

MapRT – initial use and further experience

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Background

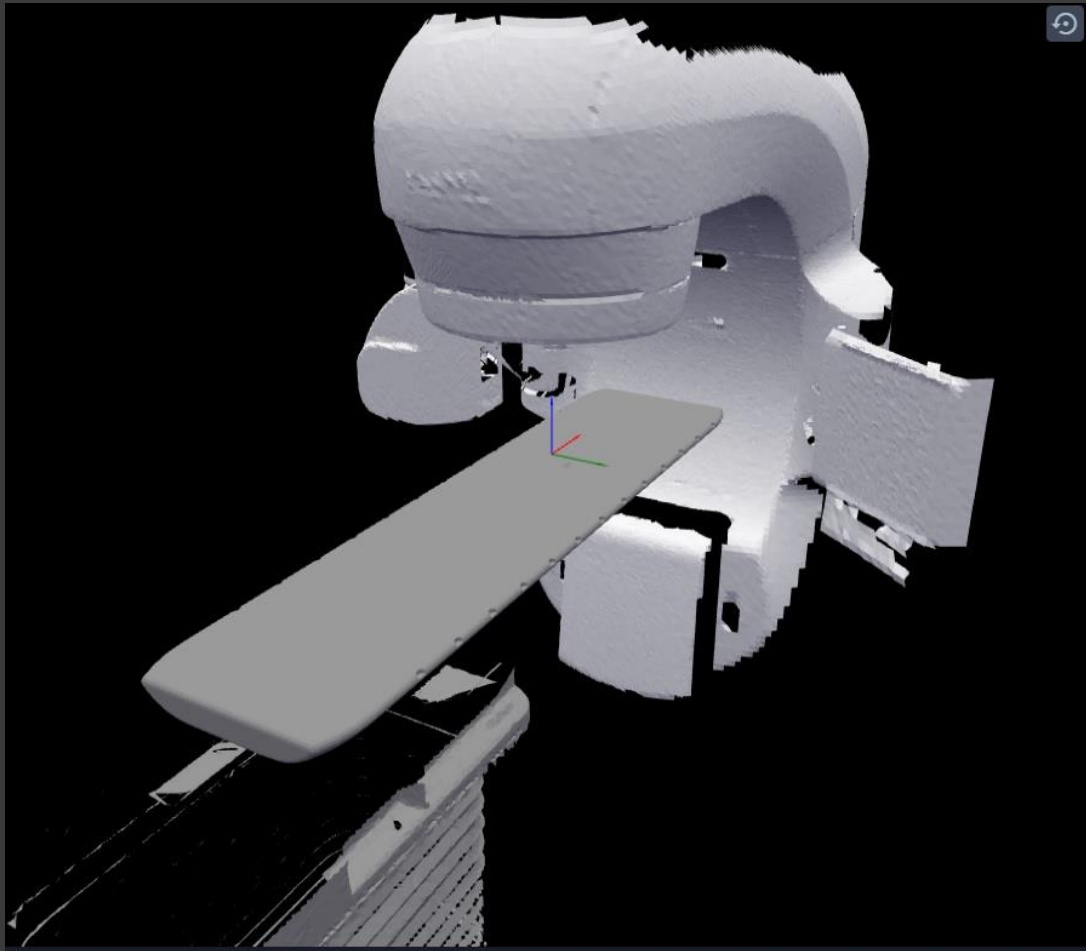
- ◎ Vision RT SGRT Products
 - SimRT
 - MapRT
 - AlignRT

Background

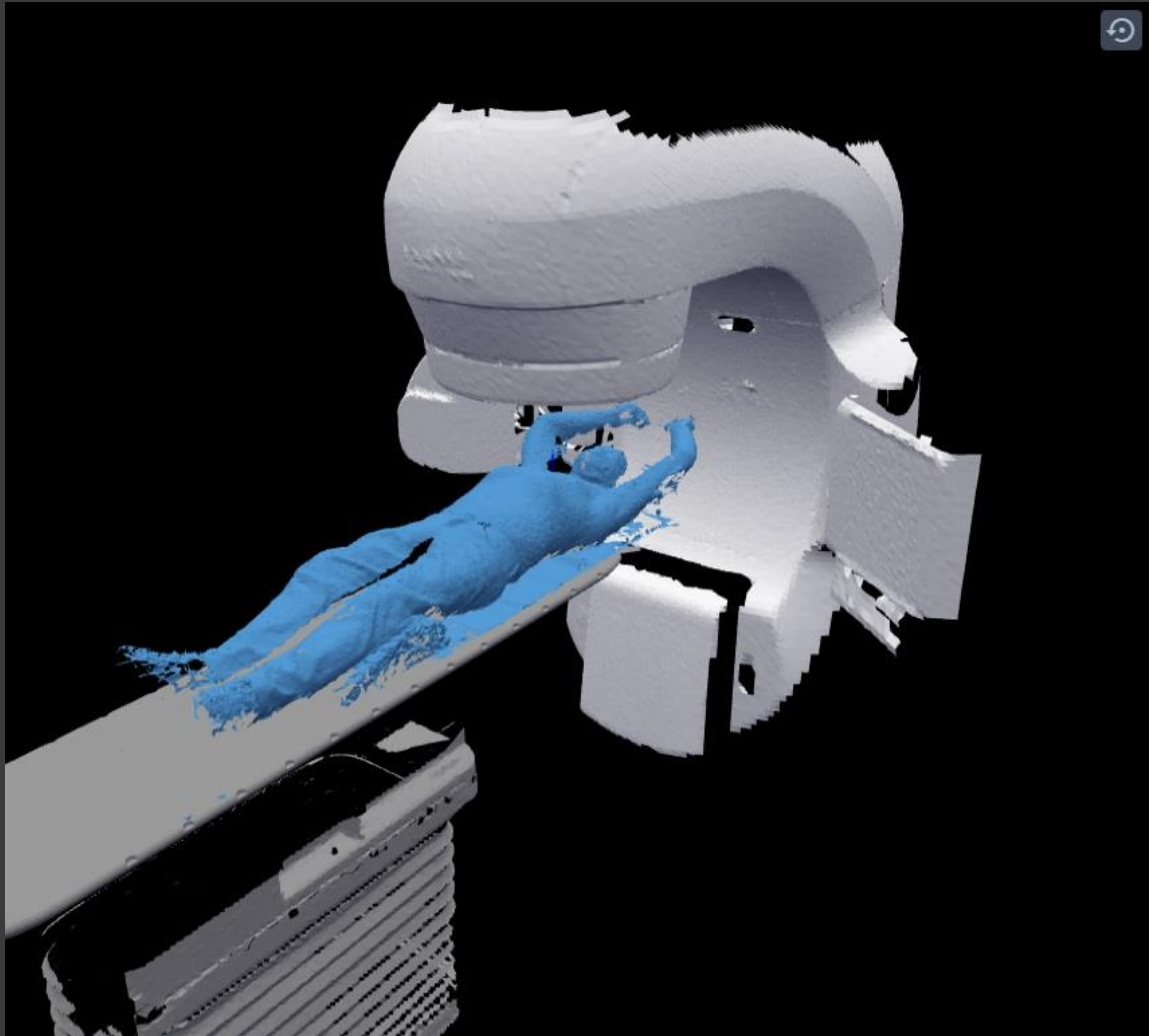
● MapRT

- 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

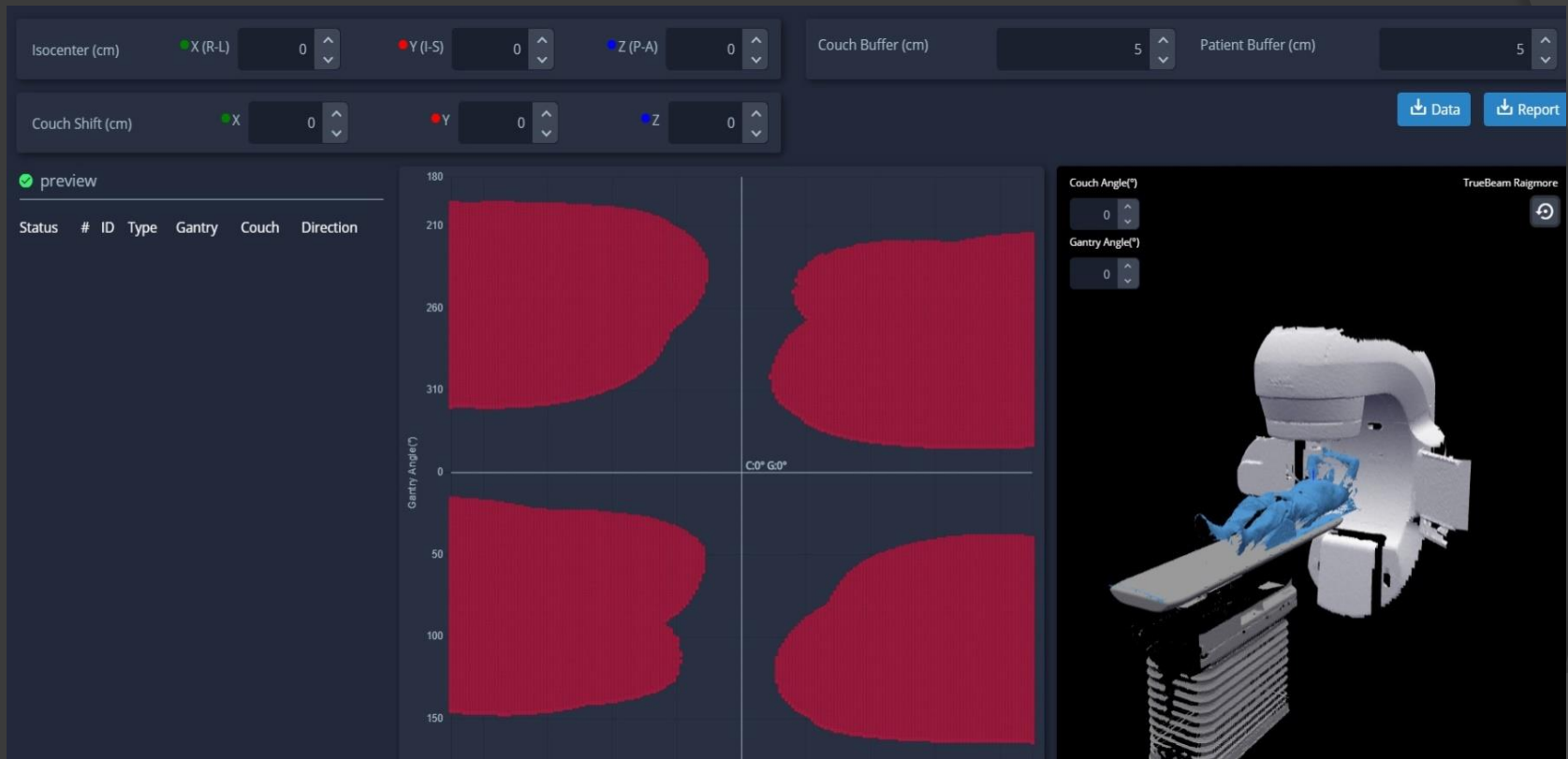
Virtual linac



Patient surface



Clearance Map



Software in action

Isocenter (cm) X (R-L) 0 Y (I-S) 0 Z (P-A) 0 Couch Buffer (cm) 5 Patient Buffer (cm) 5

Couch Shift (cm) X 0 Y 0 Z 0 [Data](#) [Report](#)

preview

Status	#	ID	Type	Gantry	Couch	Direction

Gantry Angle(°)

Couch Angle(°)

C:0° G:0°

Couch Angle(°) 0 TrueBeam H&N Extension

Gantry Angle(°) 0

Software in action – with plan

Isocenter (cm) X (R-L) 0.05 Y (I-S) 2 Z (P-A) 10.94 Couch Buffer (cm) 5 Patient Buffer (cm) 5

Couch Shift (cm) X 0 Y -35 Z 0

VTB/23/205

Status	#	ID	Type	Gantry	Couch	Direct
✓	1	1	Arc CWr	250° to 40°	10°	CW
✓	2	2	Arc CCWr	40° to 250°	10°	CC
✓	3	3	Arc CWI	320° to 110°	350°	CW
✓	4	4	Arc CCWI	110° to 320°	350°	CC
✓	5	Ant ISO	Static	0°	0°	--
✓	6	RLat	Static	270°	0°	--

RECORDED WITH SCREENCAST MATIC

Couch Angle (°) 10 Gantry Angle (°) 40

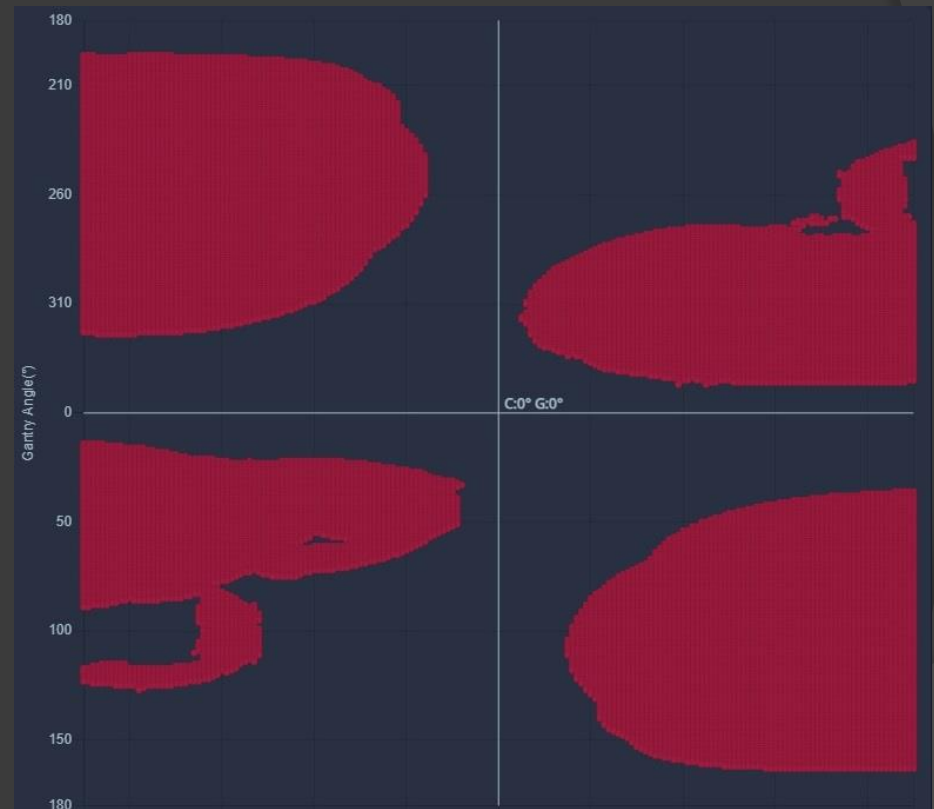
TrueBeam H&N Extension

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

Workflow – pre CT scan

- ⦿ Set up patient
- ⦿ Take full body surface capture at external lasers
- ⦿ Perform ‘plan preview’ with Clearance Map
 - If collision detected – amend patient position/accessories
 - No collision – proceed to scan



Workflow – during CT scan

- ⦿ Setup patient and capture surface
- ⦿ Estimate isocentre
 - From diagnostic CT
 - From class solution
 - From mini-CT
- ⦿ Assess Clearance Map
- ⦿ If above deemed to be practical, proceed to scan

Workflow – during planning

- ① Create initial plan in Planning system
- ② Export to server
- ③ Assess Clearance map
- ④ Adjust isocentre/machine angles if required
- ⑤ Replan if required and repeat collision assessment

Background

- ⦿ Collision problems
 - Treatment fields – both VMAT and 3DCRT
 - CBCT / kV match imaging fields
- ⦿ Immobilisation?
- ⦿ Patient co-morbidities?
- ⦿ How to predict and prevent while also improving plan quality

Current use

- ⦿ All patients routinely captured at CT
- ⦿ Several have had position amended to avoid collision
 - Thorax (especially SABR)
 - Breast patients (especially VMAT for IMC)
- ⦿ Increased use during planning to optimise plans
- ⦿ Increased radiographer confidence in removing 'dummy runs'

Current use – Collision - SABR

Isocenter (cm) X (R-L) -8.89 Y (I-S) 12.66 Z (P-A) -7.65 Couch Buffer (cm) 5 Patient Buffer (cm) 5

Couch Shift (cm) X 0 Y 0 Z 0 [Data](#) [Report](#)

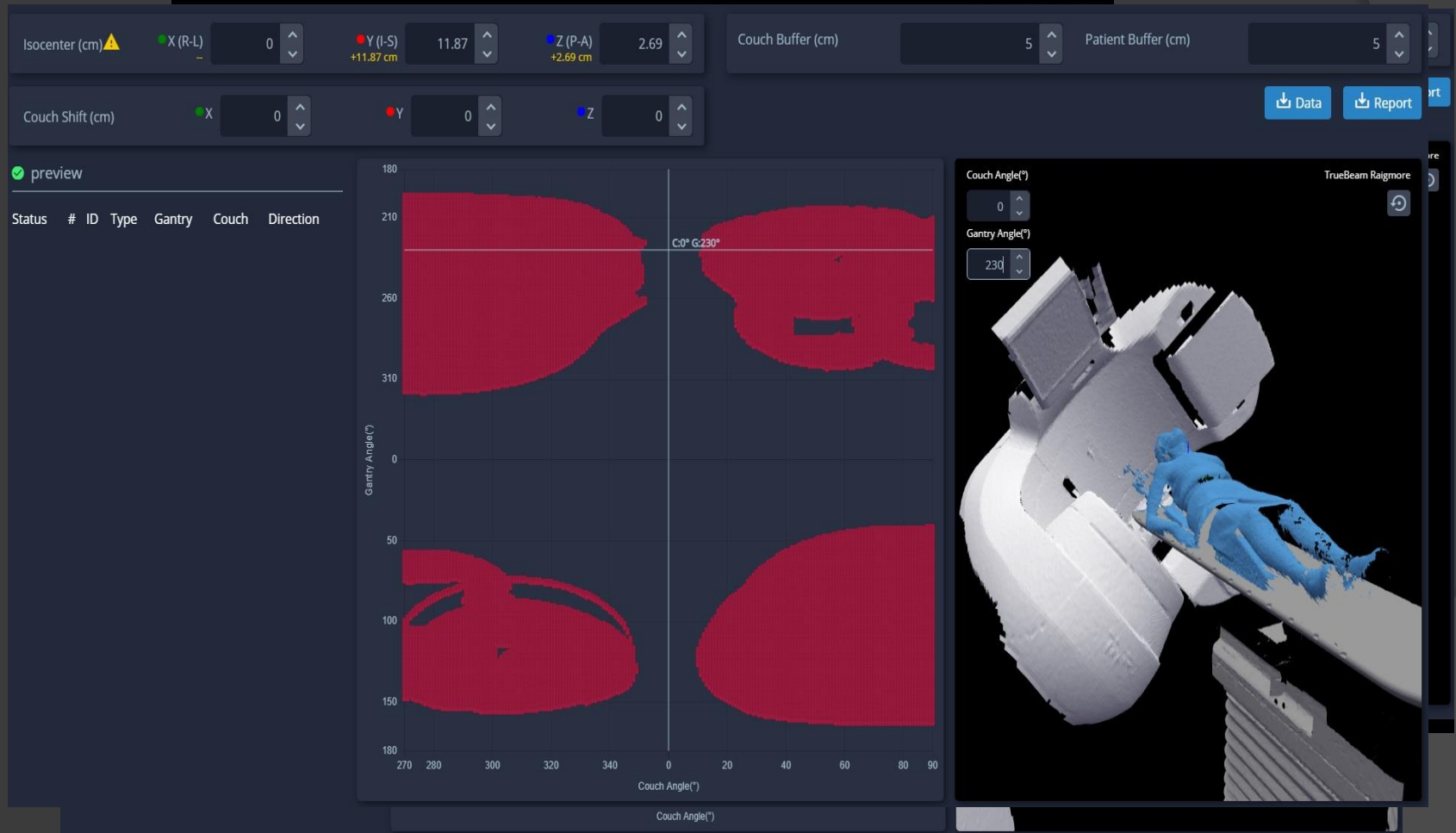
VTB/22/432

Status	#	ID	Type	Gantry	Couch	Direction
✓	1	1 CW	Arc	181° to 10°	0°	CW
✓	2	2 CCW	Arc	10° to 181°	0°	CC
✓	3	Post ISO	Static	180°	0°	--
✓	4	CBCT	Static	0°	0°	--
✓	5	RLat ISO	Static	270°	0°	--

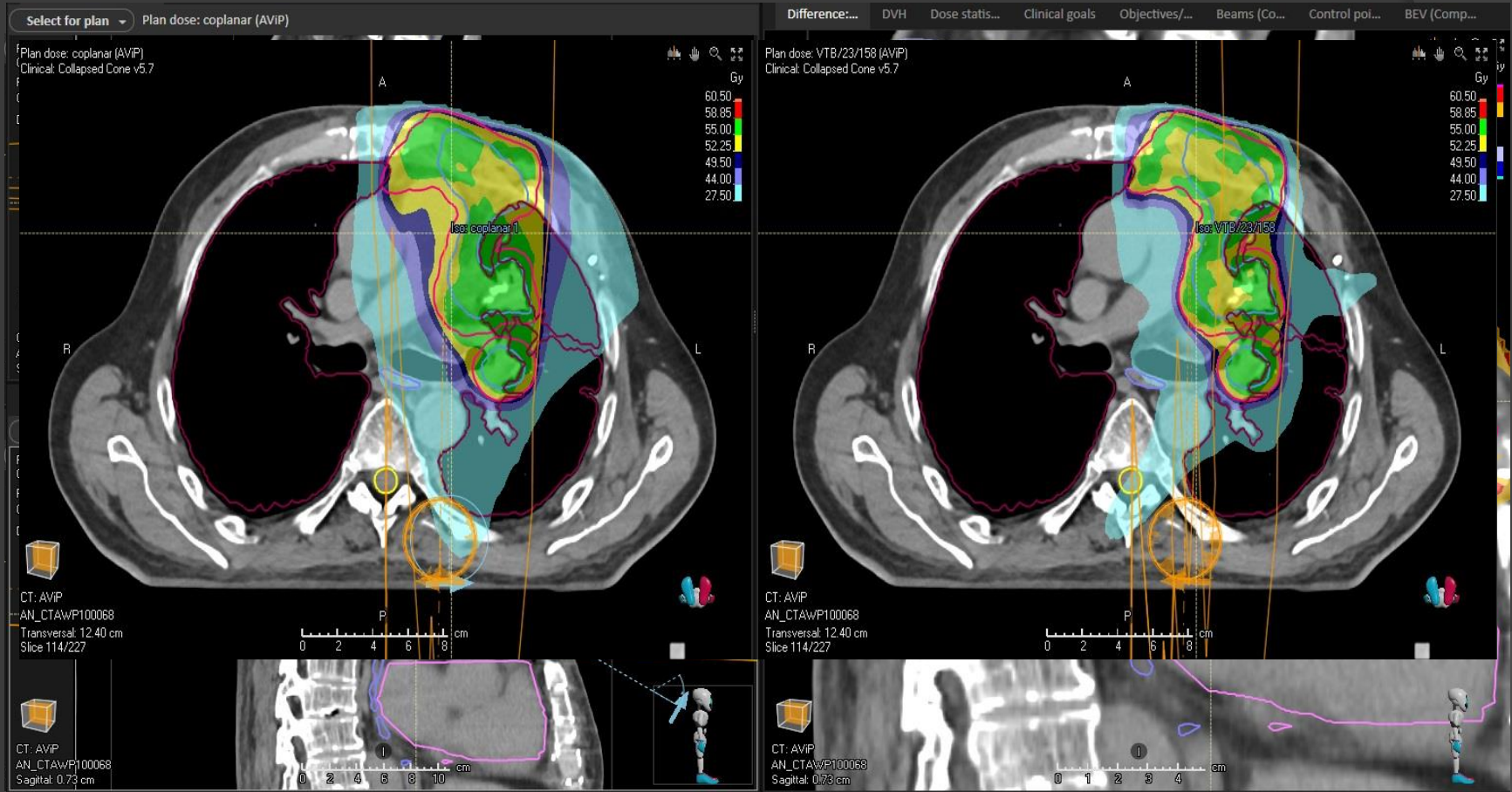
Couch Angle(°) 0
Gantry Angle(°) 50

TrueBeam Raigmore

Current use – Breast patient unusual position



Current use – Optimising non-coplanar mediastinum



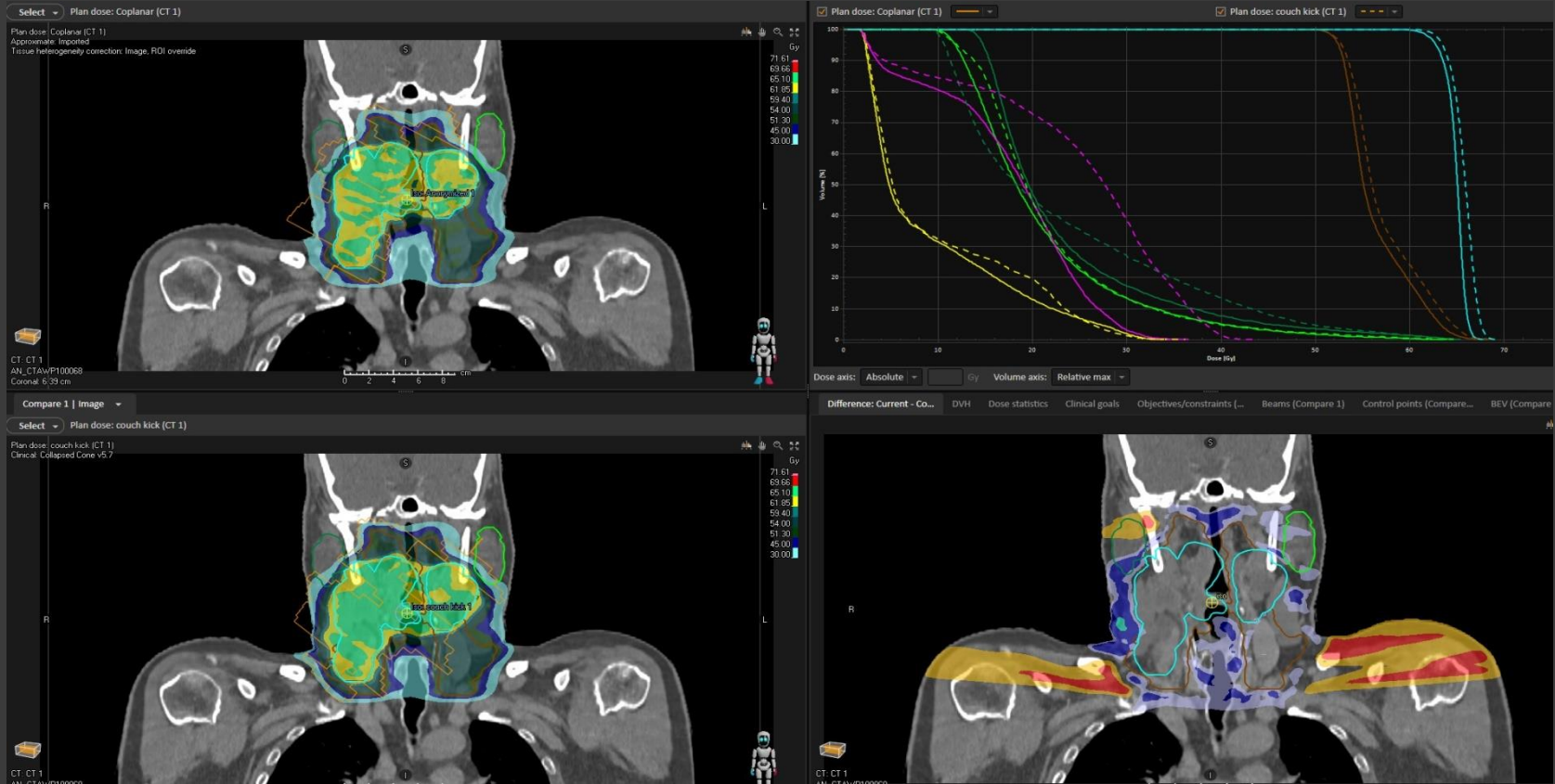
Current use – Optimising non-coplanar H&N

- ◎ Avoiding entering thro shoulders
 - Improves reliability of dosimetry due to removing positional uncertainty
 - Partial arcs or couch kicks
 - Combined workflow with AlignRT and shoulderless masks
- ◎ Optimising machine parameters
 - Avoid collision
 - Improve distribution

H&N Results

Primary PTV Nodal PTV
L Parotid R Parotid
Spinal Cord Brainstem

Coplanar

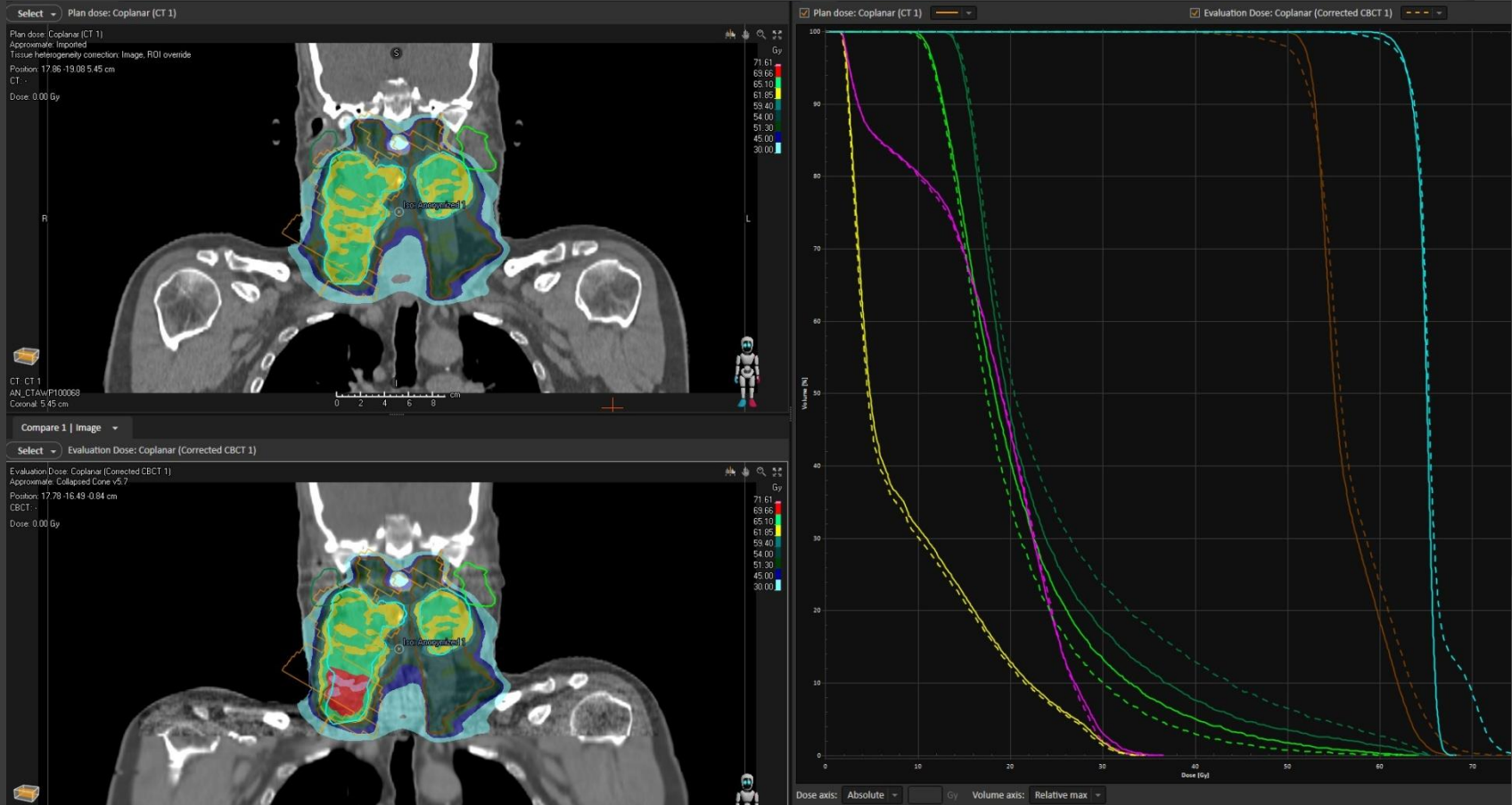


Couch kicks

Results - Coplanar

Primary PTV Nodal PTV
L Parotid R Parotid
Spinal Cord Brainstem

CT

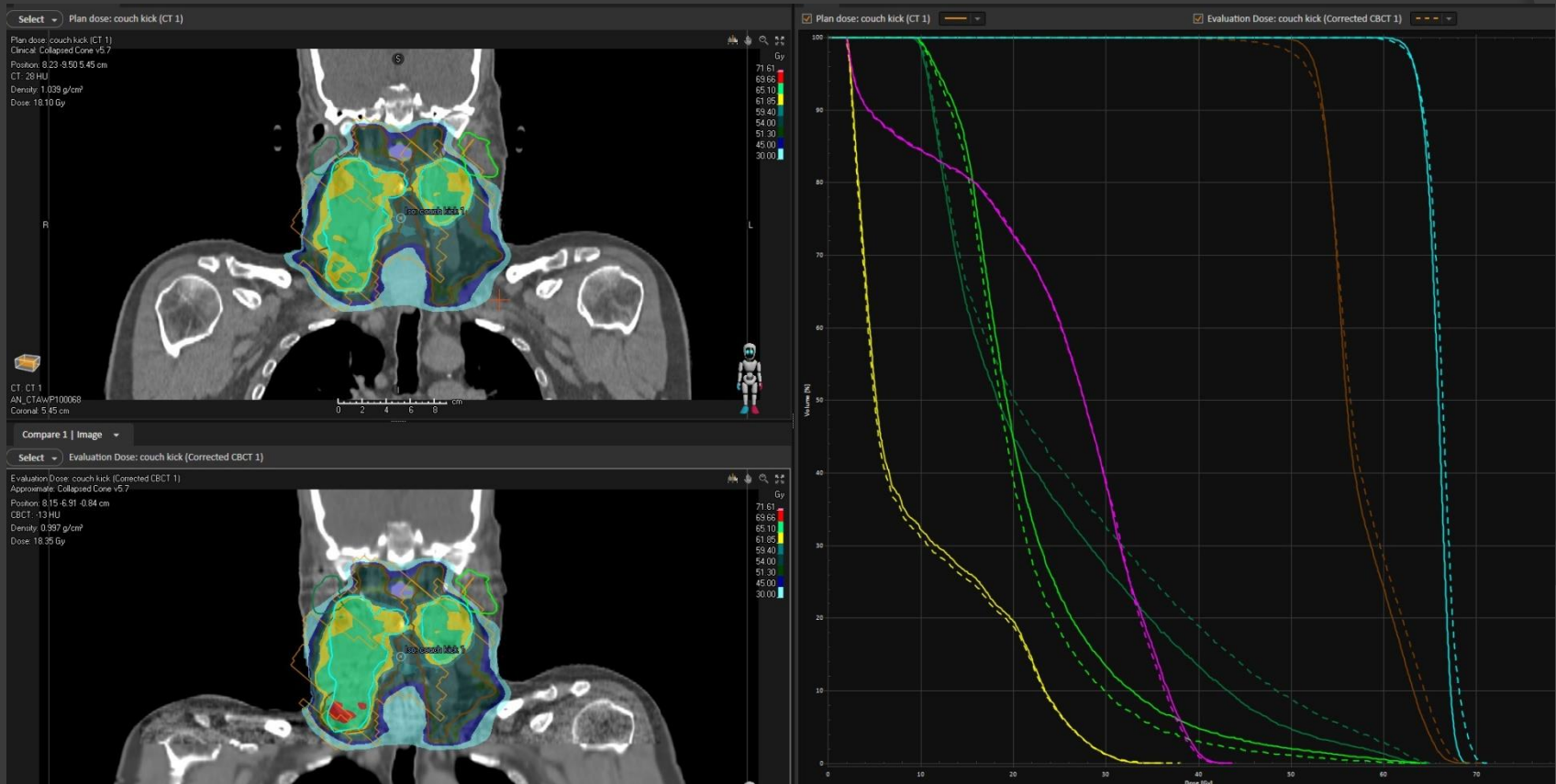


CBCT

Results – Couch Kicks

Primary PTV Nodal PTV
L Parotid R Parotid
Spinal Cord Brainstem

CT



CBCT

Conclusion

- ⦿ Valuable tool
 - Predicting collision
 - Optimising gantry and couch angles
- ⦿ Reduces risk of having to re-CT
- ⦿ Reduces need for 'dummy run' appts
- ⦿ Accurate

Future work

- ⦿ Fully roll out training to all staff
- ⦿ Retrospective planning studies
 - Improve on current class solutions
- ⦿ Optimise non-coplanar cases

Acknowledgements

- Vision RT
- Radiotherapy colleagues