Use of MapRT to optimise noncoplanar planning for head and neck patients

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Conflict of Interest

- Member of the SGRT community clearance mapping consortium

Background

- Overview of MapRT

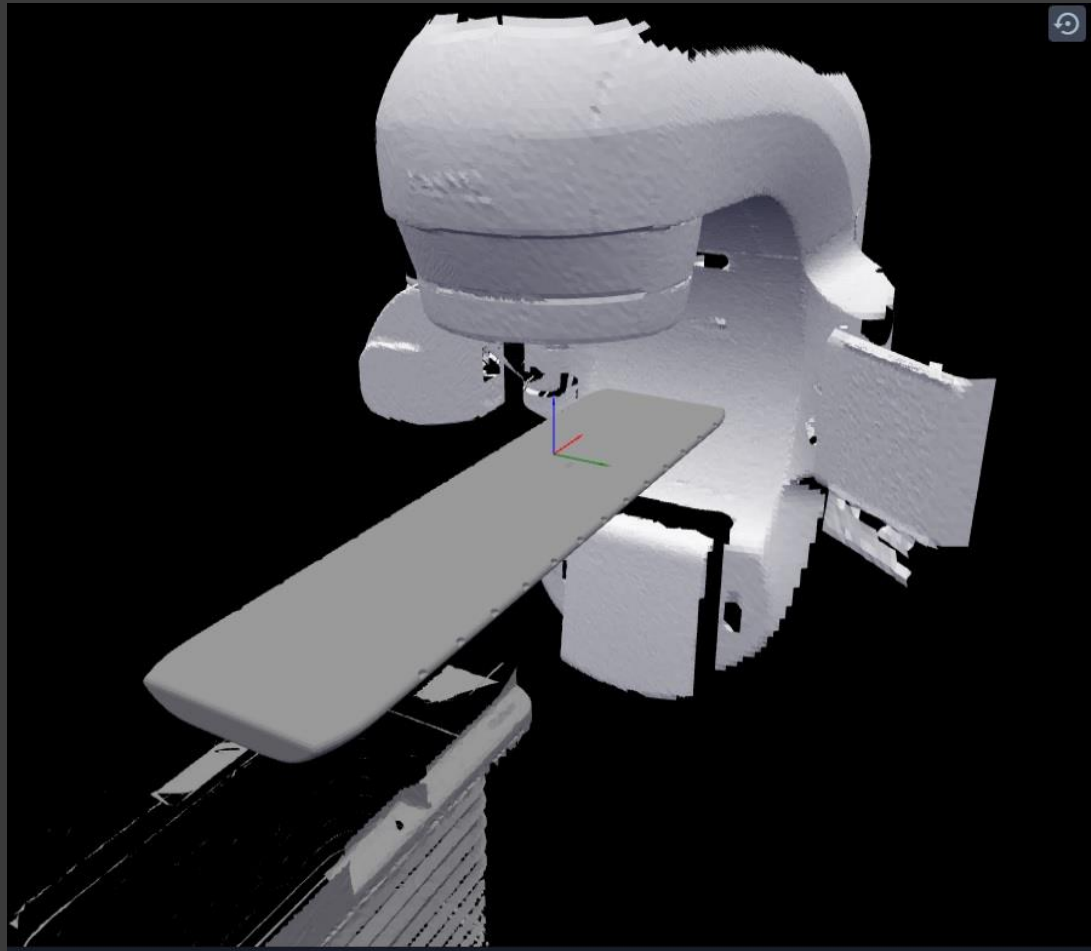- Rationale for study

- Results and Conclusion

Background

- MapRT
  - Uses camera to capture entire patient surface, along with any immobilisation/support accessories
  - Enables manipulation of isocentre, gantry and couch on virtual linac
  - Improves plan optimisation while avoiding collision

Map RT Workflow

- Pre/during CT Scan
  - Check for collision
  - Optimise patient position
- During Planning
  - Improve dose distribution with non coplanar
- Before treatment
  - Avoid dry runs and replans

Virtual linac

Patient surface

Clearance Map

Workflow - Software in action

Workflow - Software in action

Optimising non-coplanar H&N

- Shoulder positioning issues
  - ?Shell not rigid
  - Patient compliance
    - Change between CT/treatment
  - Unable to visualise shoulder position
    - Shoulderless masks allow use of AlignRT/postural video

- Poor dosimetry
  - Aware of it due to IVD

Optimising non-coplanar H&N

- Shoulder positioning issues
  - Immobilise shoulders better
    - *Or*
  - Remove them from the equation
    - Partial arcs or couch kicks

- Poor dosimetry
  - New machine parameter class solution
  - Current dosimetric class solution

Optimising non-coplanar H&N

- Not aiming to get the best possible plan

- A clinically acceptable plan that has more accurate delivery > one good on screen but not in reality

- Aware of time limitations on linac

- Need to be able to do IVD

Optimising non-coplanar H&N

- Retrospective study
- Replan with couch kicks
  - Easier to get machine class solution than partial arcs
  - Not significantly extra time on linac
- Compare plans dosimetrically
- Calculate on CBCT to compare actual treatment of each technique
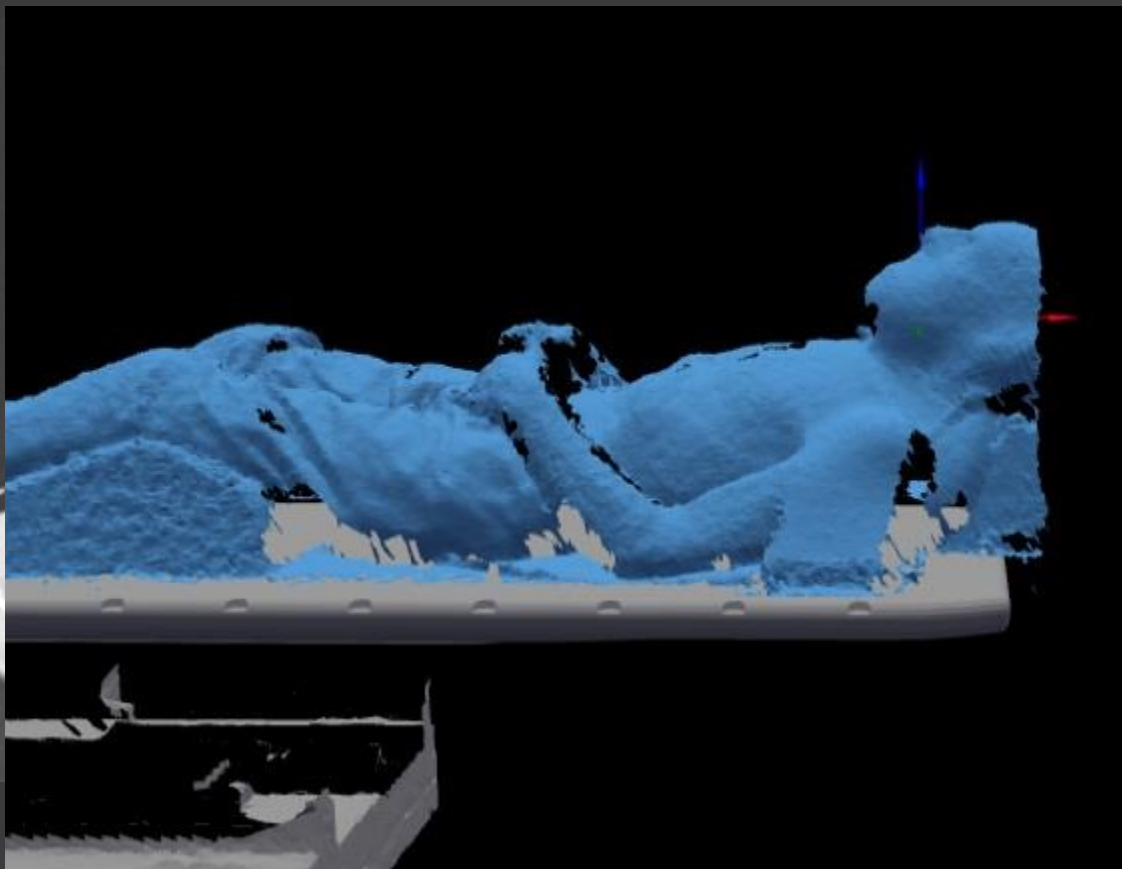
Optimising non-coplanar H&N

Optimising non-coplanar H&N

Current use – Optimising non-coplanar H&N
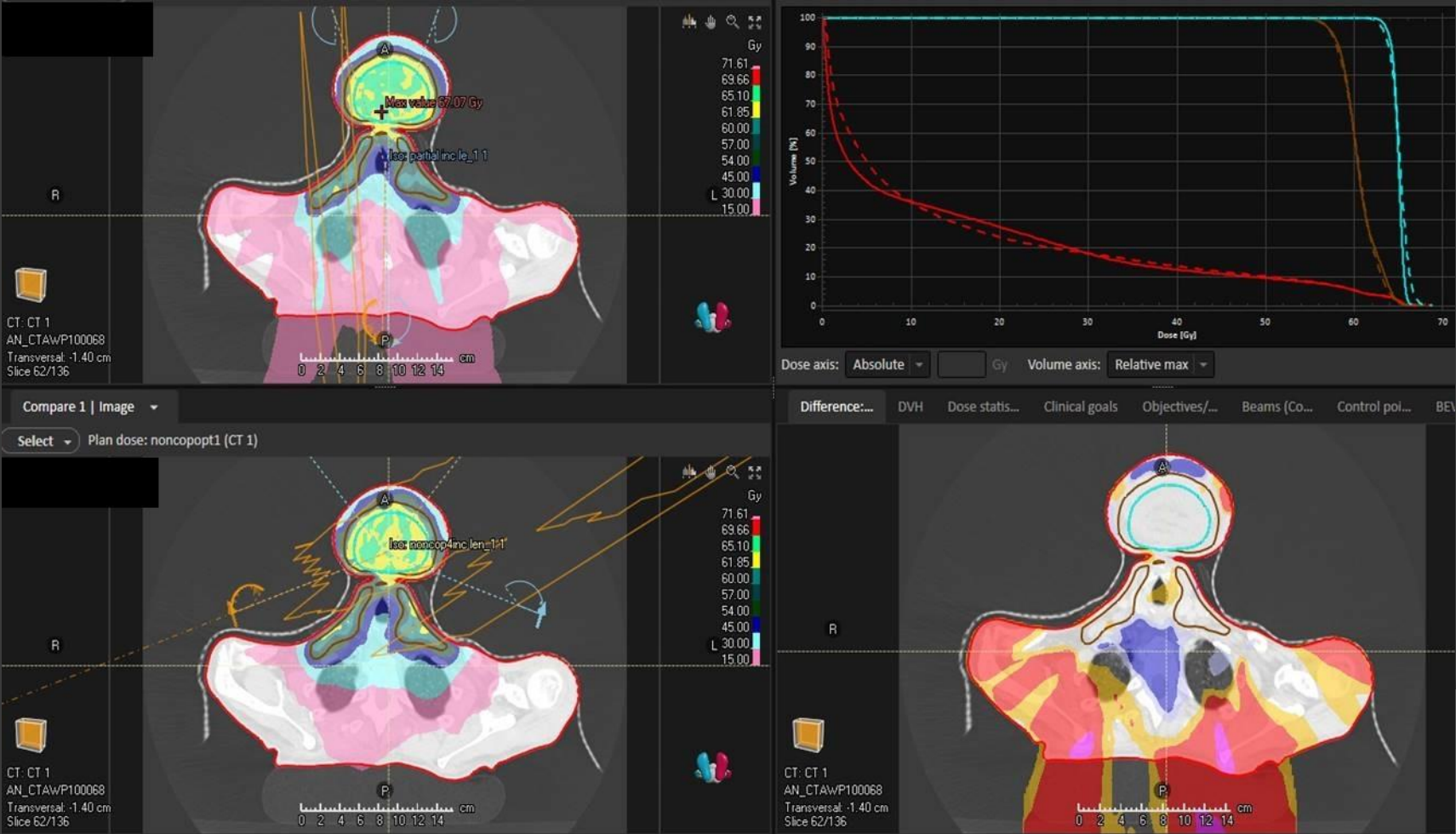
Results

- Qualitative analysis (retro and prospective)
  - DVH/dose stats analysis
  - Visual inspection of isodoses

- Problems on treatment for those planned prospectively

Results

- Class solution for machine parameters obtained
  - GA = 181 – 40; CA 10 (CW and CCW)
  - GA = 320 – 179; CA 350 (CW and CCW)

- Current dosimetric class solution works
  - Minor tweaks found during planning will improve

Results

- *ALL* plans with couch kicks were dosimetrically better when calculated on CBCT

- No problems with *plans* for those treated
  - Replans due to weight loss
  - One needed replan with full shell due to stridor meaning he couldn't keep still
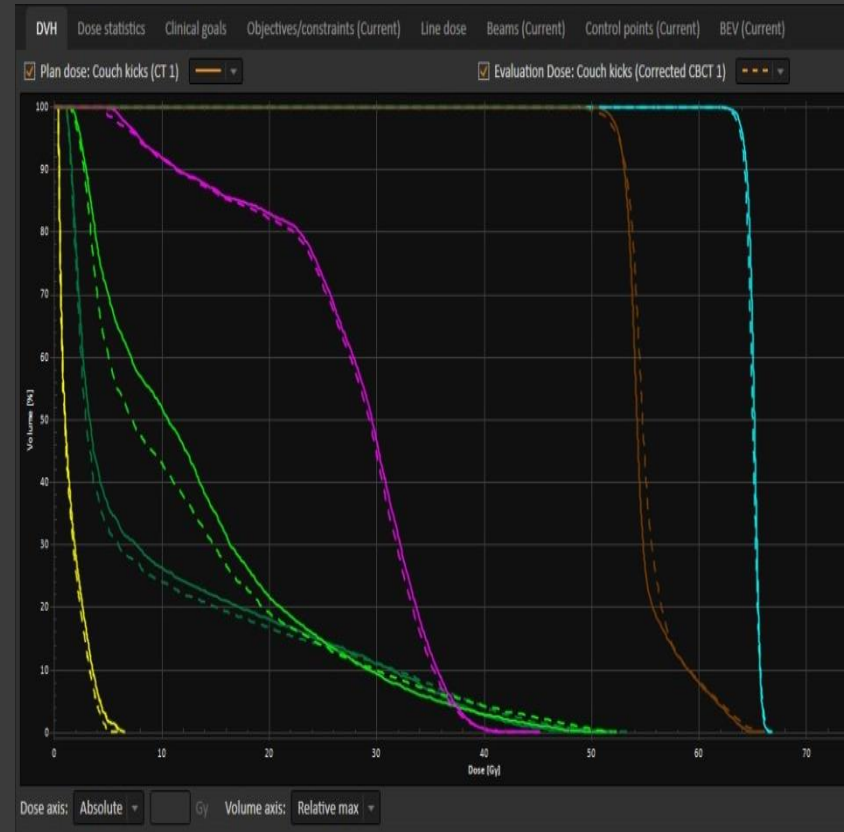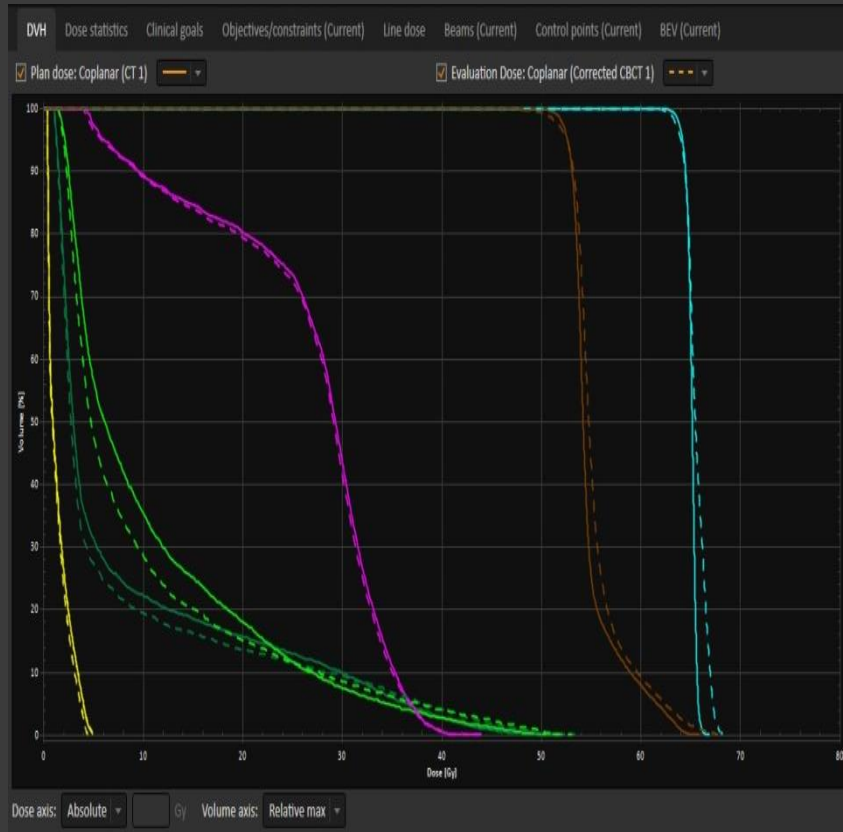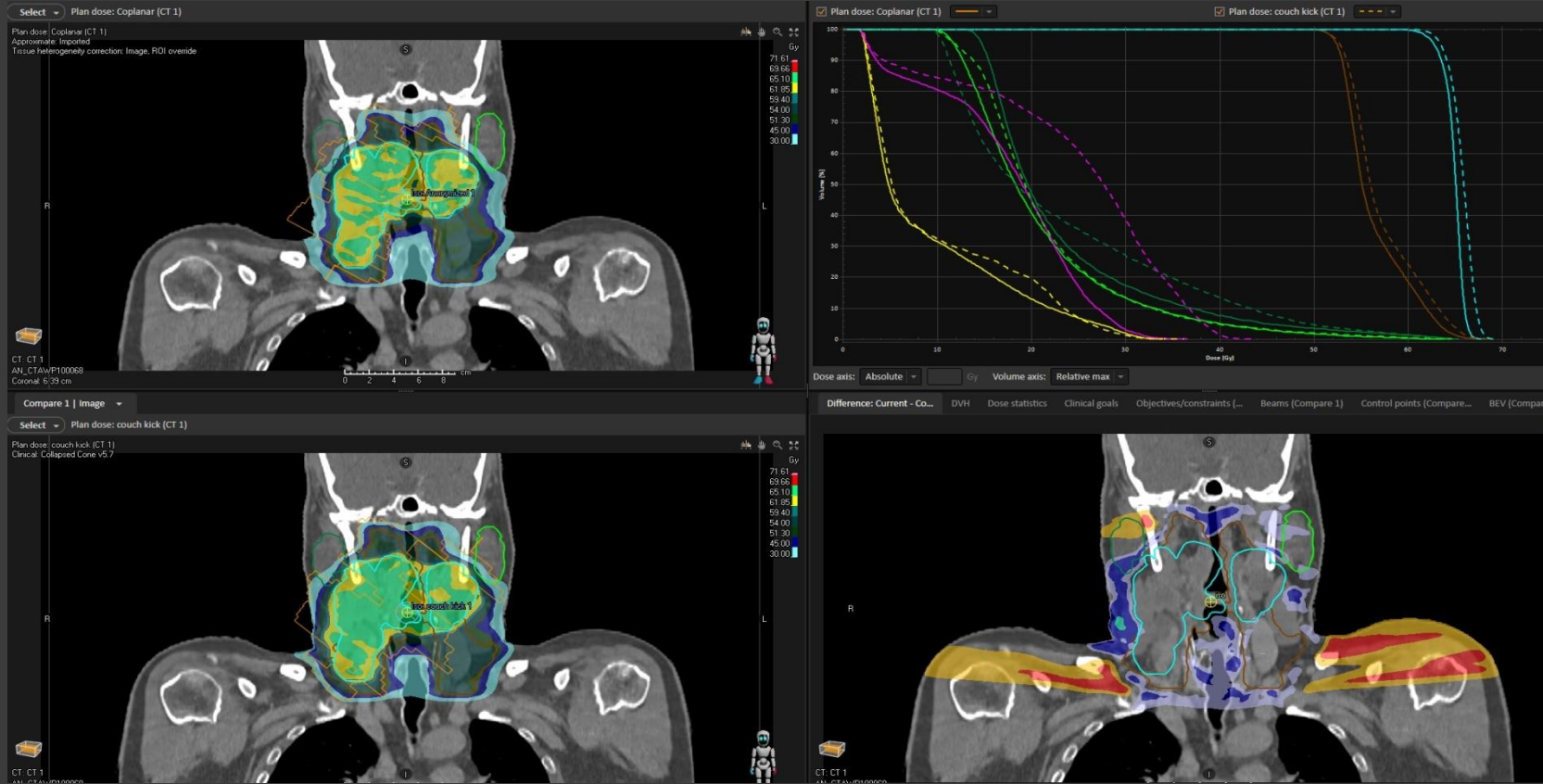
Results

Primary PTV   Nodal PTV
L Parotid   R Parotid
Spinal Cord   Brainstem
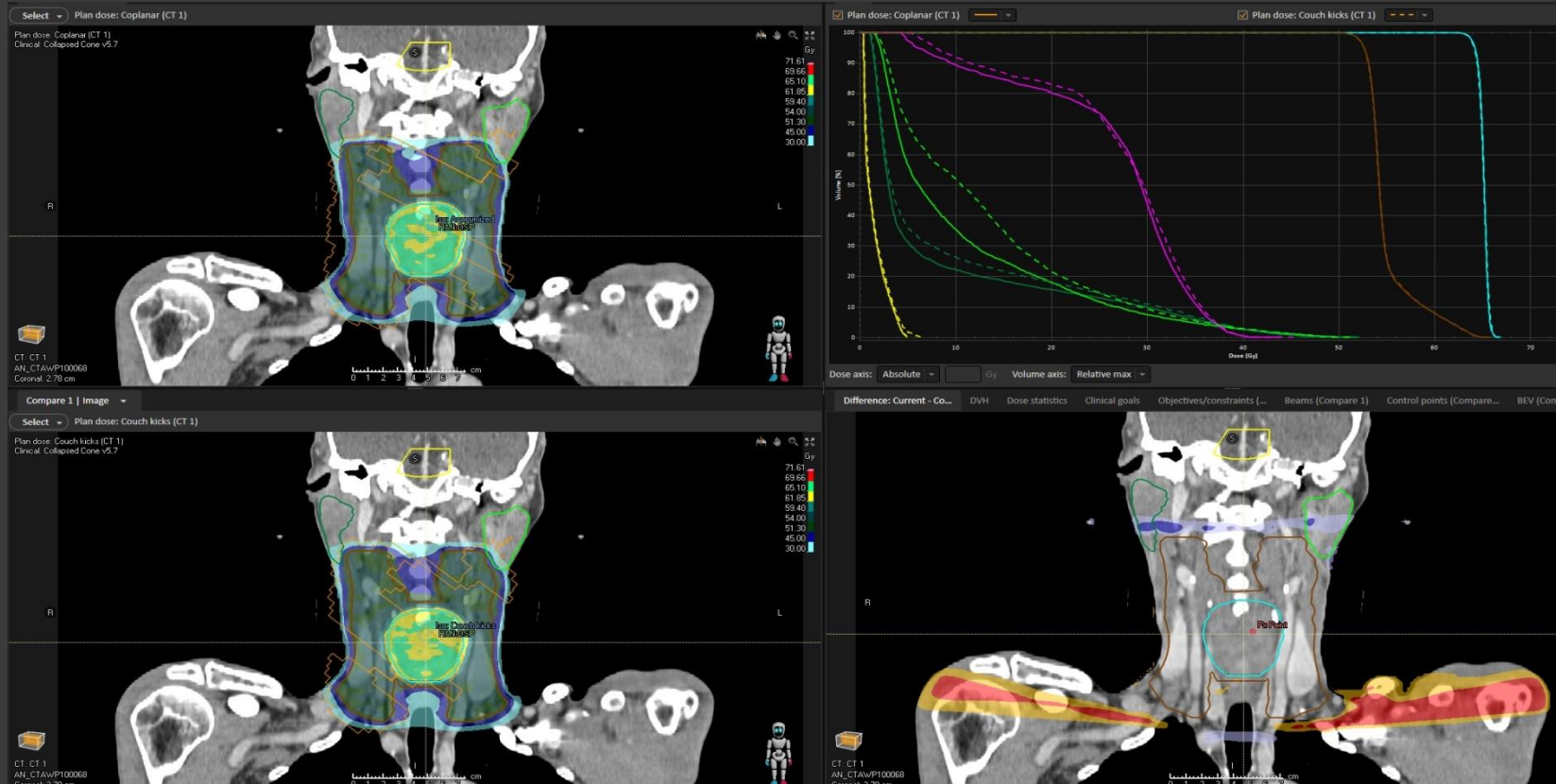
Coplanar   **Couch kicks**

Results

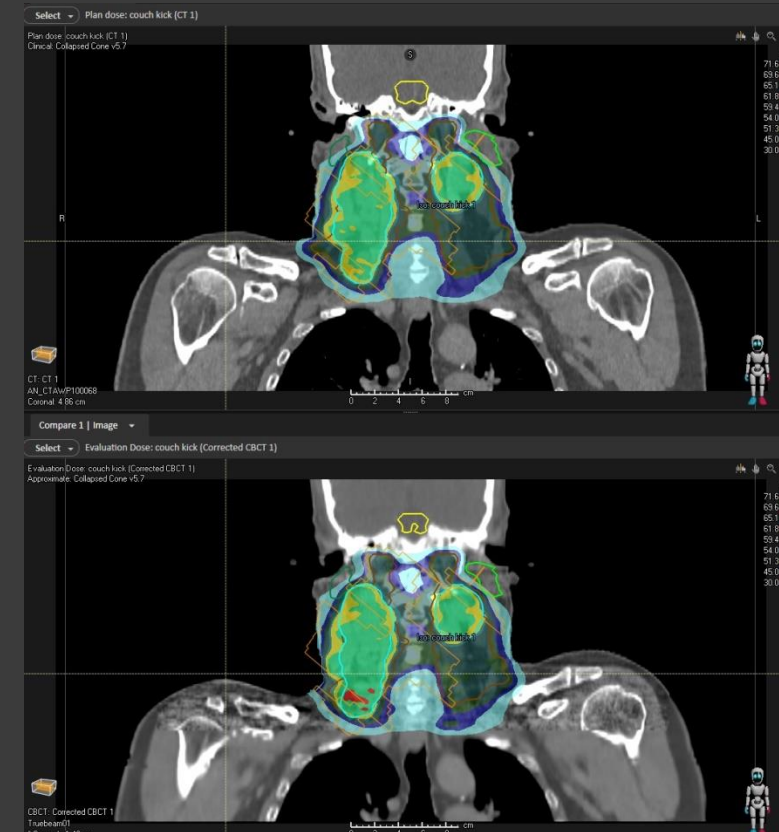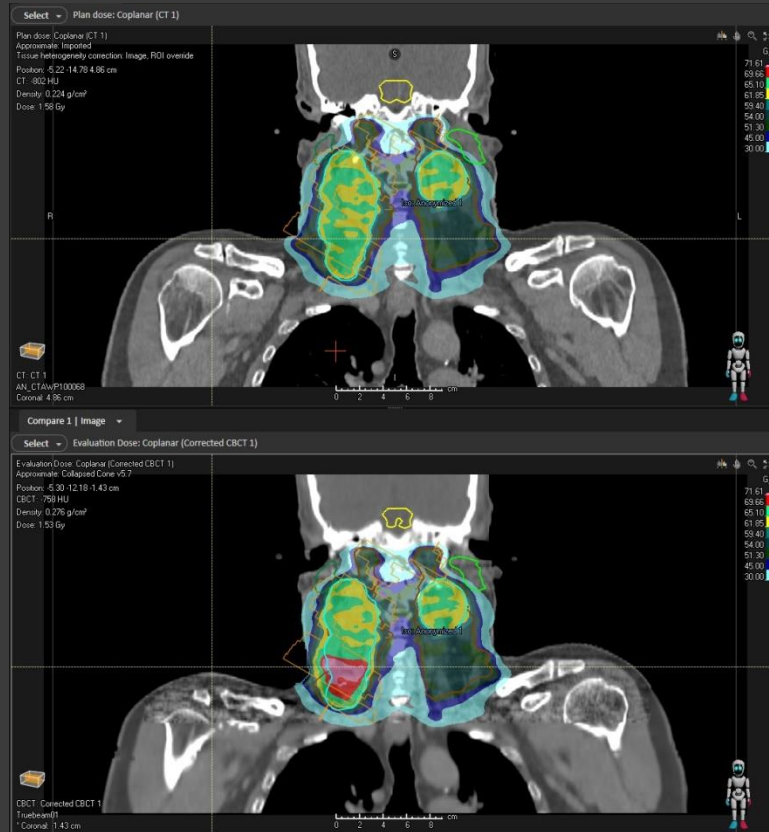Primary PTV Nodal PTV
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Coplanar

Couch kicks

Results

Primary PTV   **Nodal PTV**
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Coplanar   **Couch kicks**

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Coplanar

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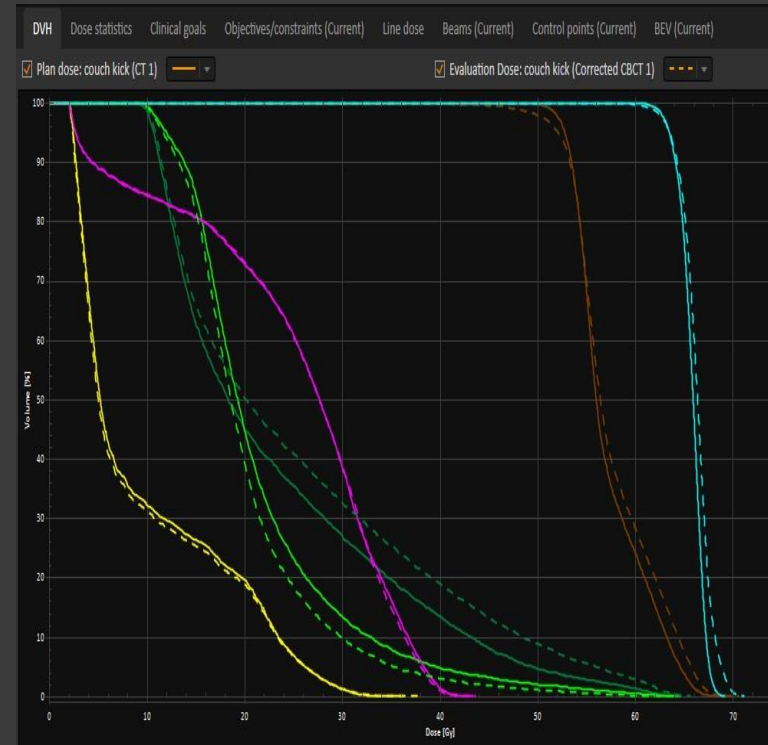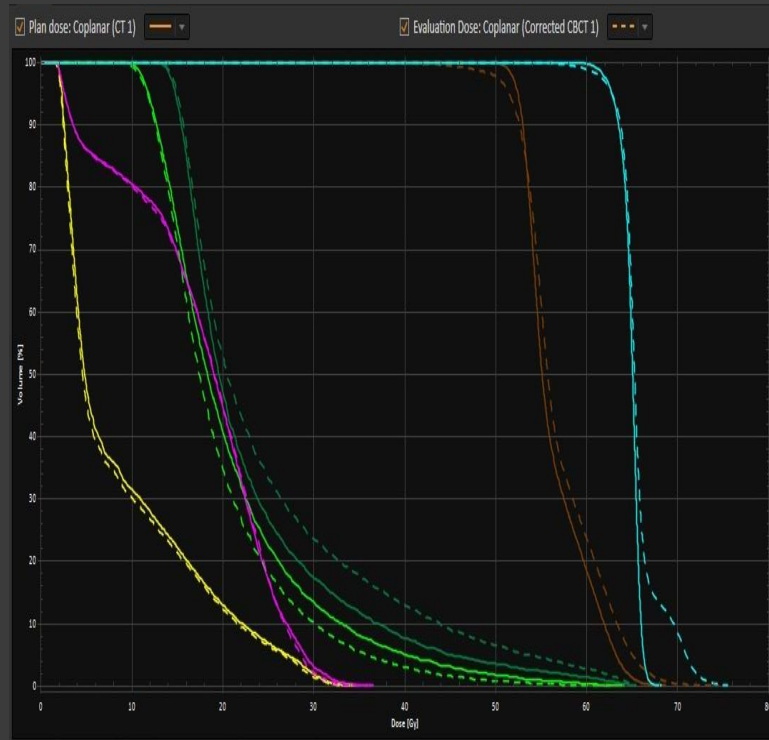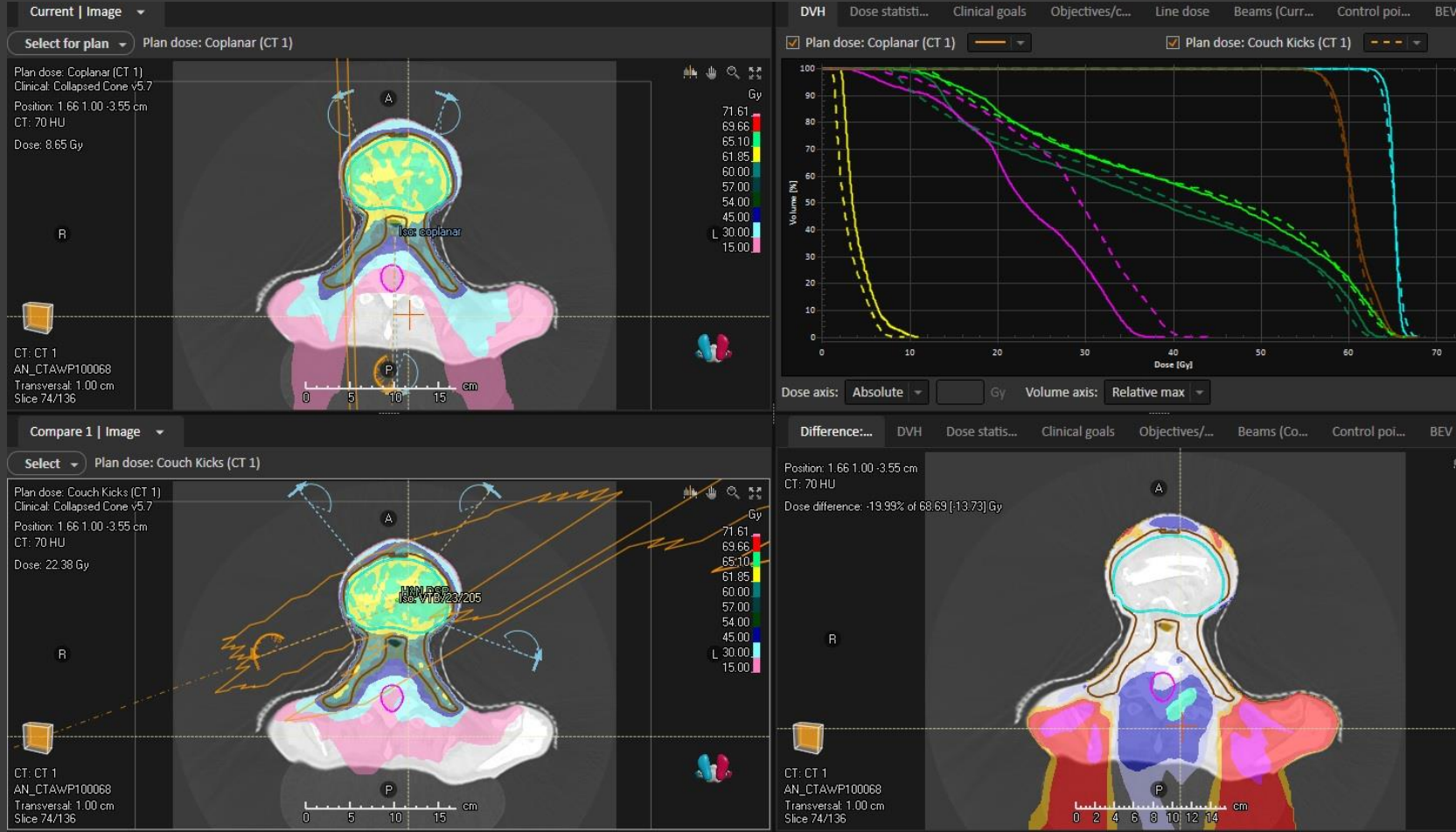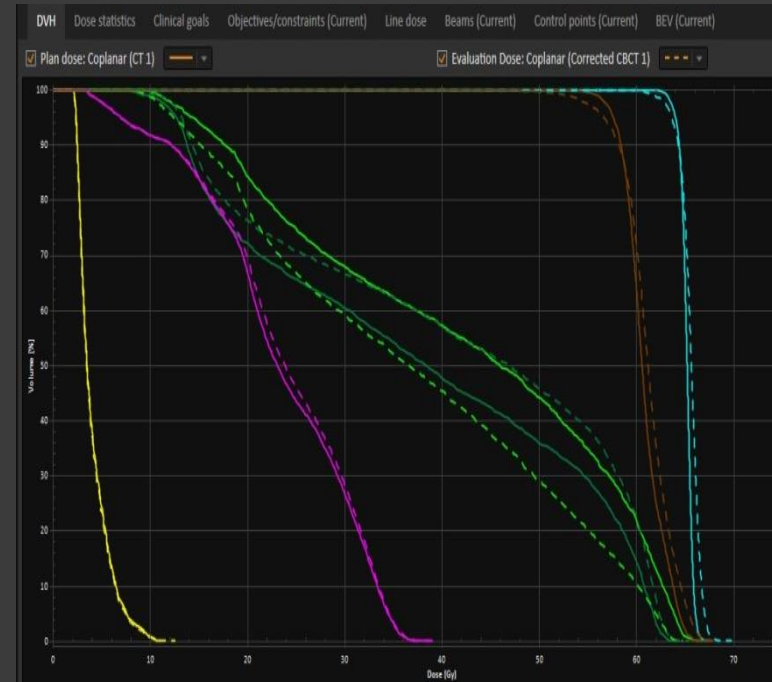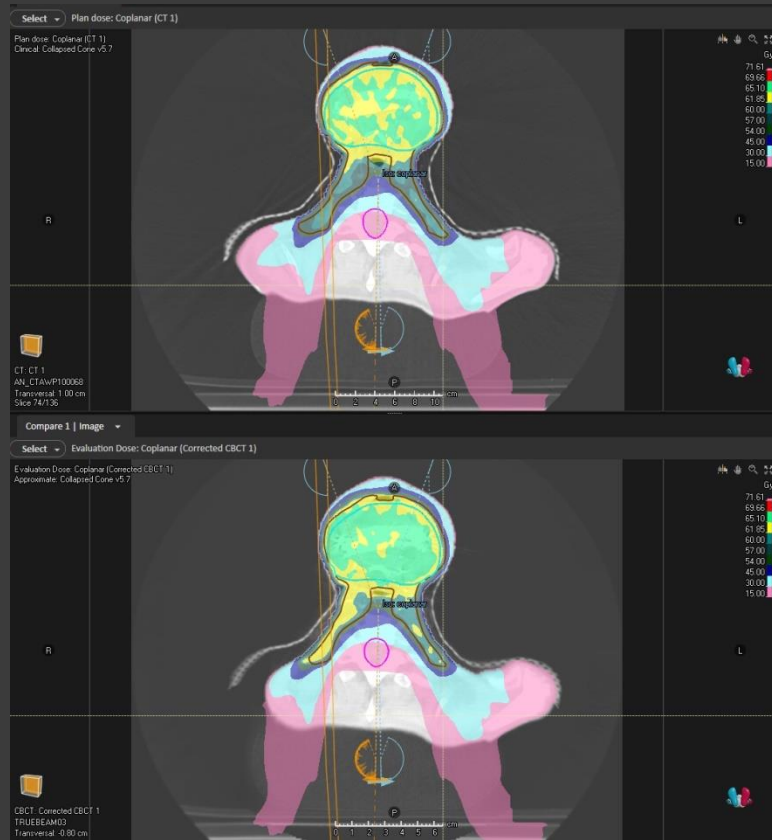L Parotid   R Parotid
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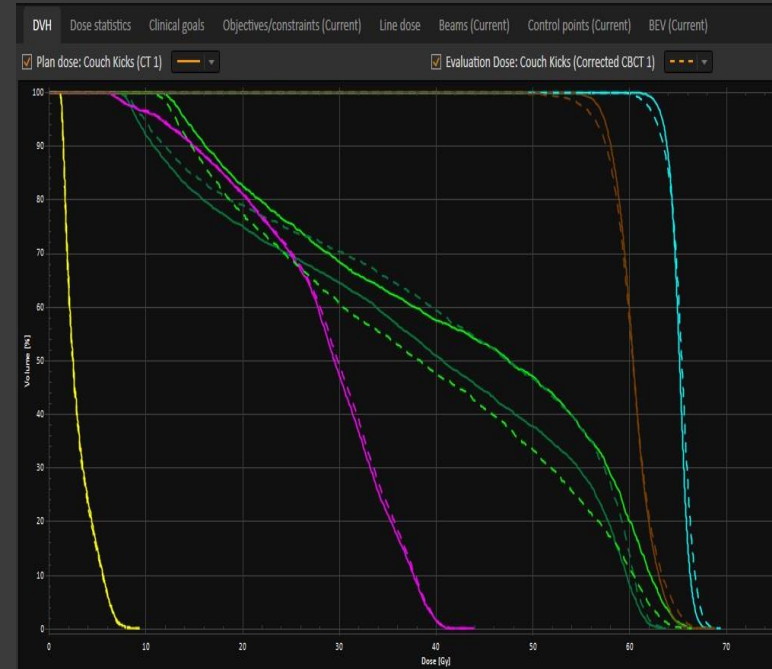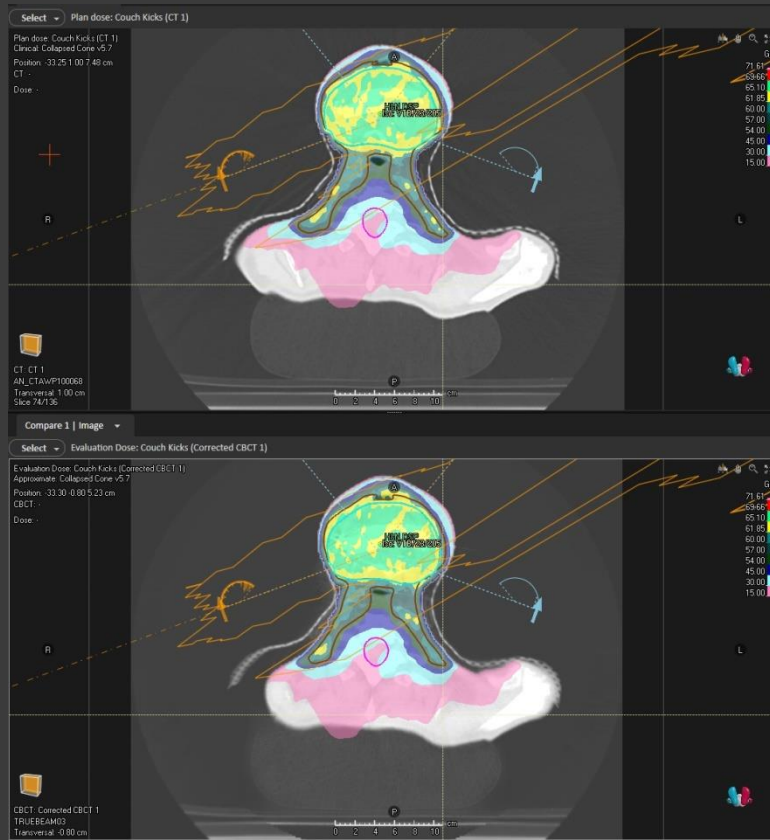
Conclusion

- Planning with couch kicks gives clinically comparable plan to coplanar AND improved reliability of treatment
- No significant time implication
  - Planning
  - Treatment
- MapRT instrumental in developing class solution
  - Can be used to adapt on patient-by-patient basis as required
  - May give us confidence to move couch from outside room

Future work

- Staff training

- Put technique into practice for all H&N patients

- Implement shoulderless/faceless masks

Acknowledgements

- Vision RT

- Radiotherapy colleagues
  - Laura Hammond
  - Robin Taylor
  - Daniel Leach