SERVIZIO SANITARIO REGIONALE
EMILIA-ROMAGNA
Azienda Ospedaliera di Reggio Emilia
Arcispedale S. Maria Nuova
Istituto in tecnologie avanzate e modelli assistenziali in oncologia
Istituto di Ricovero e Cura a Carattere Scientifico

Hypofractionated stereotactic radiation therapy for recurrent glioblastoma: a mono-institutional experience

Radiation Oncology Unit,
ASMN-IRCCS Reggio Emilia
Dr. Nicola Simoni

Purpose

SERVIZIO SANITARIO REGIONALE
EMILIA-ROMAGNA
Azienda Ospedaliera di Reggio Emilia
Arcispedale S. Maria Nuova
Istituto in tecnologie avanzate e modelli assistenziali in oncologia
Istituto di Ricovero e Cura a Carattere Scientifico

Our retrospective analysis focused on the efficacy and toxicity of a hypofractionated stereotactic radiotherapy for recurrent GBM

Between 2007 and 2012 91 patients with newly diagnosed GBM were treated with standard chemoradiation therapy according to Stupp protocol

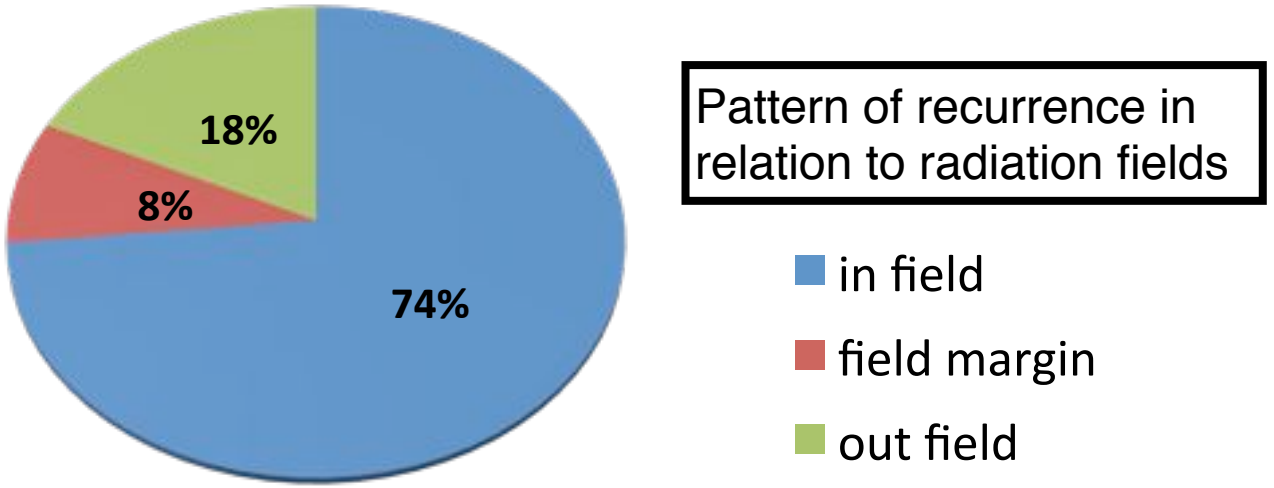
83 patients evaluated for recurrence

Recurrence

SERVIZIO SANITARIO REGIONALE
EMILIA-ROMAGNA
Azienda Ospedaliera di Reggio Emilia
Arcispedale S. Maria Nuova
Istituto in tecnologie avanzate e modelli assistenziali in oncologia
Istituto di Ricovero e Cura a Carattere Scientifico

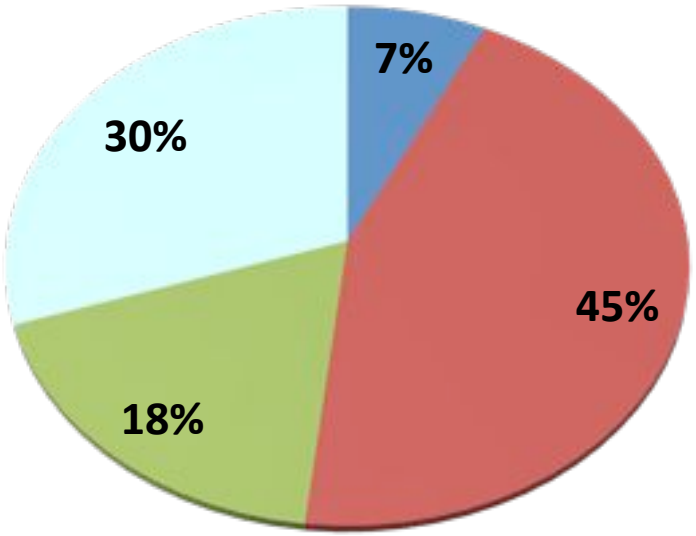
Diagnosis of tumor recurrence

- based on the joint opinion of the neuro-radiologist, neurosurgeon, radiation oncologist and neuro-oncologist
- defined as appearance of new contrast-enhanced lesion(s) on T1-weighted MRI or an increase of 25% or more of the volume of the initial enhanced lesion(s)



Managment

SERVIZIO SANITARIO REGIONALE
EMILIA-ROMAGNA
Azienda Ospedaliera di Reggio Emilia
Arcispedale S. Maria Nuova
Istituto in tecnologie avanzate e modelli assistenziali in oncologia
Istituto di Ricovero e Cura a Carattere Scientifico



- surgery
- second line chemoterapy
- re irradiation
- best supportive care

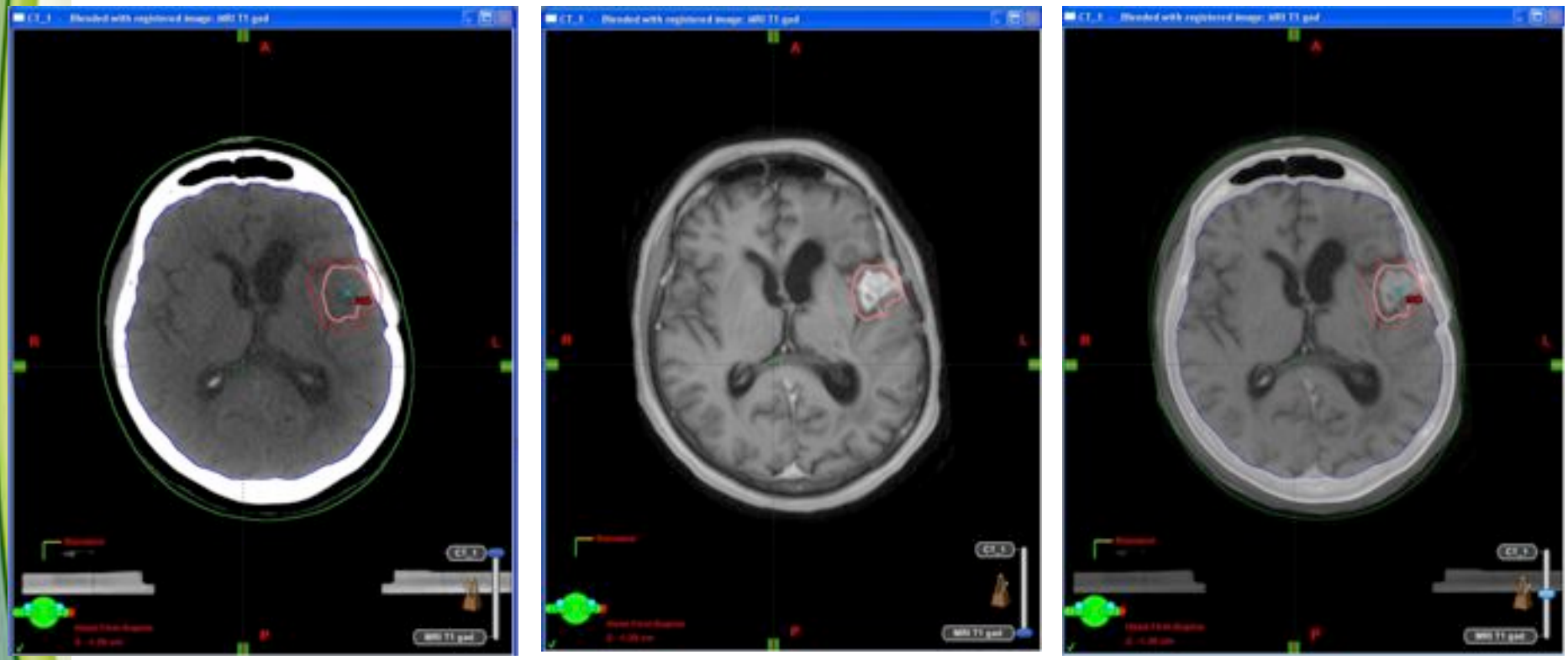
- 15 underwent salvage RT at recurrence

- indication: patient clinical condition (KPS > 70), lesion location and spread of disease (patients with multifocal spread of disease were excluded)

Re irradaiation protocol

SERVIZIO SANITARIO REGIONALE
EMILIA-ROMAGNA
Azienda Ospedaliera di Reggio Emilia
Arcispedale S. Maria Nuova
Istituto in tecnologie avanzate e modelli assistenziali in oncologia
Istituto di Ricovero e Cura a Carattere Scientifico

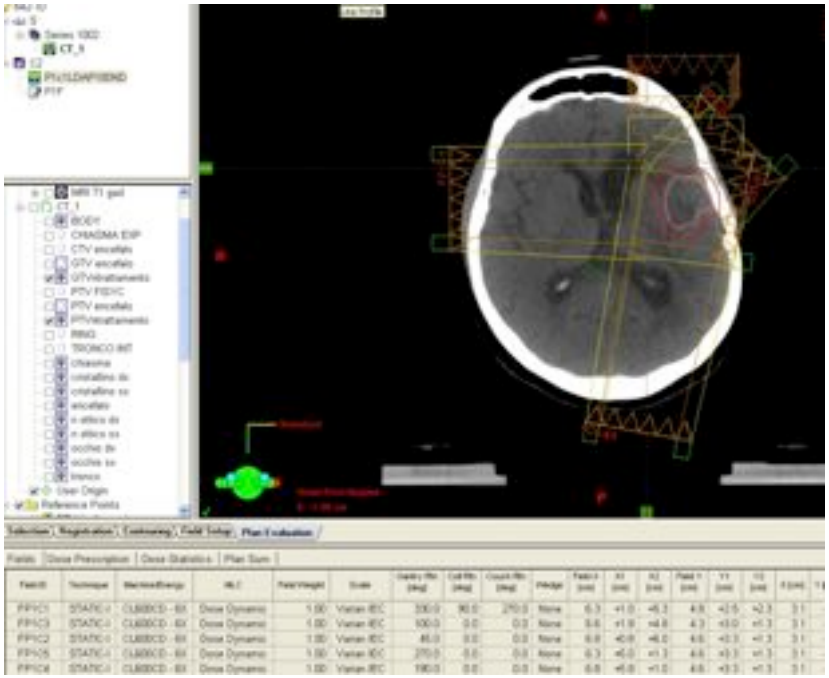
- immobilized in customized thermoplastic shells
- CT and MR simulation and co-registration of images
- GTV = contrast-enhancing tumor on T1-weighted MRI
- PTV = GTV + isotropic expansion 3–5 mm

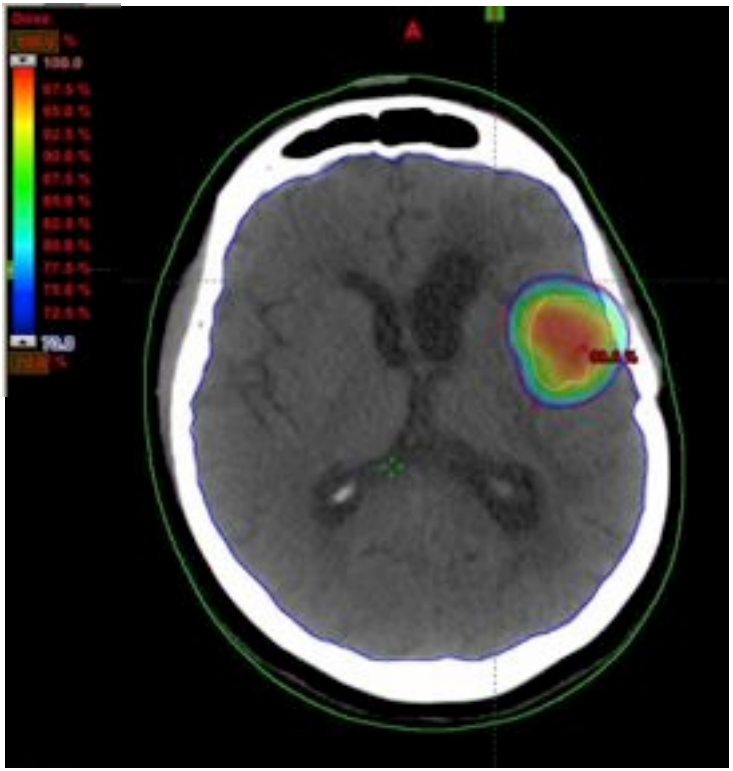


Planning

SERVIZIO SANITARIO REGIONALE
EMILIA-ROMAGNA
Azienda Ospedaliera di Reggio Emilia
Arcispedale S. Maria Nuova
Istituto in tecnologie avanzate e modelli assistenziali in oncologia
Istituto di Ricovero e Cura a Carattere Scientifico

- multiple no-coplanar beams using a standard 6-MV linear accelerator
- total dose 25 Gy prescribed to the 70% isodose
- delivered in 5 consecutive fractions
- daily pre-treatment verification with orthogonal fields





SERVIZIO SANITARIO REGIONALE
EMILIA-ROMAGNA
Azienda Ospedaliera di Reggio Emilia
Arcispedale S. Maria Nuova
Istituto in tecnologie avanzate e modelli assistenziali in oncologia
Istituto di Ricovero e Cura a Carattere Scientifico

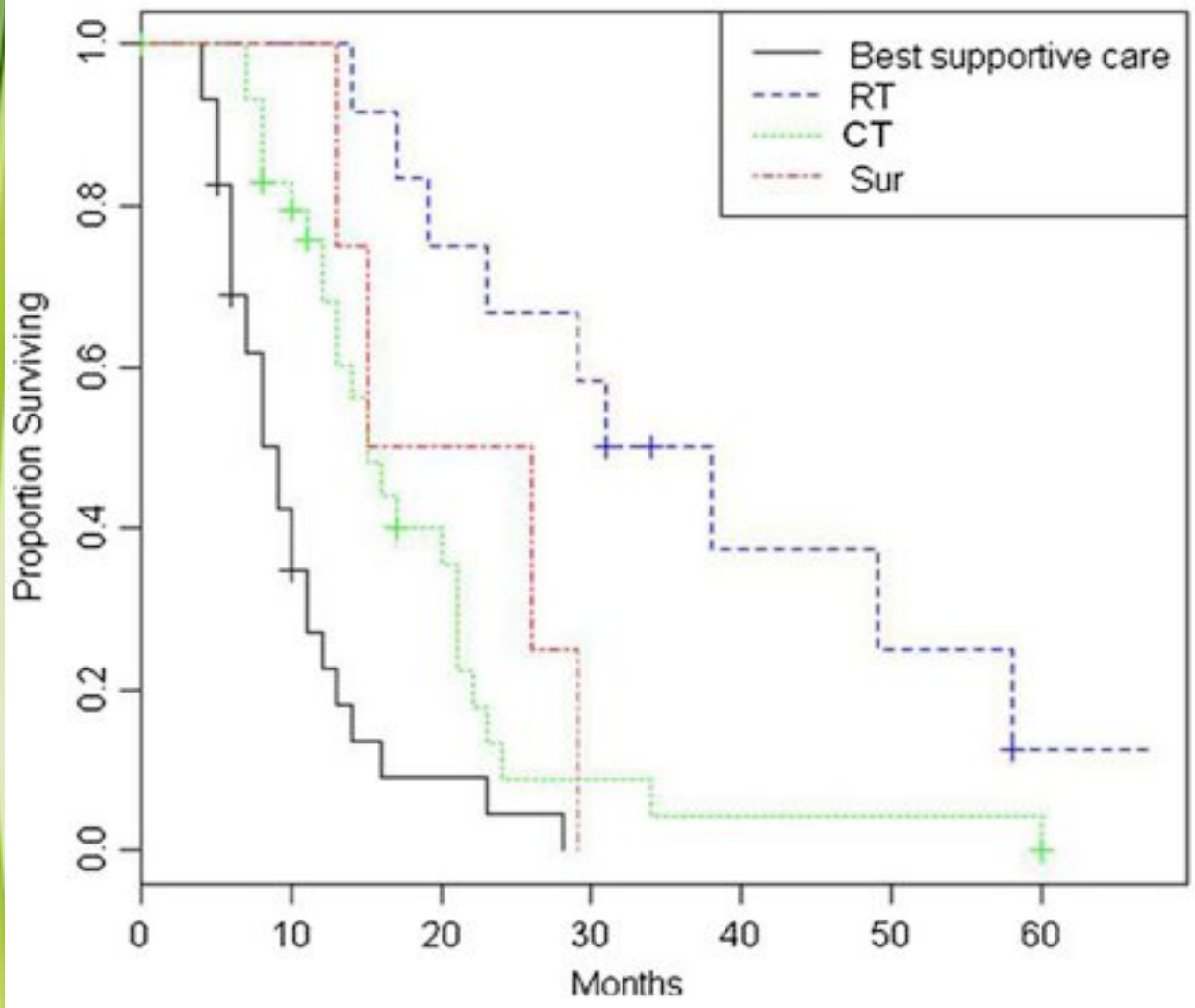
Results

- all patients were able to complete the prescribed treatment without interruption

- neurological deterioration occurred in two patients at 1 and 3 months after re-irradiation (managed successfully with dexamethasone)

Results

SERVIZIO SANITARIO REGIONALE
EMILIA-ROMAGNA
Azienda Ospedaliera di Reggio Emilia
Arcispedale S. Maria Nuova
Istituto in tecnologie avanzate e modelli assistenziali in oncologia
Istituto di Ricovero e Cura a Carattere Scientifico



Median OS from recurrence:

- 9.5 months for RT
- 5.5 months for CHT
- 2.5 months for best supportive care

SERVIZIO SANITARIO REGIONALE
EMILIA-ROMAGNA
Azienda Ospedaliera di Reggio Emilia
Arcispedale S. Maria Nuova
Istituto in tecnologie avanzate e modelli assistenziali in oncologia
Istituto di Ricovero e Cura a Carattere Scientifico

Results

• in all retreated patients the multivariate Cox proportional hazard analysis confirmed the negative prognostic effects on the OS of older age (HR 4.1; p=0,005) and biopsy alone (HR 4.5; p=0.01)

• no correlation was found between other analyzed factors and OS (sex, MGMT methylation, RPA class, primary tumor side and volume, KPS at diagnosis and recurrence)

• no correlation was found between OS and pattern of recurrence (“in field”, “marginal field”, “out field”)

Table 2 Survey of clinical outcomes after re-irradiation: fractionated stereotactic radiation therapy (FSRT), radiosurgery (SRS), brachytherapy (BT) of recurrent GBM

Authors	Patients (n)	Type of RT	Total dose/fractions	Outcomes from the re-irradiation
Cho *et al.* [30]	25	FSRT	Median dose of 37.5 Gy (range, 20-45 Gy) /2.5 Gy fractions (range, 1.8-3 Gy)	Median survival 12 months
Cho *et al.* [30]	46	SRS	Median total dose of 17 Gy delivered to the median of 50% isodose surface	Median survival 11 months
Combs *et al.* [31]	59	FSRT	36 Gy/2 Gy fractions	Median OS 8 months
				1-year survival rates 23%
				Median PFS 5 months
				1-year PFS 5%
Vordermark *et al.* [33]	19	FSRT	Median total dose 30 Gy (range, 20–30 Gy) /5 Gy fractions (range, 4–10 Gy)	Median OS 7.9 months
Simon *et al.* [49]	42	Iridium BT	50 Gy	Median OS 12.5 months
Chan *et al.* [50]	24	BT	53 Gy	Median OS 9.1 months
Larson *et al.* [51]	14	SRS	15 Gy/1 fraction	Median OS 9.5 months
Combs *et al.* [32]	32	SRS	15 Gy/1 fraction	Median OS 10 months
Shrieve *et al.* [52]	86	SRS	13 Gy/1 fraction	Median OS 10.2 months
Shrieve *et al.* [52]	32	BT	50 Gy	Median OS 11.5 months
Grosu *et al.* [53]	33	FSRT	30 Gy	Median OS 8 months (for astrocytomas and gliomas)
Kohshi *et al.* [54]	25	FSRT	22 Gy	Median OS 11 months
Ernst-Stecken *et al.* [55]	15	FSRT	35 Gy/7 Gy fractions	6 months PFS 75%
				12 months PFS 53%
Fokas *et al.* [56]	53	FSRT	Median dose 30 Gy (range 20-60 Gy)/ 3 Gy fractions (range 2-5 Gy)	Median OS 9 months
				1-year PFS 22%
				2-year PFS 5%
Henke *et al.* [57]	31 (2 grade III, 29 grade IV)	FSRT	Median total dose 20Gy (range, 20–25)/ 5 Gy fractions	Median OS 10.2 months,
Fogh *et al.* [58]	147 (42 grade III, 105 grade IV)	FSRT	Median dose 35 Gy in 3.5-Gy fractions	Median OS 11 months for grade III and 8 months for grade IV
Shepherd *et al.* [59]	29	FSRT	Median dose 35 Gy (range, 20–50 Gy)/ 5 Gy fractions	Median OS 10.7 months
Glass *et al.* [60]	20 (7 grade III, 13 grade IV)	FSRT	Median dose 38 Gy (range, 35–42 Gy)/ 3.5–6 Gy fractions	Median OS 12.7 months
Hudes *et al.* [61]	19	FSRT	Median dose 30 Gy (range, 24–35 Gy)/ 3–3.5 Gy fractions	Median OS 10.5 months
Lederman *et al.* [34]	88	FSRT	Total dose 18–36/ 4–9 Gy (weekly)	Median OS 7 months
Voynov *et al.* [62]	10 (5 WHO grade III, 5 grade IV)	FSRT	30 Gy /5 Gy fractions	Median OS 10.1 months

Ciammella et al. Rad Oncol 2013

Conclusion

SERVIZIO SANITARIO REGIONALE
EMILIA-ROMAGNA
Azienda Ospedaliera di Reggio Emilia
Arcispedale S. Maria Nuova
Istituto in tecnologie avanzate e modelli assistenziali in oncologia
Istituto di Ricovero e Cura a Carattere Scientifico

Our study shows that hypo-fractionated stereotactic radiation therapy is effective and safe in recurrent GBM after conventional chemo-radiation treatment

Anyway, until prospective randomized trial will confirm these results, the decisions for salvage re-irradiation should be based on multidisciplinary evaluation and personalized on the patient

Thank you

for your attention