2014 AAPM
Spring Clinical Meeting

TIPS AND PLANNING STRATEGIES FOR BEST PRACTICES

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What special techniques were used to ensure target coverage?

**Target Coverage**

- Highest priority in optimization
- Clean the contours (clean ROI/ post process, etc.)
- Optimization contours – separate or add gradients// back from skin at least 3-5mm
- Evaluate overlap areas of OAR and opt Targets
- VMAT (cheater PTV ~ 1mm)
- Rings (separated or gradient) to “squeeze” dose in
- “Double down” on optimization structures
- Beam arrangement (circumferential vs. hemisphere)// PA beam
- Inner rind of 3mm to “boost” edge for coverage
What special techniques were used when approaching a multiple PTV case?

**Multiple PTVs**

- Isocenter location close to high dose PTV
- Separate targets
- Ensure there are no conflicting objectives
- Gradient margins
- Rings follow same gradient approach (1mm, 5mm, etc.)
PTV45 OPT (CREATE SEPARATION)

RING FOR LOWER PTV (2 DIFFERENT GRADIENT KILOSOMES)
What special techniques were used when trying to make your plan as **conformal** as possible?

**Conformality**

- Push the rings until target coverage buds ... then stop!!!
- 2 normal tissue contours with margin
- Non-overlapping rings
- Overlap areas with bowel/ bladder (treat as a target)
- VMAT (lock jaw width <15cm)
- Fluence editing
- Respect the point of diminishing returns for conformality
- Multiple DVH objectives on the rings (not just a max dose)
What special techniques were used when trying to keep your plan from getting too “hot”? 

Controlling “hotness”

- Small, incremental steps
- Special smaller structures – isodose to contour
- Each time take away something off OAR, raise priority on targets
- Extreme high priority on max dose
- “wash plan” after final optimization one last time
- VMAT – adding a 3rd partial arc// TOMO (pinhole in middle of target)
- Optimization numbers very close together
- Separate GTV from PTV run hotter with loose constraints
- Use body as constraint for extra emphasis
- Fluence editing
What special techniques were used when sparing OAR’s (organs at risk), without sacrificing target coverage or conformity?

Sparing OAR’s

- Address overlap areas prior to optimizing
- Clone OAR - separate
- Separate opti structures from targets – mean dose
- EUD, Biological, etc.
- Never take OAR higher than target
- Hardly had to do anything for this plan
- Multiple optimizations to pause and wait
- Mean dose in optimization, in addition to max
- Beam arrangement – evaluating
- Step into them gently
Top 10

List for IMRT/ VMAT Best Practices
#10 – Consistent Plan Evaluation

- Clear, reasonable goals from the physician
- Rx prior to planning
- Dose grid settings
- Algorithm used
- Consistent field labels/ plan labels
- DVH/ metric analysis of every goal
- Consider using advanced metrics (conformation number)
- The “Smell Test” (isodose lines vs. color wash)
- How is “hotness” defined? (consider absolute volumes)
- USE ABSOLUTE DOSE!!!
#9 – “Where is the normalization handbook?”

- Every TPS has different normalization settings
- Seems to be a lot of confusion
- Physicians normalizing to DVH (not an isodose line)
- Print plans with actual dose being delivered
- USE ABSOLUTE DOSE!!!
#8 – “Isn’t that special!”

- Prove concept of special TPS-specific tools
- Make the heavy service contracts worth the expense!
- Advanced features can save time
- Efficiency of planning and delivery
- Increase consistency inter-planner
- Examples (biological, NTO, fluence editing)
#7 – “Dip your toes in the water”

- Small incremental steps
- Optimize to targets only
- Do not try to overload the optimizer at the start
- See what is possible
- If there is an issue, check contours
- Re-evaluate approach if targets are being compromised
#6 – “Build a good foundation first”

- Beam arrangement can make or break a plan
- More is not always better
- Not enough can lead to headaches
- Consider varying beam arrangements
- Fixing jaws to improve delivery (VMAT)
- Isocenter placement
- Energy selection (mixed; 10x if available)

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## Beam Summary

<table>
<thead>
<tr>
<th>Beam Details</th>
<th>Geometry (IEC)</th>
<th>Modifiers</th>
<th>BEV Intensity</th>
<th># CPs</th>
<th>Meterset</th>
</tr>
</thead>
<tbody>
<tr>
<td>[1] Name: 1</td>
<td>Gantry (deg): 180 Collimator (deg): 0 Couch (deg): 0 Isocenter (DICOM) (mm): [-0.5, -10.9, -18.0] Isocenter (Couch) (mm): [0,0,0,0,0,0]</td>
<td>X Jaws*: X1 = -110 mm / X2 = 123 mm Y Jaws*: Y1 = -125 mm / Y2 = 100 mm * Max jaw extents (all control points) Multi-Leaf Collimation (X)</td>
<td>![Beam Image]</td>
<td>289</td>
<td>378 MU</td>
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<tr>
<td>Machine: 21 IX, Energy: 6 MV</td>
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<td># Fractions: 28 (Fx Group 1)</td>
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<td>[5] Name: 2</td>
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<td>X Jaws*: X1 = -93 mm / X2 = 90 mm Y Jaws*: Y1 = -115 mm / Y2 = 103 mm * Max jaw extents (all control points) Multi-Leaf Collimation (X)</td>
<td>![Beam Image]</td>
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<td>360 MU</td>
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<td>366 MU</td>
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<td>X Jaws*: X1 = -88 mm / X2 = 100 mm Y Jaws*: Y1 = -115 mm / Y2 = 103 mm * Max jaw extents (all control points) Multi-Leaf Collimation (X)</td>
<td>![Beam Image]</td>
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**NOTE:** "IMRT" label(s) derived from: 1) usage of MLC and 2) multiple segments.

Generated By: Greg Bobisson | ROI | 6/5/2013 10:23:13 PM

Totals: 1443 CPs 1806 MU
#5 – “As the collimator turns...”

- Collimate when possible
- Static beams – look at Beams Eye View with targets turned on
- VMAT – turn varying degrees for each arc
- Obtain coverage easier
- Plans more homogenous
#4 – “Garbage in, garbage out.”

- Don’t confuse the optimizer!
  - Abutting/ overlapping contours
  - Poor priority weighting
  - Keep it simple and practical

#3 – “Go the extra mile with contours”

- Even with special, efficiency tools in TPS extra contours are still VERY valuable
  - Rings
  - Normal Tissue
  - Specific dose control structures
- Convert isodose lines to contours to “wash the plan”
#2 – “Don’t forget the physical limits”

- Gradient margins - they are important!
- 5-10%/mm dose fall-off is a good rule of thumb
- Use for targets
- Use for rings
- Use for OAR’s

#1 – “The more things change, the more they stay the same.”

- CONTOURS, CONTOURS, CONTOURS
  - Optimization Contours
  - Cleaning targets
  - Standardization of names, colors, etc.
  - Smoothing contours