XXIII CONGRESSO AIRO

Giardini Naxos - Taormina, 26 - 29 ottobre

IDENTIFICAZIONE DEL *VOLUME DI TRATTAMENTO* RADIANTE NEI PAZIENTI CON *GLIOMA AD ALTO GRADO* UTILIZZANDO *L'IMAGING FUNZIONALE*

P. Navarria, E. Clerici, A.M. Ascolese, S. Tomatis, P. Mancosu, F. Alongi, E. Villa, T. Comito, A.Tozzi and M. Scorsetti

Unità Operativa di Radioterapia e Radiochirurgia
Humanitas Cancer Center Rozzano - Milano

HUMANITAS
CANCER CENTER

RATIONALE

STANDARD OF CARE: Surgical resection, adjuvant RT and CT

Several studies to define the Optimal Radiation Dose and Fractionation Schedule

New techniques allow delivery of high -dose to the tumor with maximum sparing of normal brain and critical structures

The extent of tumor must be correctly defined

HUMANITAS
CANCER CENTER

DEFINITION OF TARGET VOLUME

CTV: Residual tumor and resection cavity plus 2 cm
PTV: CTV plus 3 mm

Minniti G J Neurooncol 2008; EORTC trials: Stupp R N Engl J Med 2005; Brandes AA, Eur J Cancer 2010

CTV1: peritumoral edema post-op plus 2 cm $\longrightarrow$ 46 Gy
CTV2: residual tumor plus 2 cm $\longrightarrow$ 60 Gy

RTOG 0525 and 8525 trials

CTV: enhanced area plus 2 cm
PTV: CTV + 5 mm

Eric L. IJROBP 2007 (MDACC)

GTV: enhanced T1 and FLAIR/T2 (*pre and post MRI*)
CTV: GTV plus 2-3 cm

NCCN Guidelines 2013

Carbon-11-labeled methionine PET ([11C]MET-PET) uptake by normal brain parenchyma is relatively low
More precisely outline of the true extent of viable tumor tissue than MRI

HUMANITAS
CANCER CENTER

Identificazione del Volume di RT in HGG utilizzando l'Imaging Funzionale

AIM , PATIENTS and METHODS

PURPOSE
Infuence of FLAIR/MRI and 11C-MET-PET in Target Volume Definition and LC

PATIENTS and METHODS
November 2011- December 2012   102 pts newly diagnoses of HGG Surgery, concomitant RT-CT and adjuvant CT

20 consecutive patients

- Simulation contrast CT scan
- Simulation T1 contrast MRI and FLAIR/T2 MRI
- Simulation [11C]MET-PET
- Preoperative T1/FLAIR/MRI

COREGISTERED

Identificazione del Volume di RT in HGG utilizzando l'Imaging Funzionale

PATIENTS

7 F 13 M median age 57 years (range 27-69 years)

Glioblastoma	13 pts
Anaplastic Astocytoma	6 pts
Anaplastic Oligodendroglioma	1 pts

RPA I:3 pts RPA II:4 pts RPA III:3 pts RPA V:10 pts

Complete Resection CR   12 pts
Subtotal Resection   SR   7 pts median EOR 90.7% (60.8-99.1%)
Partial Resection   PR   1 pts   EOR 12%

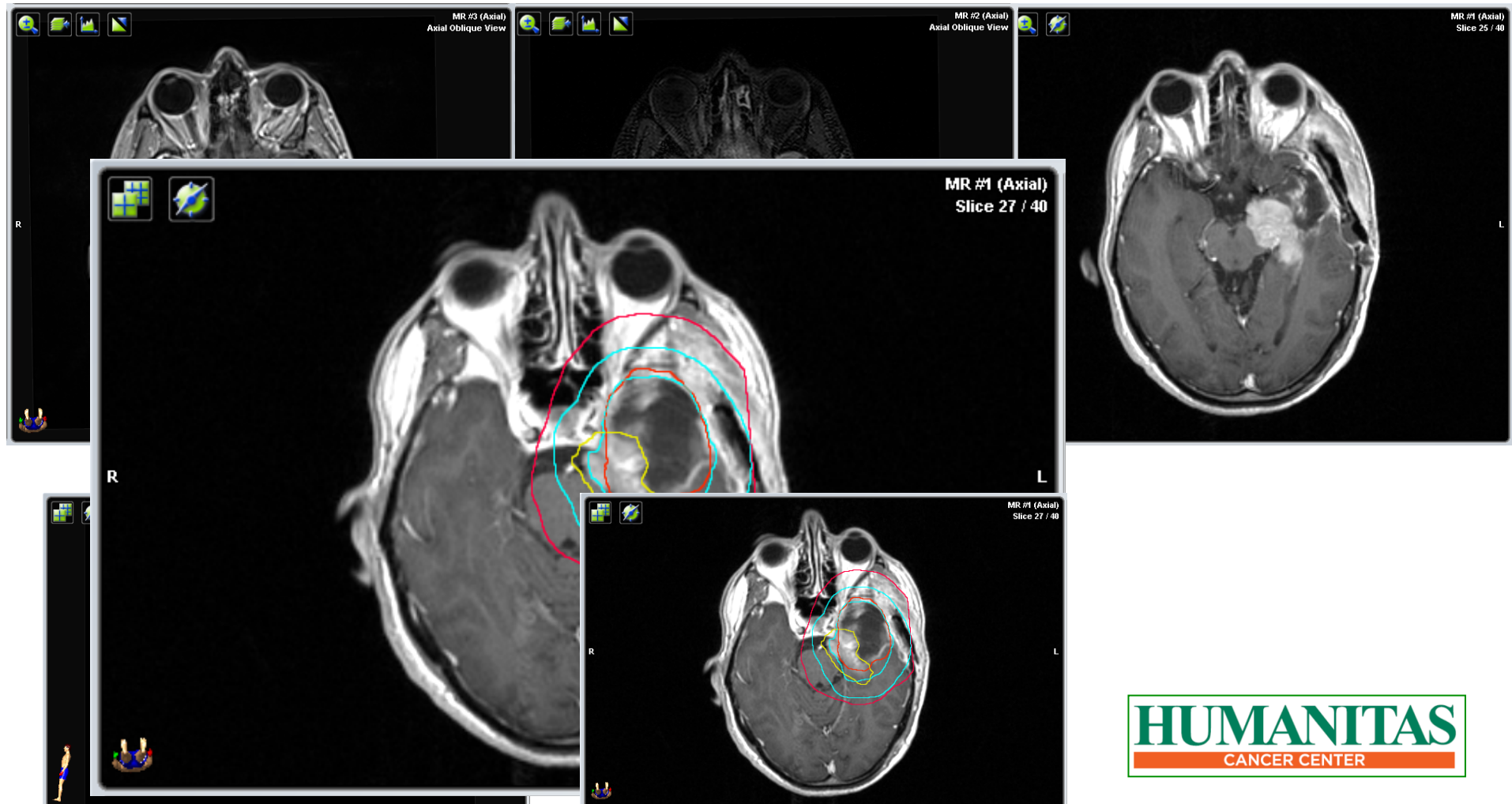# Identificazione del Volume di RT in HGG utilizzando l'Imaging Funzionale

METHODS

CTV1: FLAIR/MRI + resection cavity + MET-PET uptake
PTV1: CTV1 + margin 1 cm

All patients were treated on PTVI 60 Gy/30 fractions with concomitant Temozolomide

CTV2: resection cavity + postop enhanced MRI
PTV2: CTV2 + margin 2 cm

Identificazione del Volume di RT in HGG utilizzando l'Imaging Funzionale

Identificazione del Volume di RT in HGG utilizzando l'Imaging Funzionale
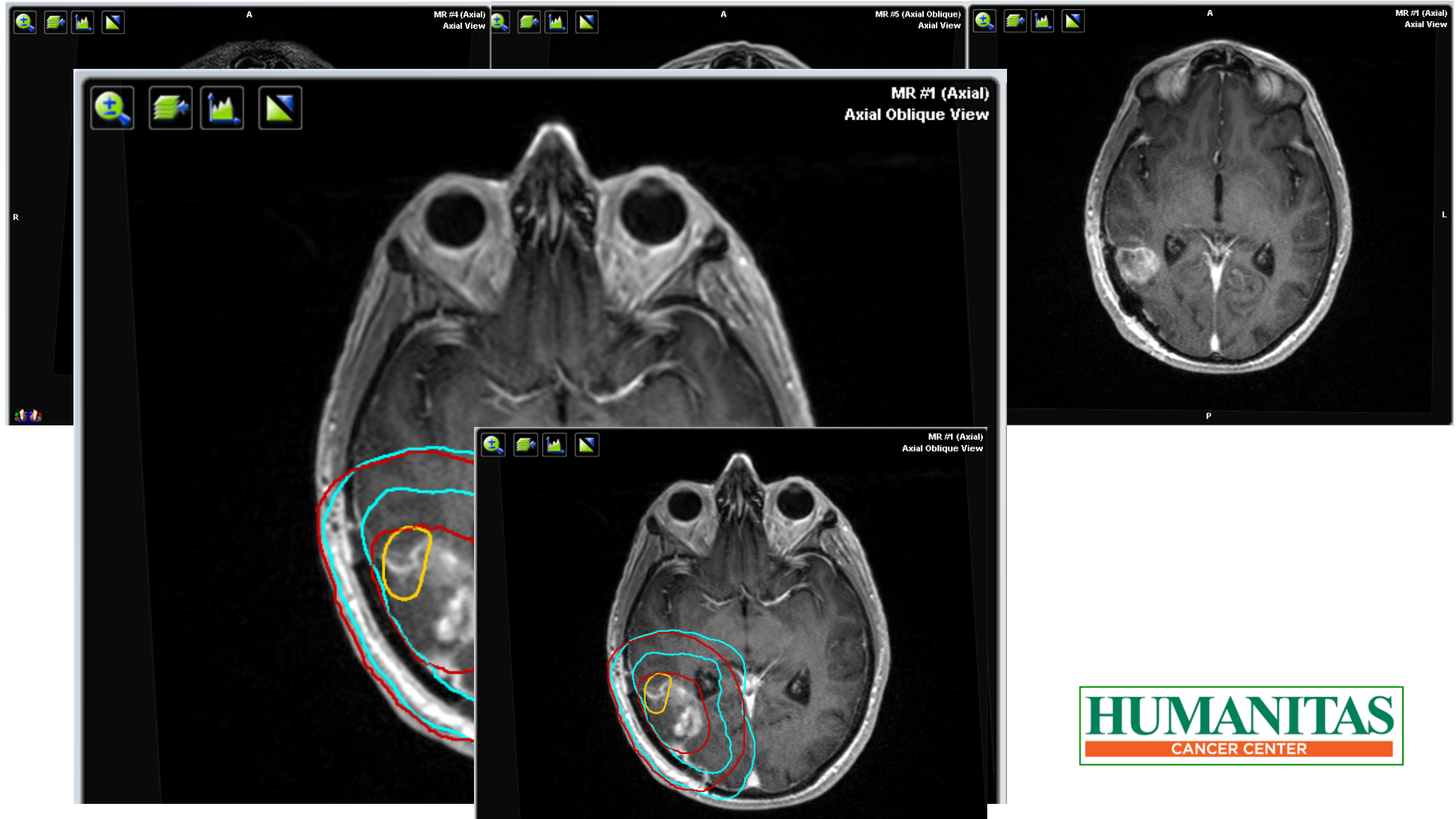
Identificazione del Volume di RT in HGG utilizzando l'Imaging Funzionale

RESULTS

Pts	CTV1cc	CTV2 cc	PTV 1 cc	PTV 2 cc	MET-PET Uptake		
All	m 80 r 32-209	m 55 r 16-109	m 230 r 134-533	m 407 r 143-594	Site	up to mm	SUV max
12CR					4 RC 8 OS 12 IS Flair	31	nuanced ≤ 4
7 SR					3 RT 4 RT + spot 7 IS Flair	32	≥ 4
1 PR					1 RT 1 IS Flair		≥ 4

RC Resection Cavity
OS outside
IS inside
RT residual tumor

Identificazione del Volume di RT in HGG utilizzando l'Imaging Funzionale

RESULTS

Local Relapse   7/20 patients at median time 9 months (range 5-12 months)
7/20 in field progression
* 4/12 CR   uptake MET-PET outside of SC
* 3/7 SR   2/3 uptake residual and outside SC
1/3 uptake residual tumor

Median OS   14 months (range 6-19 months)
16 alive
4 dead (1 other cause)
* 2/3: 8 and 17 months SR
* 1/3: CR with uptake up to 31 mm

Toxicity   Negligible

Identificazione del Volume di RT in HGG utilizzando l'Imaging Funzionale

CONCLUSION

The Target Volume define on contrast MRI has limitation for the high risk of tumor target omission

FLAIR-MRI PTV volumes are lower/comparable with contrast-MRI PTV
Better selectively on tumor volume with major sparing of normal brain

Uptake MET-PET allowed us to define microscopically residual tumor not evident on postoperative MRI above all in patients underwent to complete resection

Uptake MET-PET was inside of preoperative FLAIR-MRI images

HUMANITAS
CANCER CENTER