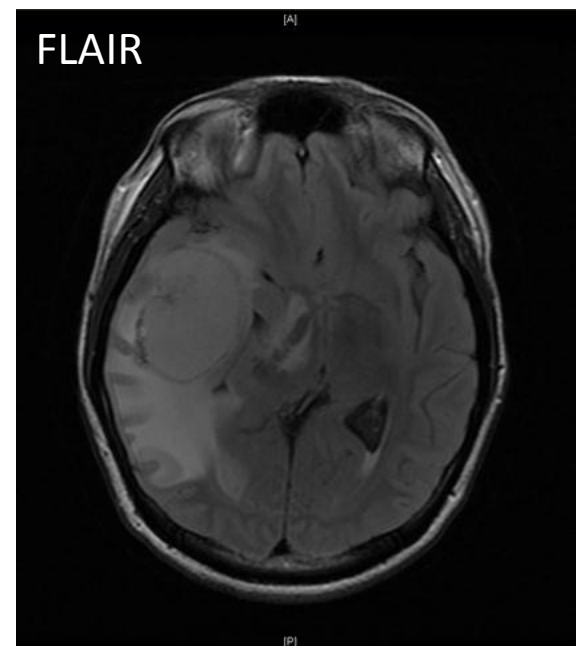
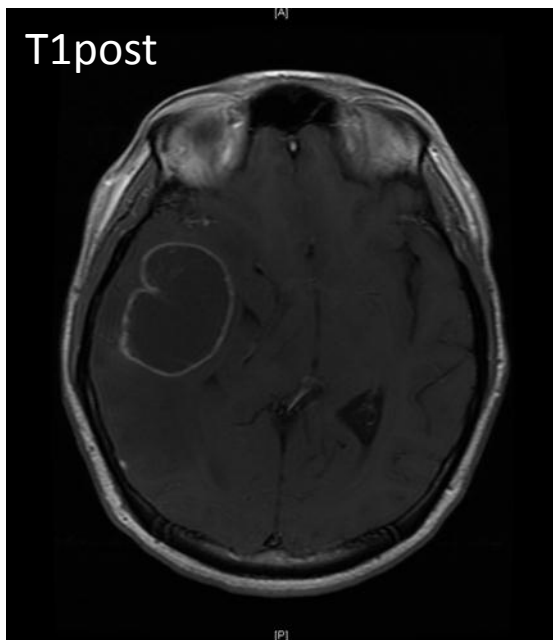


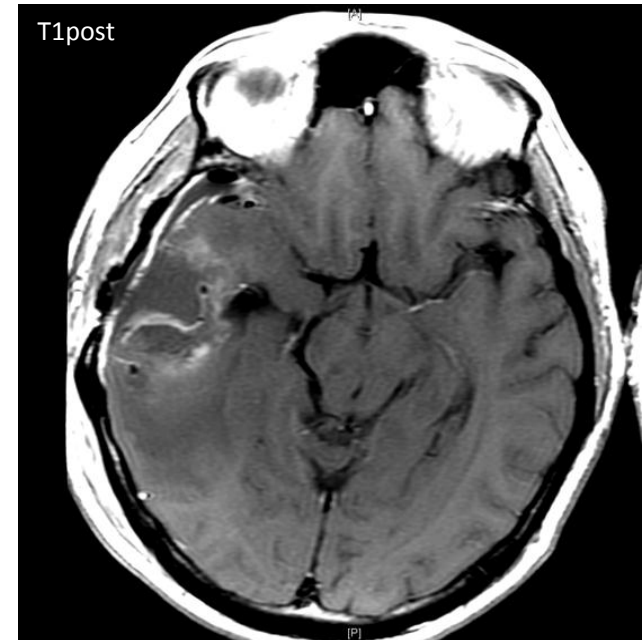
# Glioblastoma Multiforme (GBM)

## Presentation /Work Up:

- Age: 39, previously healthy
- Neck Pain, visual changes and headache over few weeks.
- MRI brain: 5x4 cm right temporal mass with a cystic component and associated hemorrhage, edema and a 1.5 cm midline shift .



- Surgery: Subtotal resection
- Pathology: WHO IV, glioblastoma multiforme, MGMT negative
- Postop MRI: residual enhancement measuring 1.2 cm in the posterior resection cavity.
- Exam: KPS 90  
Craniotomy scar, no neurological deficits



## Simulation:

- Contrasted Head CT
- Supine, neck flexed
- Face mask for Immobilization

# Treatment Planning:

A- Fusion of planning CT with preop MRI:  
-pre-op MRI axial T1 +Con

B- Contouring:

GTV: post-op MRI axial T1 +Con\*

CTV:GTV+ 2cm smart margin (off bones)

PTV: CTV +0.5 cm

## Other Structures:

- Optic Nerves
- Chiasm
- Temporal Lobes
- Cochlea
- Lenses
- Brainstem
- Spinal Cord
- Globes

\* Per Stupp et al. (1,2)

### •Alternatively: volumes per RTOG definitions:

GTV1: per T2 or the FLAIR abnormality postoperative MRI scan.

CTV1: GTV1+ 2cm

PTV1:CTV1+ 0.3-0.5 cm

GTV2/boost: contrast-enhanced T1 abnormality post-op

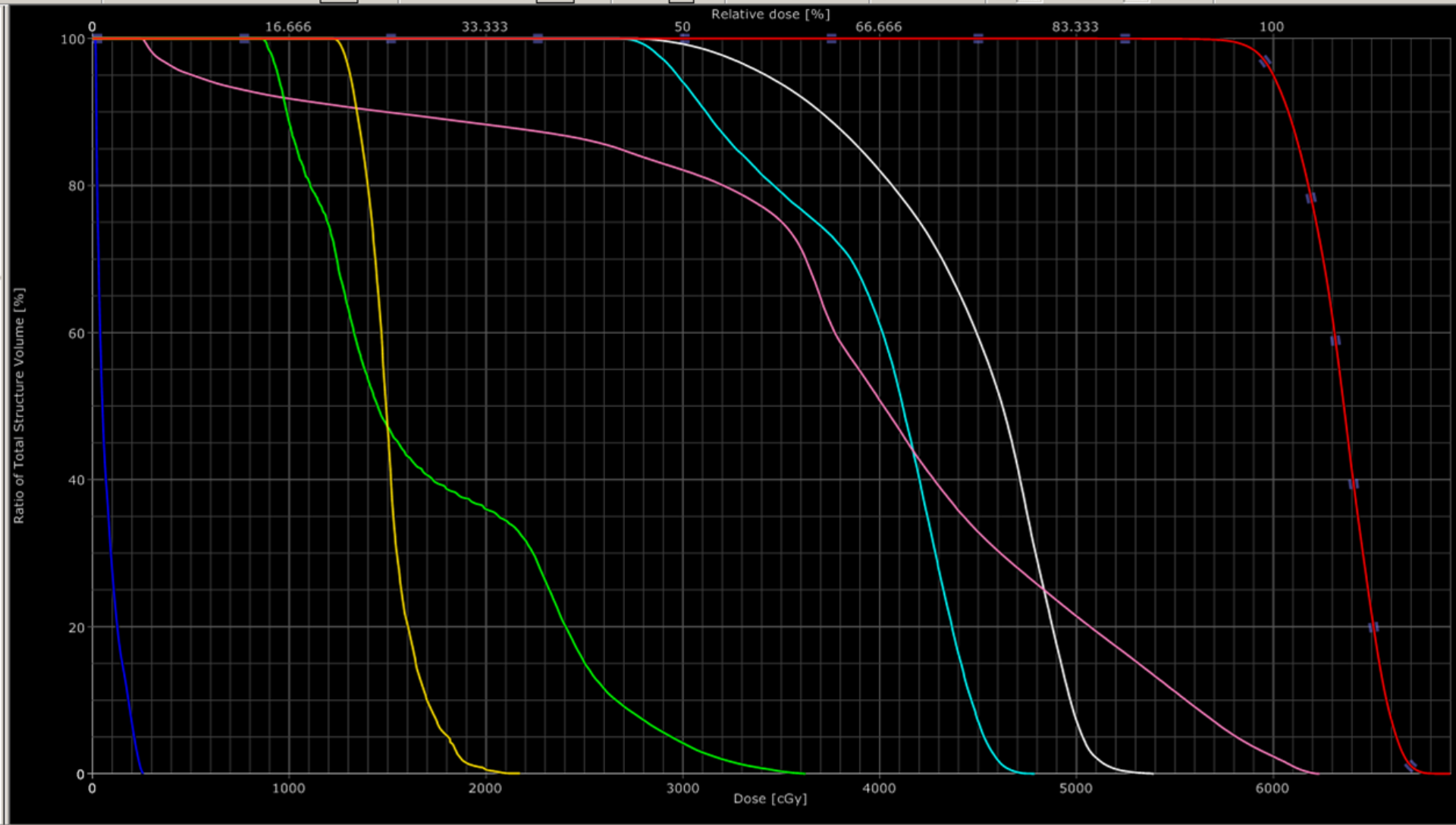
CTV2 : GTV +2 cm.

PTV2: CTV2+0.3-0.5 cm.

Rx:46 Gy to PTV1 +14 Gy boost to PTV2

# Prescription and Dose Constraints:

<b>Critical Structure</b>	<b>Dose volume constraints</b>	<b>Maximum dose constraint</b>
Chiasm		52 Gy
Chiasm PRV		54 Gy
Left optic nerve		52 Gy
Left optic nerve PRV		54 Gy
Left optic nerve		52 Gy
Right optic nerve PRV		54 Gy
Brainstem		56 Gy
Brainstem PRV		60 Gy
eyes		15 Gy
L/R Cochlea		30 Gy
L/R Cochlea PRV		35 Gy
GTV	≥100% coverage to a dose of at least 60 Gy ≥97% covered by 60Gy	68Gy
PTV	≥95% coverage to at least 60 Gy	68 Gy



Fields | Dose Prescription | Dose Statistics | Plan Sum

View	DVH Line	Structure	Approval Status	Plan	Course	Volume [cm <sup>3</sup> ]	Dose Cover. [%]	Sampling Cover...	Min Dose [cGy]	Max Dose [cGy]	Mean Dose [cGy]
<input checked="" type="checkbox"/>		OPTIC_NRV_L	Approved	8fld_IMRT	C1	0.6	100.0	100.4	857.9	3630.7	1724.9
<input checked="" type="checkbox"/>		Chiasm PRV	Approved	8fld_IMRT	C1	2.3	100.0	100.0	2743.6	5401.6	4467.8
<input checked="" type="checkbox"/>		BRAINSTEM	Approved	8fld_IMRT	C1	26.5	100.0	100.0	244.9	6243.2	3881.8
<input checked="" type="checkbox"/>		PTV60	Approved	8fld_IMRT	C1	284.9	100.0	100.0	3932.6	6901.9	6341.0
<input checked="" type="checkbox"/>		OPTIC_NRV_R	Approved	8fld_IMRT	C1	0.5	100.0	100.4	2672.0	4793.1	3960.4
<input checked="" type="checkbox"/>		SPINAL_CORD	Approved	8fld_IMRT	C1	13.7	100.0	100.2	13.1	261.8	75.7
<input checked="" type="checkbox"/>		COCHLEA_R	Approved	8fld_IMRT	C1	0.2	100.0	100.3	1224.2	2176.0	1509.5

# Course

- Concurrent\_temozolomide at a dose of 75 mg/m<sup>2</sup> per day
- Nausea: Ondansetron
- Weekly CBC and metabolic panel (watch for thrombocytopenia with TMZ)
- Rt ear otitis
- Follow up: 4 weeks after completion with repeat MRI

## References:

1. Ataman F, Poortmans P, Stupp R, Fisher B, Mirimanoff R-O. Quality assurance of the EORTC 26981/22981; NCIC CE3 intergroup trial on radiotherapy with or without temozolomide for newly-diagnosed glioblastoma multiforme: the individual case review. *European Journal of Cancer*. 2004;40(11):1724-30.
2. Stupp R, Mason WP, van den Bent MJ, Weller M, Fisher B, Taphoorn MJB, et al. Radiotherapy plus Concomitant and Adjuvant Temozolomide for Glioblastoma. *New England Journal of Medicine*. 2005;352(10):987-96.
3. Stupp R, Hegi ME, Mason WP, van den Bent MJ, Taphoorn MJ, Janzer RC, et al. Effects of radiotherapy with concomitant and adjuvant temozolomide versus radiotherapy alone on survival in glioblastoma in a randomised phase III study: 5-year analysis of the EORTC-NCIC trial. *Lancet Oncol*. 2009 May;10(5):459-66.



# Hi Yield!

- Pseudoprogression: transient radiographic changes seen within first 6 months after finishing treatment, which represent exaggerated treatment response.
- MGMT: O6-methylguanine-methyltransferase, a DNA repair protein . MGMT promoter methylation is a favorable prognostic factor.
- **Stupp et al: RCT : XRT vs. XRT +TMZ (2,3):**
  - ❖ RT : 60 Gy in 30 fx .
  - ❖ Temozolomide : daily 75 mg/m<sup>2</sup> with RT and 150-200 mg/m<sup>2</sup> adjuvant first 5 days each month x 6 months.
  - ❖ Median OS : RT 12.1 mo vs. RT + TMZ 14.6 mo
  - ❖ MGMT methylation strongest survival prognostic factor: methylated 23.4 mo vs. unmethylated 12.6 mo.
  - ❖ Survival Benefit of TMZ: seen across the board, regardless of MGMT status.