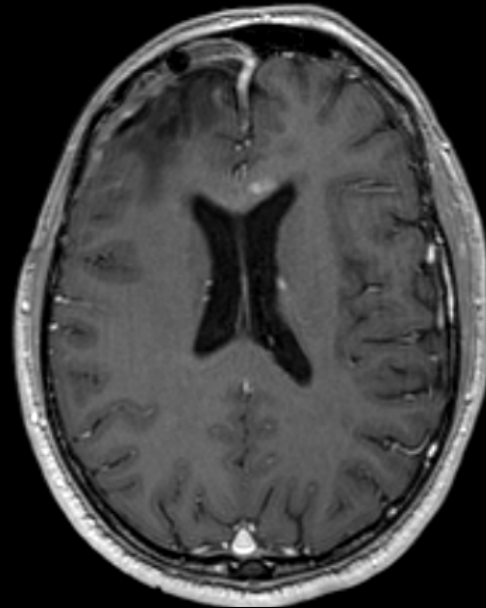


L: 0406
W: 0901

10 cm

R

Flip Angle: 25°
SE: GR
TE: 4.028 ms

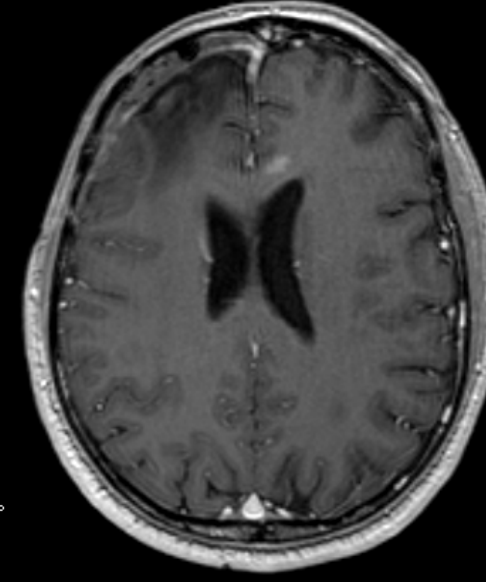


L: 0401
W: 0891

10 cm

R

Flip Angle: 25°
SE: GR
TE: 4.028 ms
TR: 25 ms



CONCLUSION

Salvage stereotactic reirradiation

is an effective

and well tolerated treatment

for recurrent HGG.

Outcomes in patients with glioblastoma who survive after the development of radionecrosis may actually be more favorable than in those who do not develop this complications.

Gutin PH, Floyd NS, Forsyth PA





GRAZIE PER L'ATTENZIONE!