



XXXII CONGRESSO NAZIONALE AIRO
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AIRO2022

Radioterapia di precisione per un'oncologia innovativa e sostenibile

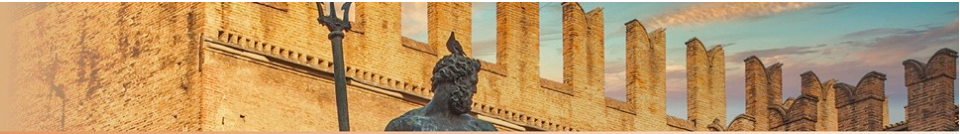
BOLOGNA, 25-27 NOVEMBRE
PALAZZO DEI CONGRESSI

WHICH ROLE FOR 11C-METHIONINE PET IN RADIOTHERAPY PLANNING IN NEWLY DIAGNOSED GLIOBLASTOMA PATIENTS?

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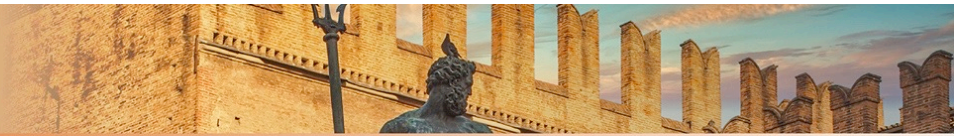


DICHIARAZIONE

Relatore: Elena Clerici

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 (NIENTE DA DICHIARARE)
- 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)



Standard of care for newly diagnosed GBM:



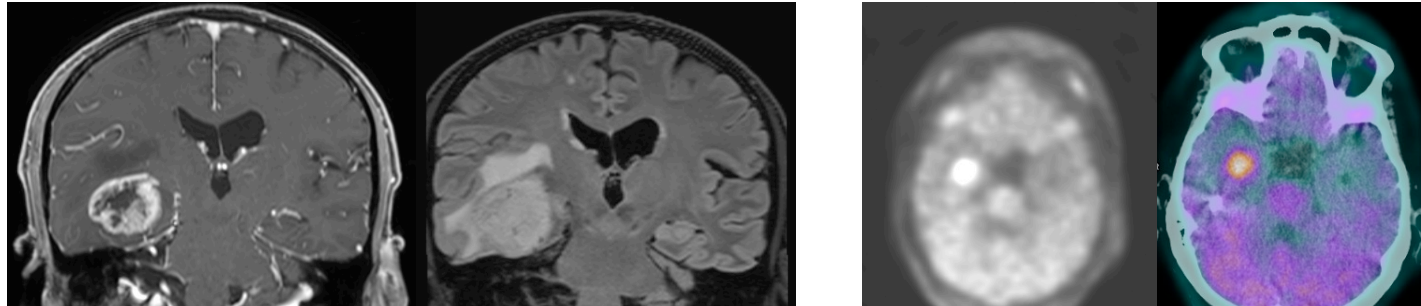
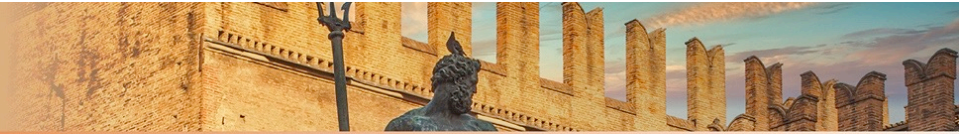
maximal safe resection - adjuvant RT with concurrent and adjuvant TMZ



Almost all cases **relapse** in the site of **primary** treatment



A way forward in improving the outcome might be **more precise** identification of the **volume** at the most significant risk of recurrence.

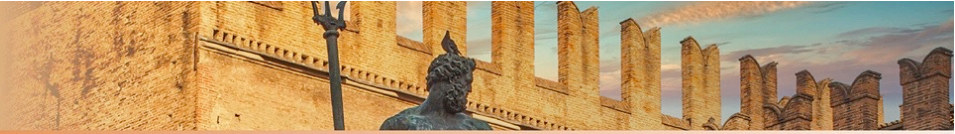


Evidence regarding the **predictive and prognostic value** is still lacking

Its use in planning local treatments, such as surgery and radiation therapy, is debated

Aims were to evaluate the employment of metabolic imaging, [11C]MET PET, along with morphological ones, MRI, could provide **additional** information to

- **maximize the EOR**
- **improve the target volume delineation for RT planning**



Materials and Methods:

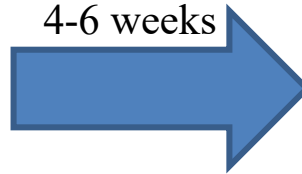
- Newly diagnosed GBM patients
- Ages 18–70 years
- KPS \geq 70
- Residual tumor or surgical cavity with a maximum diameter of 10 cm
- Normal liver, kidney and bone marrow functions
- Available MRI and MET PET
- Enrolled in NCT00006353 trial



48-72 h: MRI

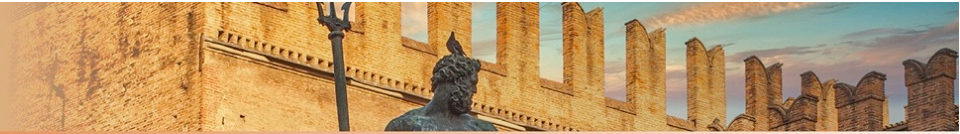
- ✓ EOR
- ✓ CERTV

4-6 weeks



48-60Gy

15 frs
 + TMZ



Target delineation

CTV1:

entire surgical **cavity**

residual tumor after surgery

abnormality on the **T1-weighted post-contrast MPRAGE**

uptake on ¹¹C METPET

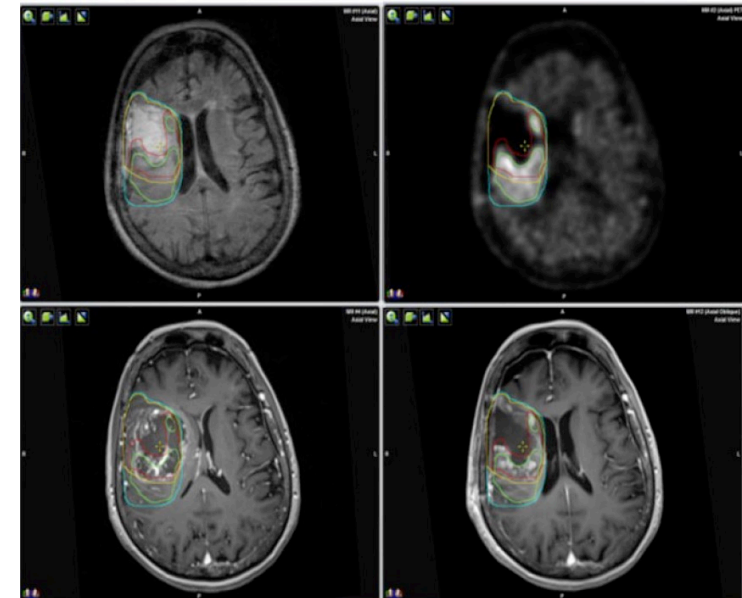
CTV2:

abnormality on **FLAIR** MRI images after surgery

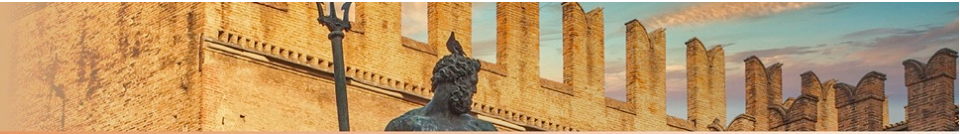
CTV1

PTV1/PTV2:

adding an isotropic margin of **5 mm** from CTV1 and CTV2



The dose prescribed was **60 Gy** on PTV1, and **42 Gy** on PTV2 for **15 days**, using a simultaneous integrated boost.



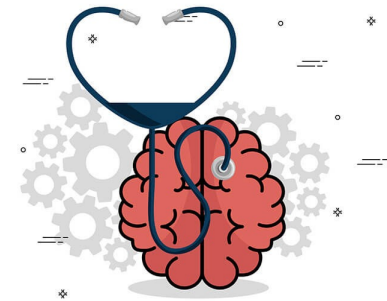
All patients received **concurrently/adjuvant TMZ**

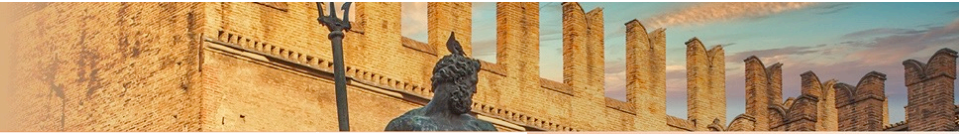
Corticosteroids

Neurological examination and **MRI**: at 1 month after concurrent CHT–HFRT and every 4 months after that

MET PET: at 4 and 12 months during maintenance CHT or to rule out pseudoprogression

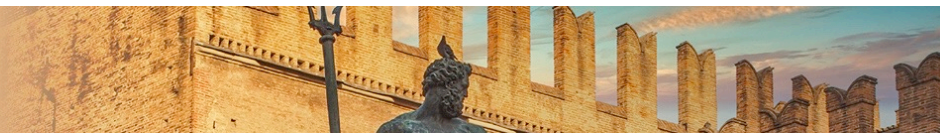
Neuropsychological assessment: “Milano Bicocca Battery”





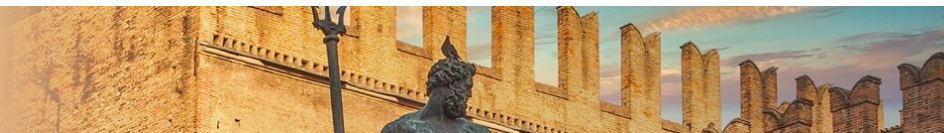
Results:

From August 2013 to April 2016	N. (tot 93 pts)	%
Median age (range)	61 years (range 23–77 years)	
KPS		
70	6	6.4
80	20	21.6
90-100	67	72
Gender		
Female	33	35.5
Male	60	64.5
Histology		
Glioblastoma IDH WT	93	100
MGMT Methylated	53	57
MGMT Unmethylated	40	43
EOR		
GTR	45	48.3
STR	18	19.4
PR	16	17.2
B	14	15.1



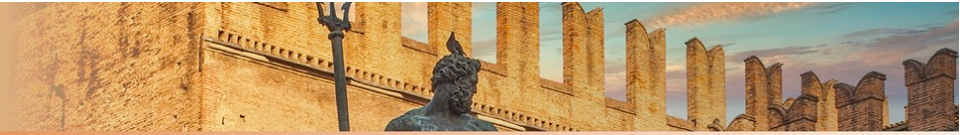
Results:

From August 2013 to April 2016	N. (tot 93 pts)	%
CERTV on postoperative MRI		
Yes	63	67.7
No	30	32.3
Median CERTV	4.23 (0.17-35.33)	
BTV on [11C]METPET		
Yes	78	83.9
No	15	16.1
Median BTV on [11C]MET PET	8.47 (0.11–62.20)	
Median SUVmax [11C]MET PET	4.03 (2.30–13.90)	
Median TBRmax	4.34 (2.36–12.00)	
Location of BTV	78	100
CE + FLAIR abnormalities	63	80.8
Only FLAIR abnormalities	15	19.2



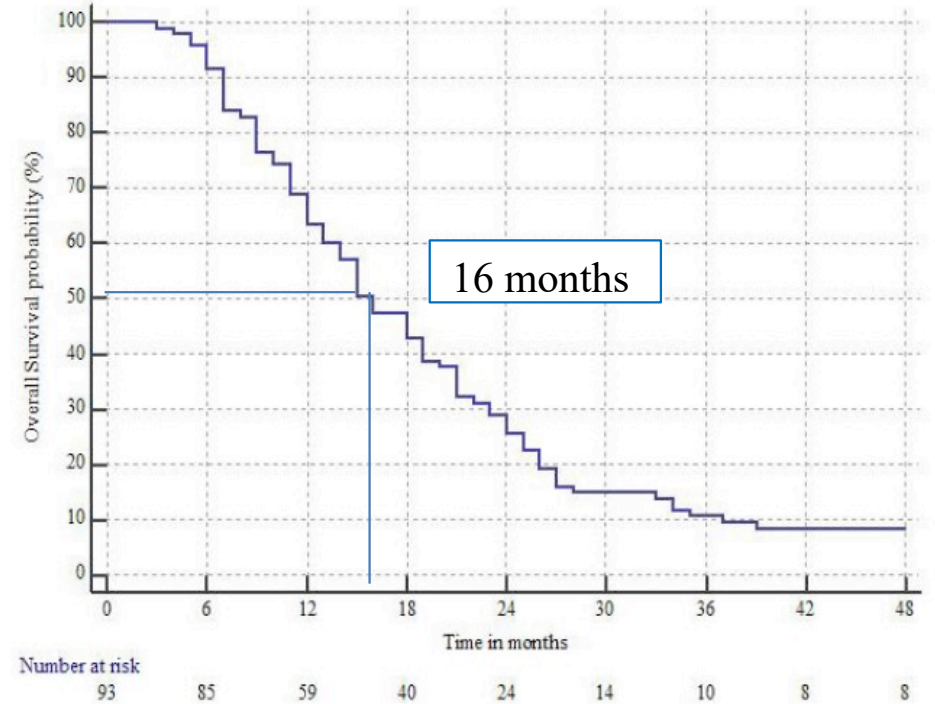
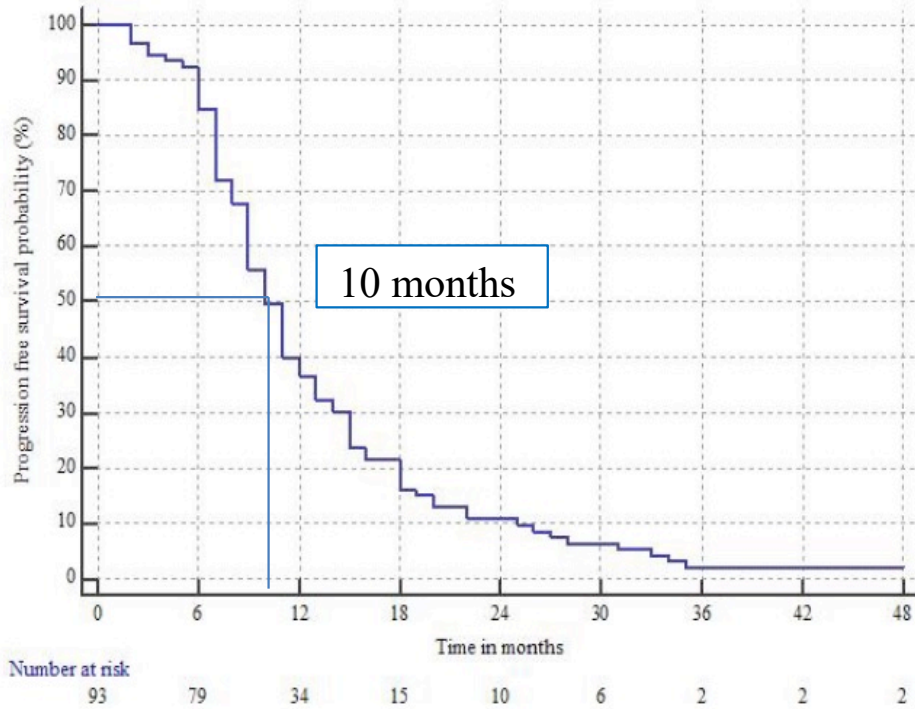
Results:

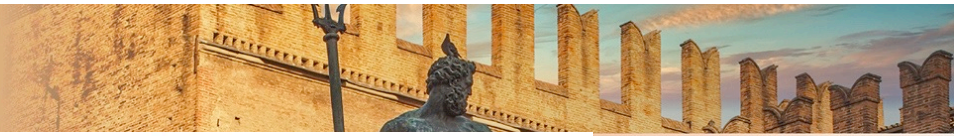
	GTR	STR	PR
No patients	45	18	16
Residual Tumor NO (CERTV/BTV)	15	0	0
Residual Tumor YES			
CERTV + BTV	15	18	16
BTV only	15	0	0
Median SUVmax (range)	3.70 (2.20–9.54)	3.25 (2.3–7.5)	4.7 (2.96–9.30)
Median PFS months (range)	10 (6–22)	11 (2–28)	10 (2–35)



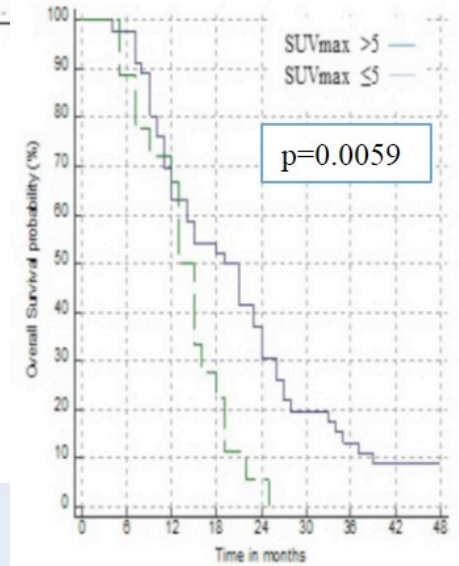
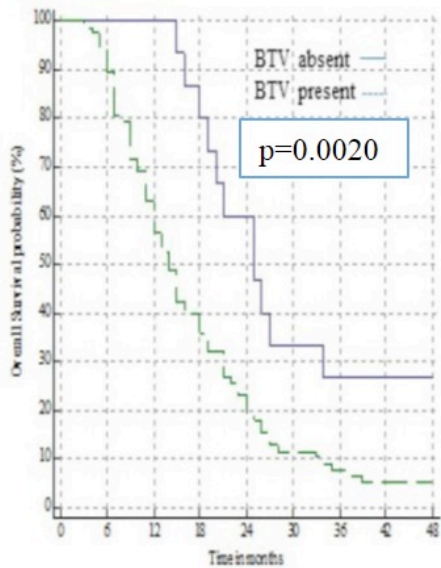
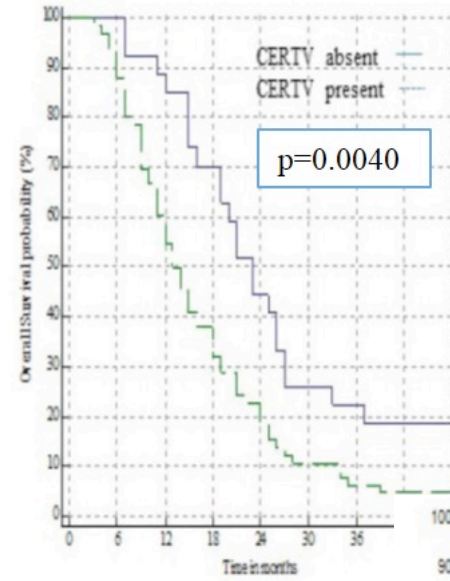
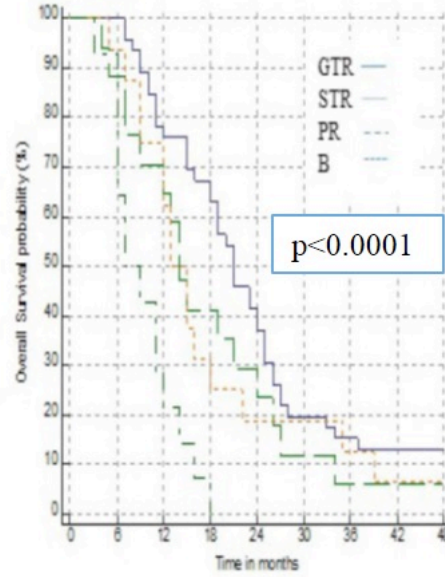
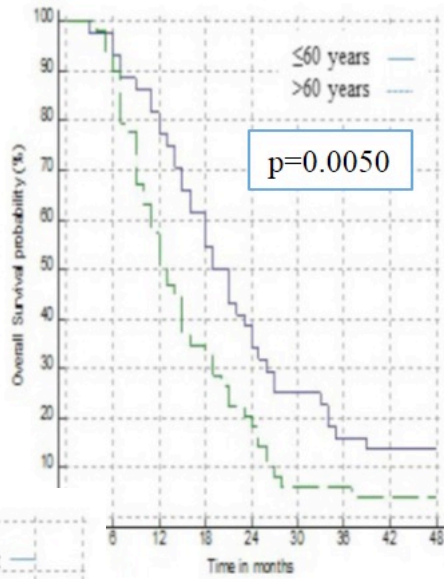
Results:

The median follow-up time was 72 months (range 58–90 months)



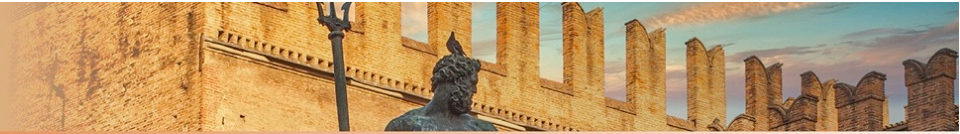


Results:



Results:

	Pts	Median OS Months (Months 95% CI)	1 Year OS % (SE)	2 Year OS % (SE)	3 Year OS % (SE)	p Value Univariate	HR Multivariate (95% CI)	p Value Multivariate
Overall survival	93	16 (14-19)	63.4 (±4.9)	25.8 (±4.5)	10.8 (±3.2)			
Age								
≤60	44	19 (16-24)	77.3 (±6.3)	34.1 (±6.4)	15.9 (±5.5)	0.0050	2.6038 (1.5578-4.3524)	0.0003
>60	49	13 (10-16)	51.0 (±7.1)	18.4 (±5.5)	6.1 (±3.4)			
EOR	46	21 (18-25)	76.1 (±6.2)	37.0 (±7.1)	15.2 (±5.3)	<0.0001	160.2776 (20.3294-1263.6345)	<0.0001
GTR	17	14 (9-24)	64.7 (±11.6)	23.5 (±10.3)	5.8 (±5.7)			
STR	16	13 (12-18)	62.5 (±12.1)	18.8 (±9.7)	6.2 (±6.0)			
PR B	14	7 (6-12)	21.4 (±11.0)	0	0			
MGMT	53	18 (14-23)	66.0 (±6.5)	34.0 (±6.5)	15.1 (±4.9)	0.14	0.4626 (0.2776-0.7711)	0.0031
Methylated Unmethylated	40	15 (12-18)	60.0 (±7.7)	15.0 (±5.6)	5.0 (±3.4)			
CERTV	30	23 (19-27)	85.2 (±6.5)	44.4 (±9.5)	22.2 (±8.0)	0.0040	4.1696 (2.3985-7.2485)	<0.0001
absent present	63	13 (11-16)	54.5 (±6.1)	18.2 (±4.7)	6.0 (±2.9)			
BTV	15	25 (20-34)	100	60.0 (±12.6)	26.7 (±11.4)	0.0020	0.4800 (0.3772-0.6109)	<0.0001
absent present	78	14 (12-18)	56.4 (±5.6)	19.2 (±4.4)	7.6 (±3.0)			
CERTV/BTV								
CERTV								
absent								
BTV								
absent								
CERTV	15	25 (20-34)	100	60.0 (±12.6)	26.7 (±11.4)	0.0029	1.0728 (0.6131-1.8770)	0.856
absent	15	21 (15-26)	73.3 (±11.4)	33.3 (±12.2)	13.3 (±8.7)			
BTV	63	13 (11-16)	52.4 (±6.2)	15.9 (±4.6)	6.3 (±3.0)			
present								
CERTV								
present								
BTV								
present								
SUVmax *								
>5	18	13 (12-16)	66.7 (±11.1)	5.5 (±5.4)	0	0.0059	2.1071 (1.135-3.909)	0.0181
2.2-5	46	19 (12-24)	63.0 (±7.1)	30.4 (±6.7)	13.0 (±4.9)			
TBRmax *								
≤4.5	36	21 (13-24)	70.6(±7.8)	32.4(±8.0)	14.7(±4.0)	0.0077	2.0273 (1.1419-3.5991)	0.0158
>4.5	28	13 (10-16)	57.1(±9.3)	10.7(±5.8)	3.5 (±3.5)			



Conclusions:

The use of **[11C]MET PET** and contrast-enhanced T1 and **FLAIR MRI** proved to be effective in **tumor volume definition** for RT planning

This metabolic imaging allowed to detect **areas at higher risk of recurrence** located in the FLAIR abnormalities, confirming the need to perform surgical resection beyond the enhanced boundaries where uptake is visible.

Challenging issues:

- Extent of the surgical resection to perform
- Margins reduction

