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:

<table>
<thead>
<tr>
<th>Critical Structure</th>
<th>Dose volume constraints</th>
<th>Maximum dose constraint</th>
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</thead>
<tbody>
<tr>
<td>Chiasm</td>
<td></td>
<td>52 Gy</td>
</tr>
<tr>
<td>Chiasm PRV</td>
<td></td>
<td>54 Gy</td>
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<tr>
<td>Left optic nerve</td>
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<tr>
<td>Left optic nerve PRV</td>
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<td>Right optic nerve PRV</td>
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<td>15 Gy</td>
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<tr>
<td>L/R Cochlea</td>
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<td>30 Gy</td>
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<tr>
<td>L/R Cochlea PRV</td>
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<td>35 Gy</td>
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<tr>
<td>GTV</td>
<td>≥100% coverage to a dose of at least 60 Gy</td>
<td>68Gy</td>
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<tr>
<td></td>
<td>≥97% covered by 60Gy</td>
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<tr>
<td>PTV</td>
<td>≥95% coverage to at least 60 Gy</td>
<td>68 Gy</td>
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</tbody>
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Course

-Concurrent temozolomide at a dose of 75 mg/m^2 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:


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/m2 with RT and 150-200 mg/m2 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.