SURFACE GUIDANCE WITH RING GANTRY TREATMENT DELIVERY IN TWO ISO CENTRE CASES

From,

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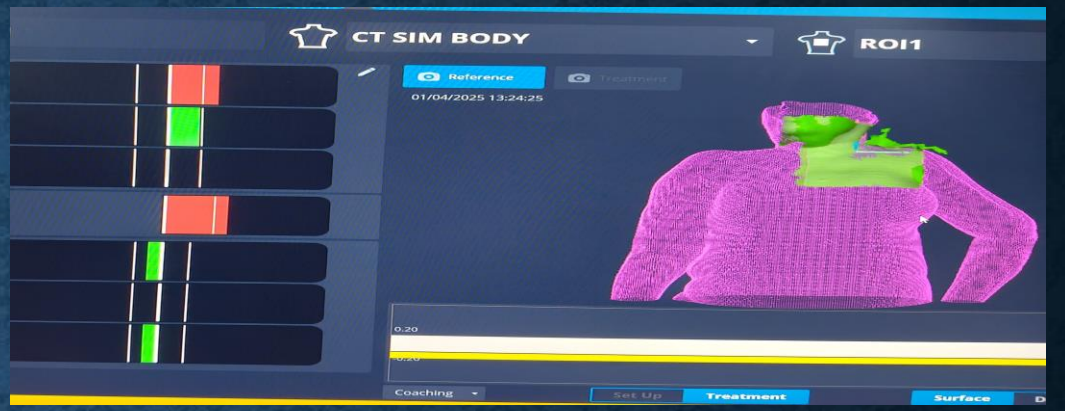
INTRODUCTION

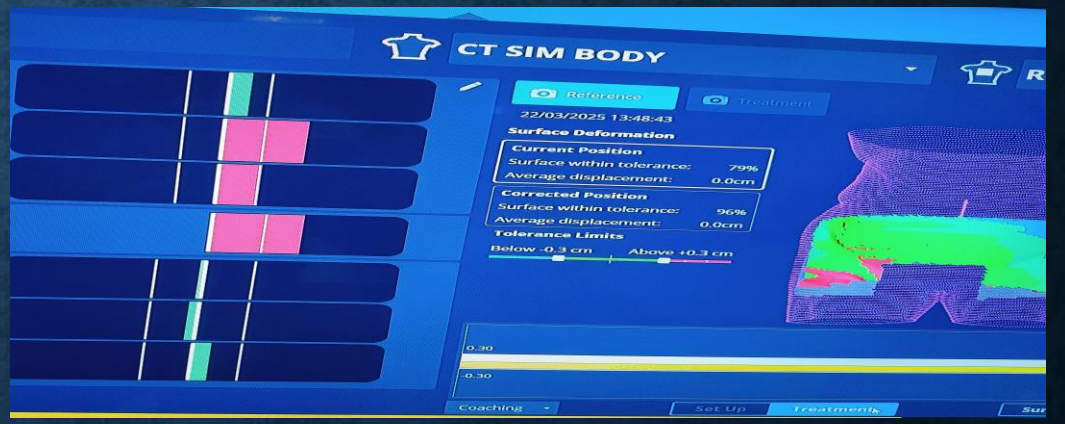
- Surface guided radiotherapy is a unique (advance) tool in the image guided radiation therapy (IGRT).
- Its main advantage is that it is nonionizing.
- Surface imaging reconstructs the three-dimensional (3D) surface of the patient in real time monitoring using optical imaging without the need for external markers.
- it can be used on a daily basis for initial positioning and continuous with monitoring of intrafraction motion and we can hold or interrupt the treatment manually, if motion will exceed the threshold of the treatment.

THREE WAY TO SET UP WITH SGRT

Matching the surface



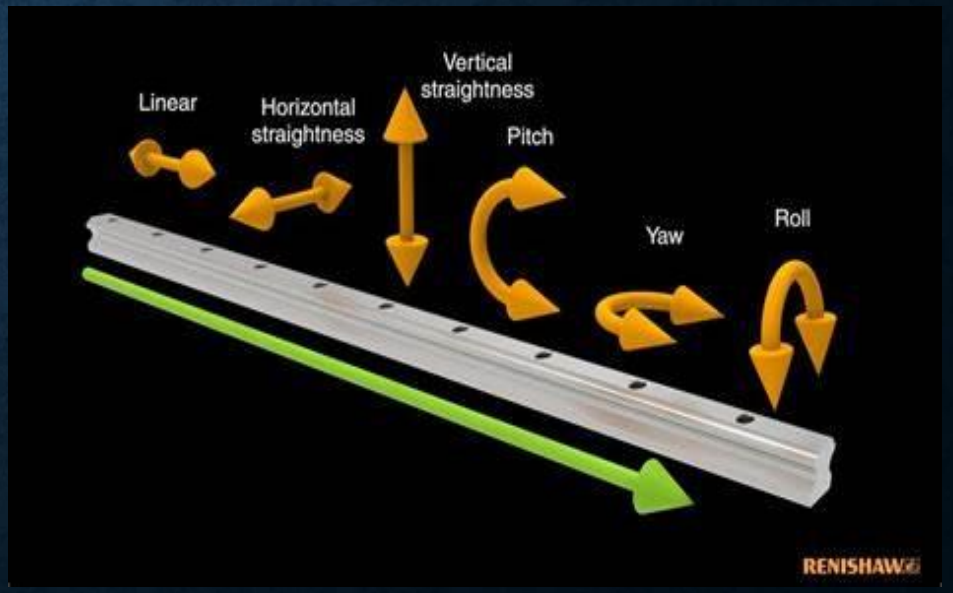
Matching the surface Deformation



Matching the Postural Video

PURPOSE

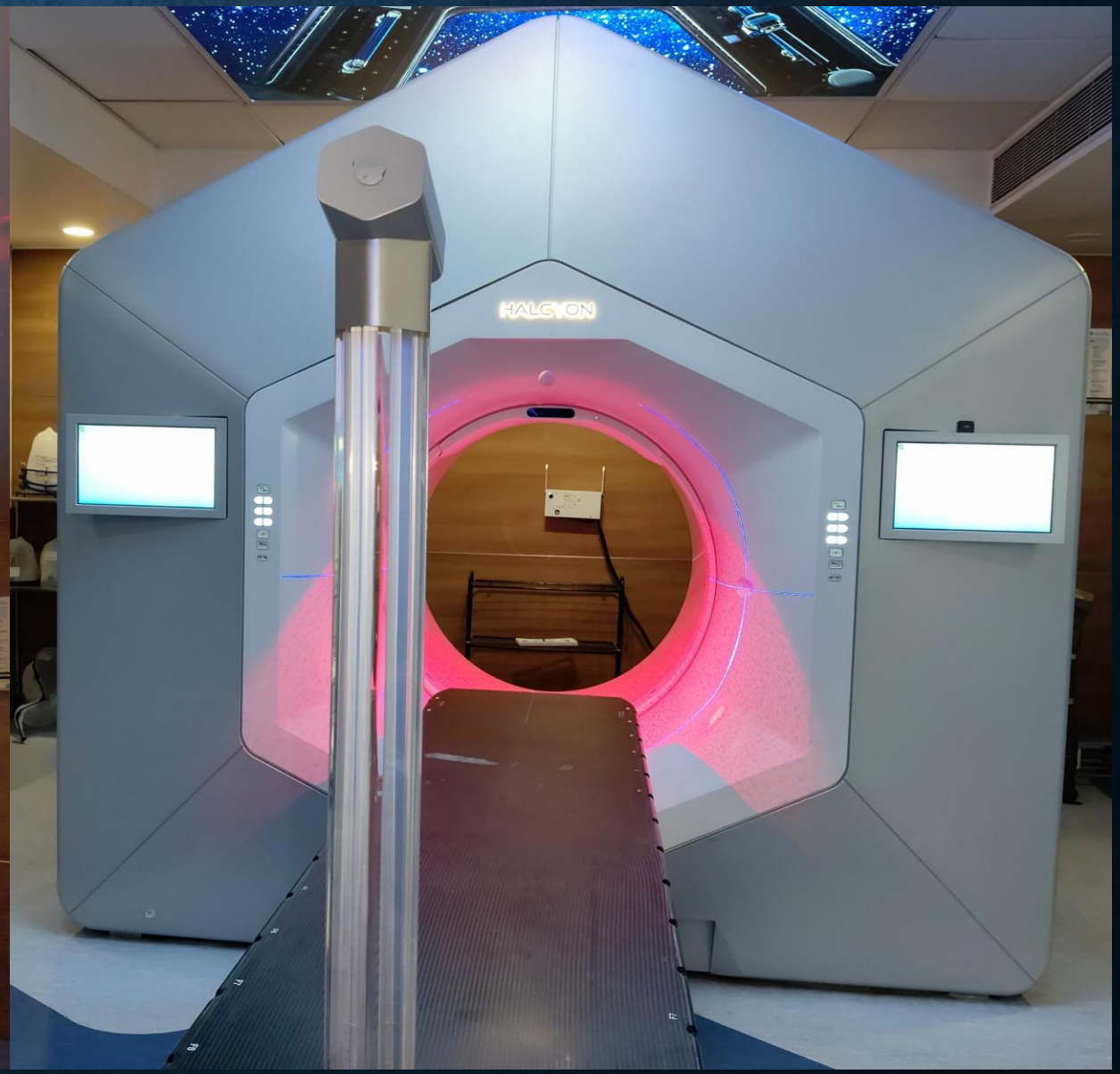
- It Non- invasive, reduces the use of immobilization.
- It reduces the need of “permanent tattoos or skin marking process”
- High Precision in aligning patient during the radiotherapy positioning.
- Reduces the repetition of KV-CBCT imaging radiation exposure to the patients.
- SGRT gives six degrees of freedom to correct the patients positioning by translations and rotations errors in real time during the set up for treatment.



WORK FLOW OF SGRT SYSTEM

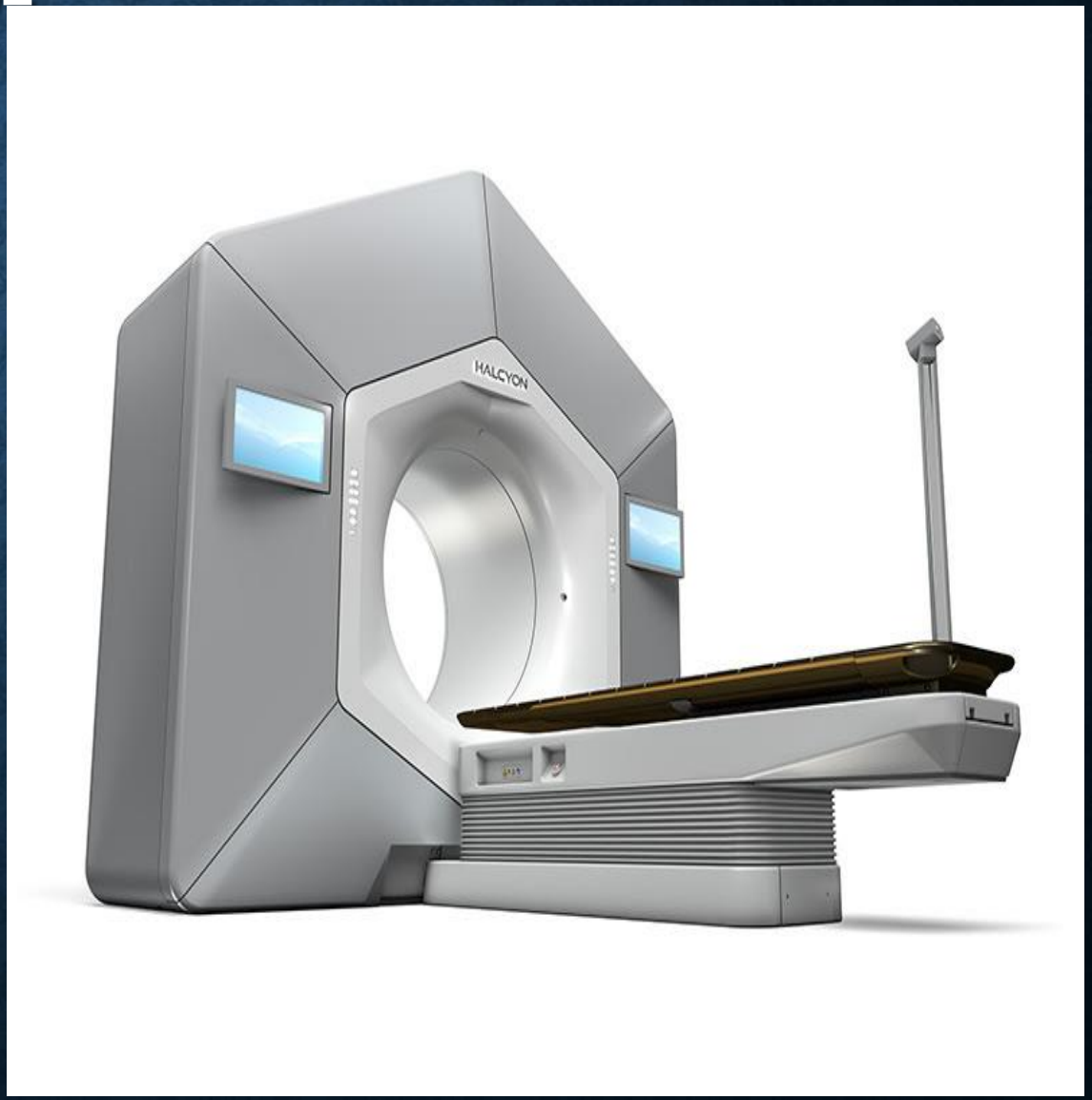
- Daily morning QA check
- Mark ROI delineation
- Check skin tone surface
- Setup Patient for treatment
- Treatment Delivery and monitor

VISION-RT SYSTEM INSTALLED IN NOVEMBER 2024 VERSION 7.0

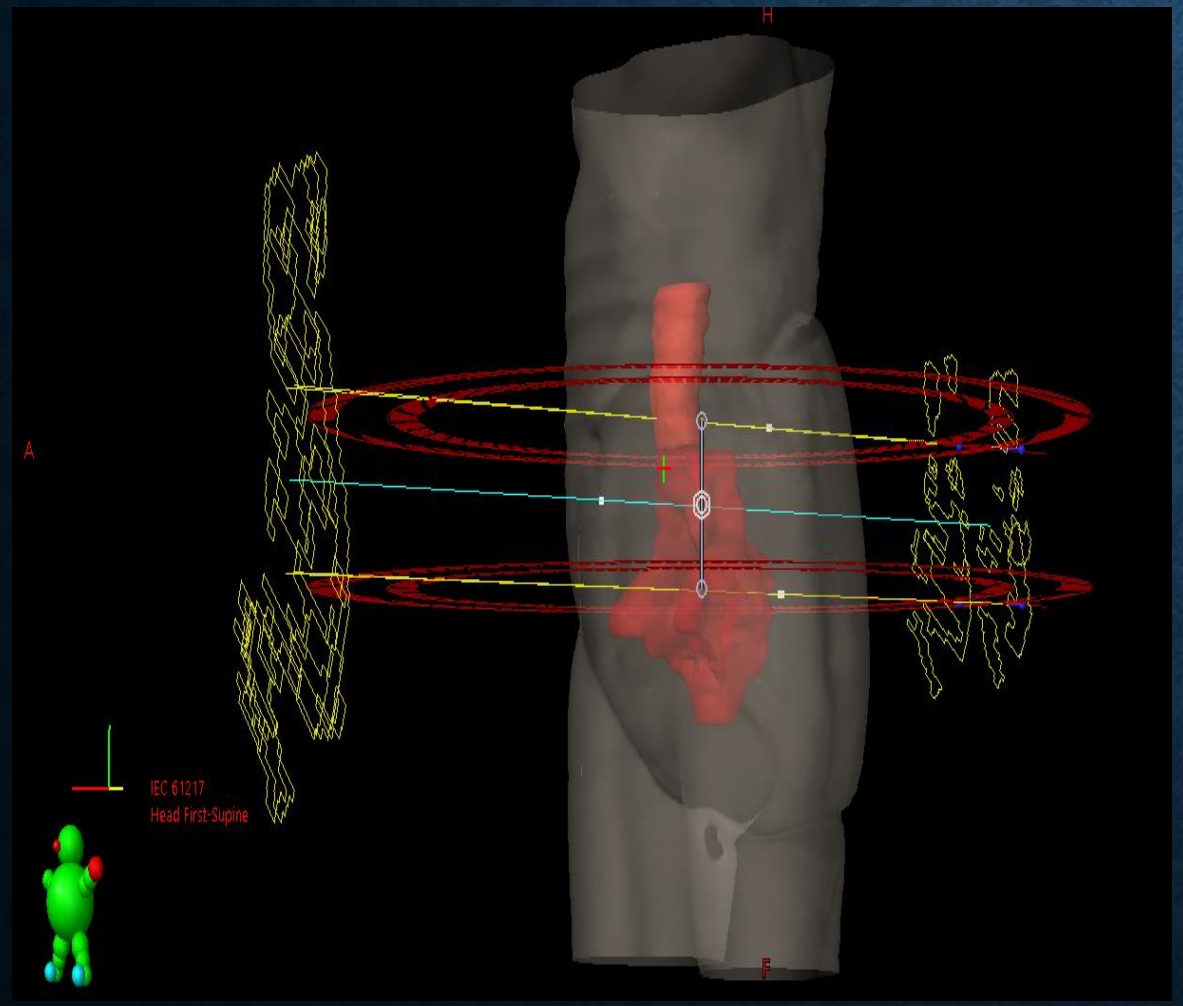


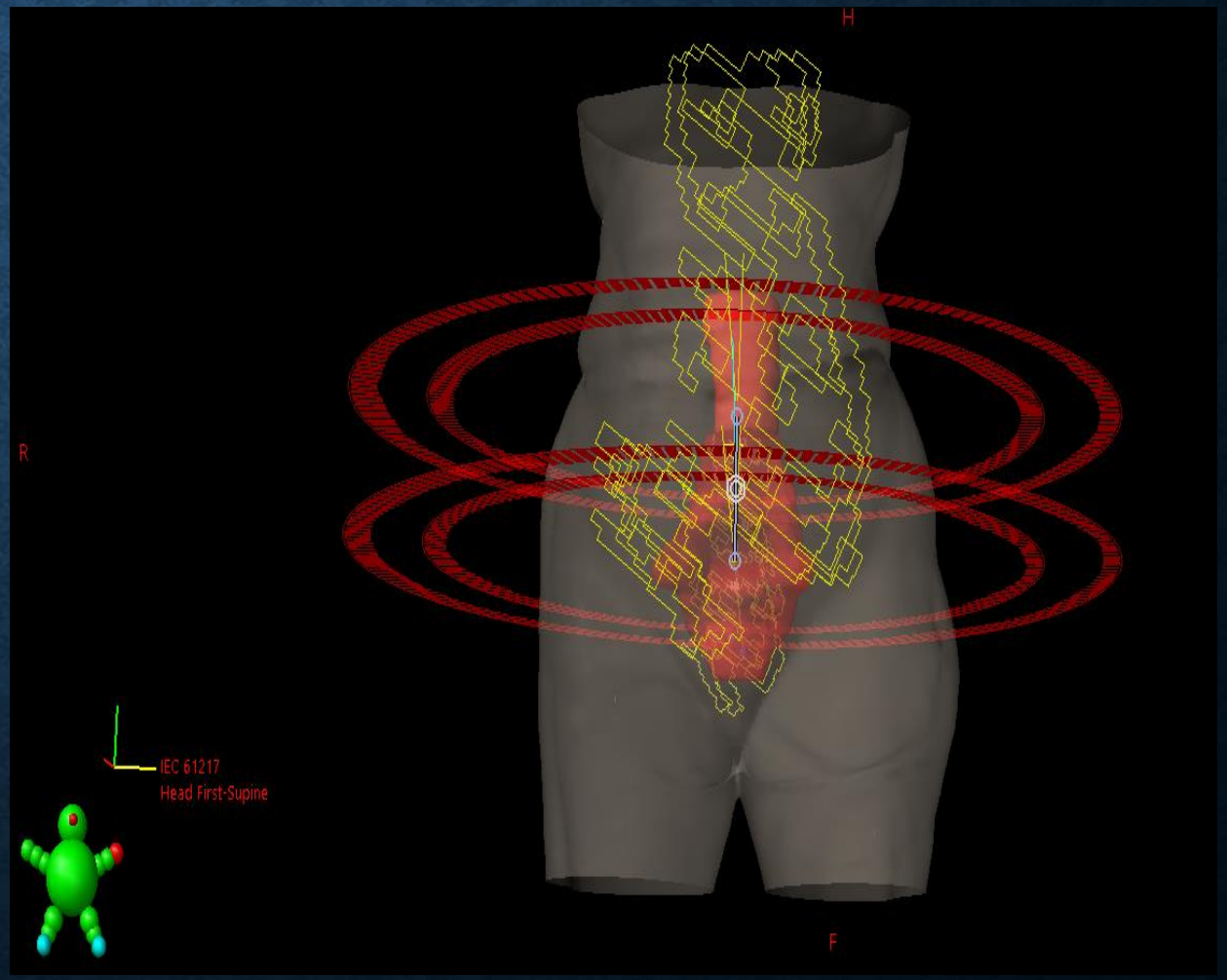
IMPORTED POINTS OF HALCYON VARIAN SYSTEM

- Ring gantry design
- Dual-layer MLC (Multi-Leaf Collimator)
- 6 MV FFF (Flattening Filter-Free) photon beam at 800 MU/min fixed dose rate.
- CBCT imaging (16sec.)
- Over all Treatment time is 3-4 min.
- Speed up radiotherapy treatment delivery while maintaining precision.



TWO ISO CENTRE 3D VIEW





SGRT & HALCYON CBCT & TABLE VALUES

First patient

SGRT Value after shift delta

First CBCT Iso centre

Second CBCT Iso centre

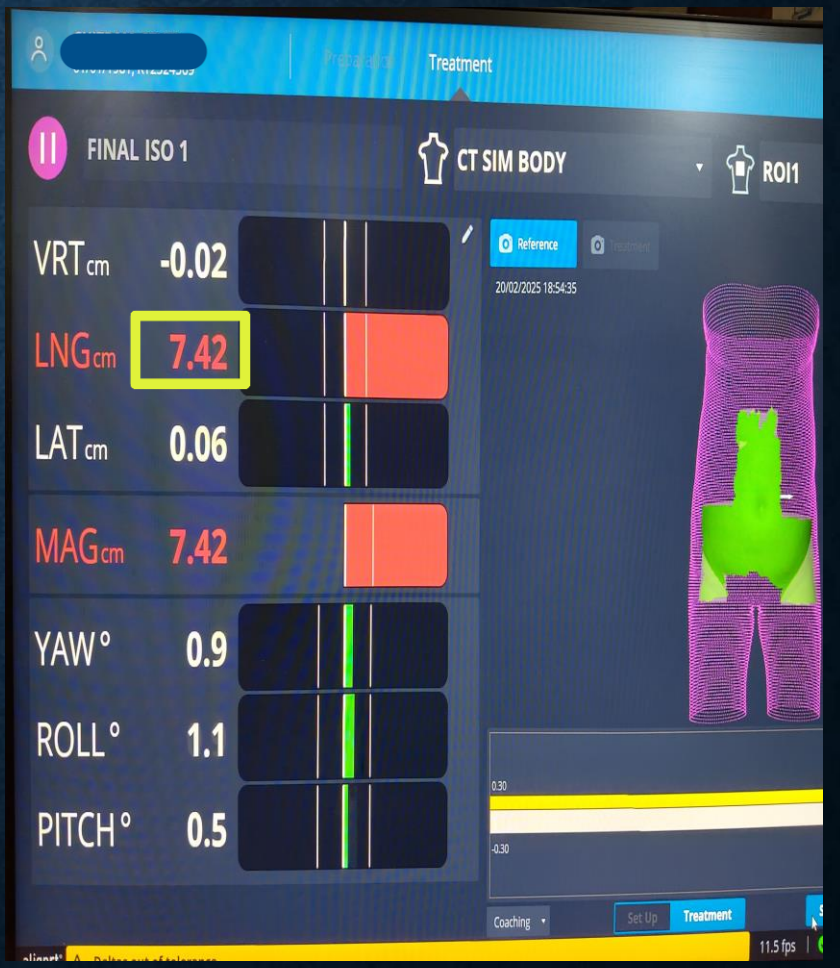


Table Value of CBCT first Iso

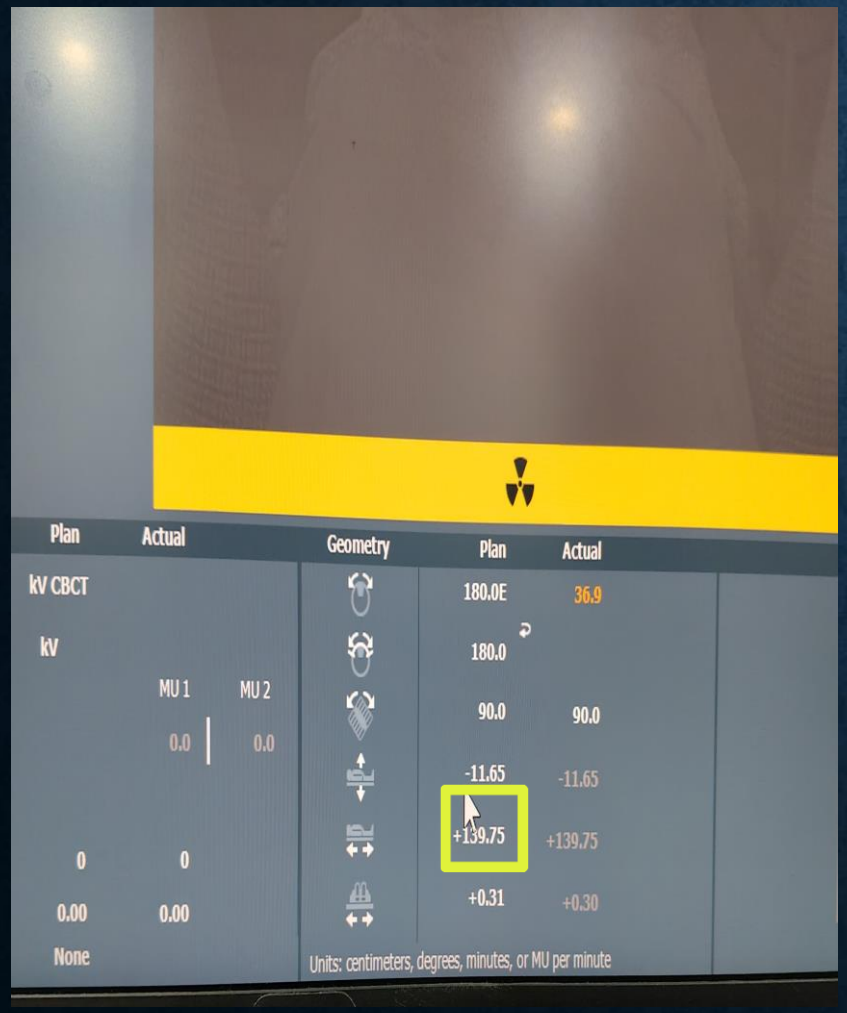
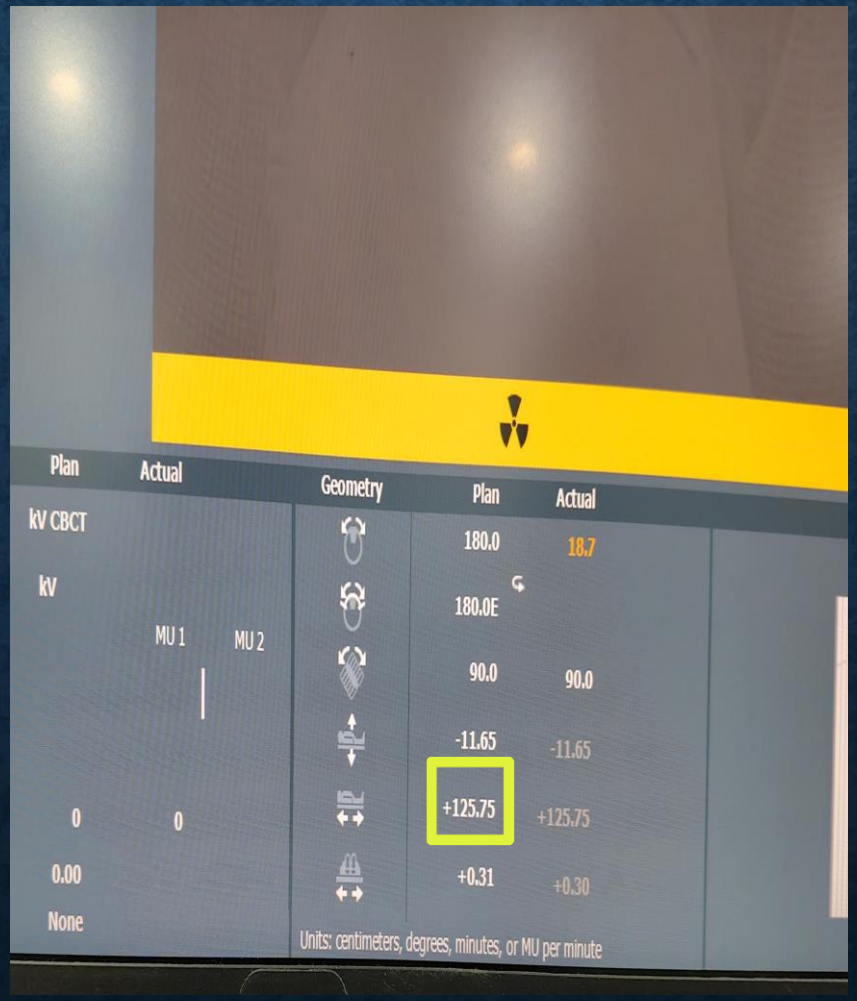
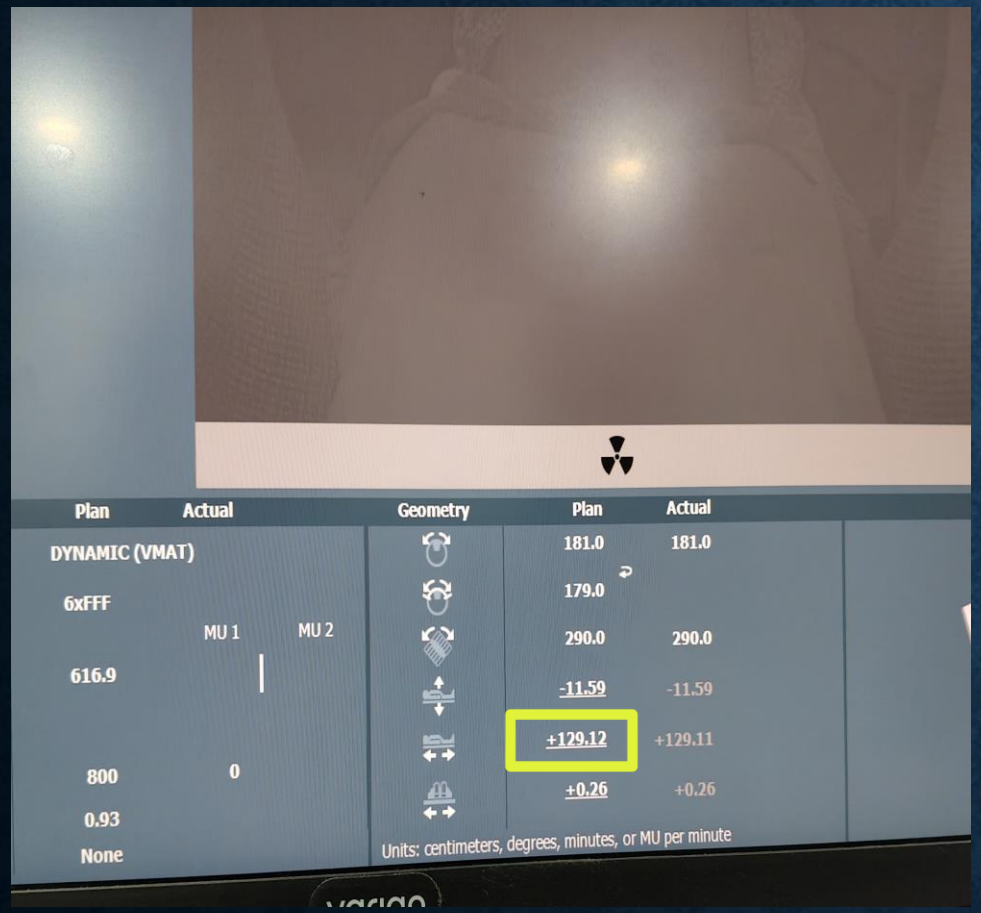


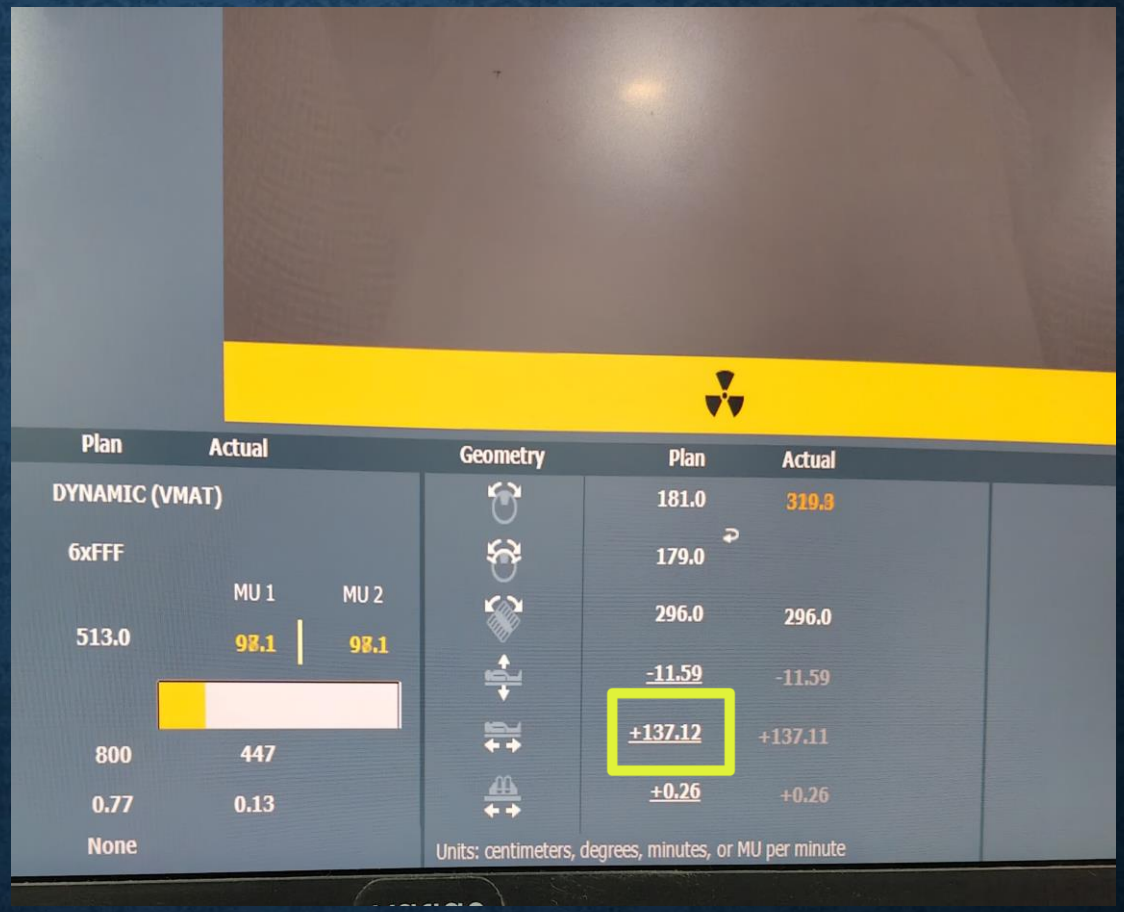
Table Value of CBCT Second Iso



SGRT Value after CBCT first Iso

TREATMENT TABLE VALUES





LONG- 137.12 – 129.12
Difference is 8 cm in Longitudinal

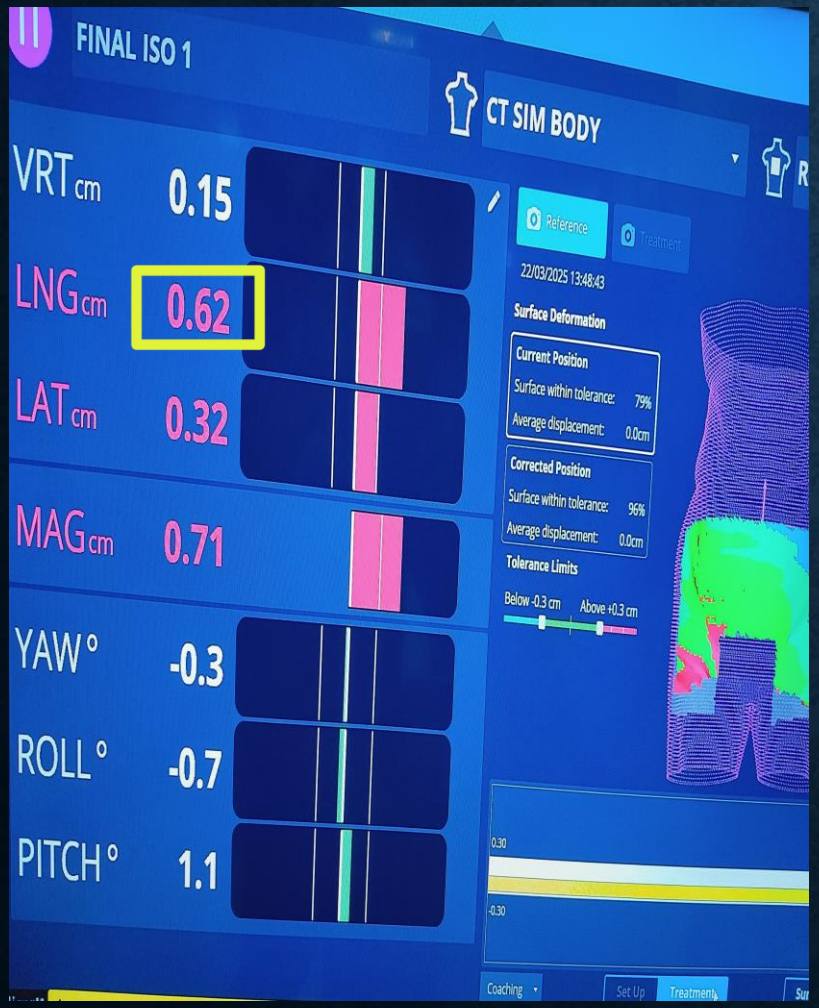
OBSERVATION TABLE

TREATMENT COUCH	CBCT FIRST ISO TABLE VALUE	CBCT SECOND ISO TABLE VALUE	DIFFERENCE BETWEEN CBCT	SGRT FIRST CBCT VALUE	SGRT SECOND CBCT VALUE	AVERAGE BETWEEN SGRT ISO
VERTICAL	-11.65	-11.65		-0.70	-0.02	-0.05
LONG.	139.75	125.75	14CM	-7.55	7.42 = 14.97 CM	3.93
LATERAL	0.31	0.30		-0.09	0.06	0.11
YAW				-0.7	0.9	1.4
ROLL				1.0	1.1	1.2
PITCH				0.6	0.5	1.2

SGRT & HALCYON CBCT & TABLE VALUES

Second Patient

SGRT Value after shift delta



First CBCT Iso centre

Second CBCT Iso centre

Table Value of CBCT first Iso

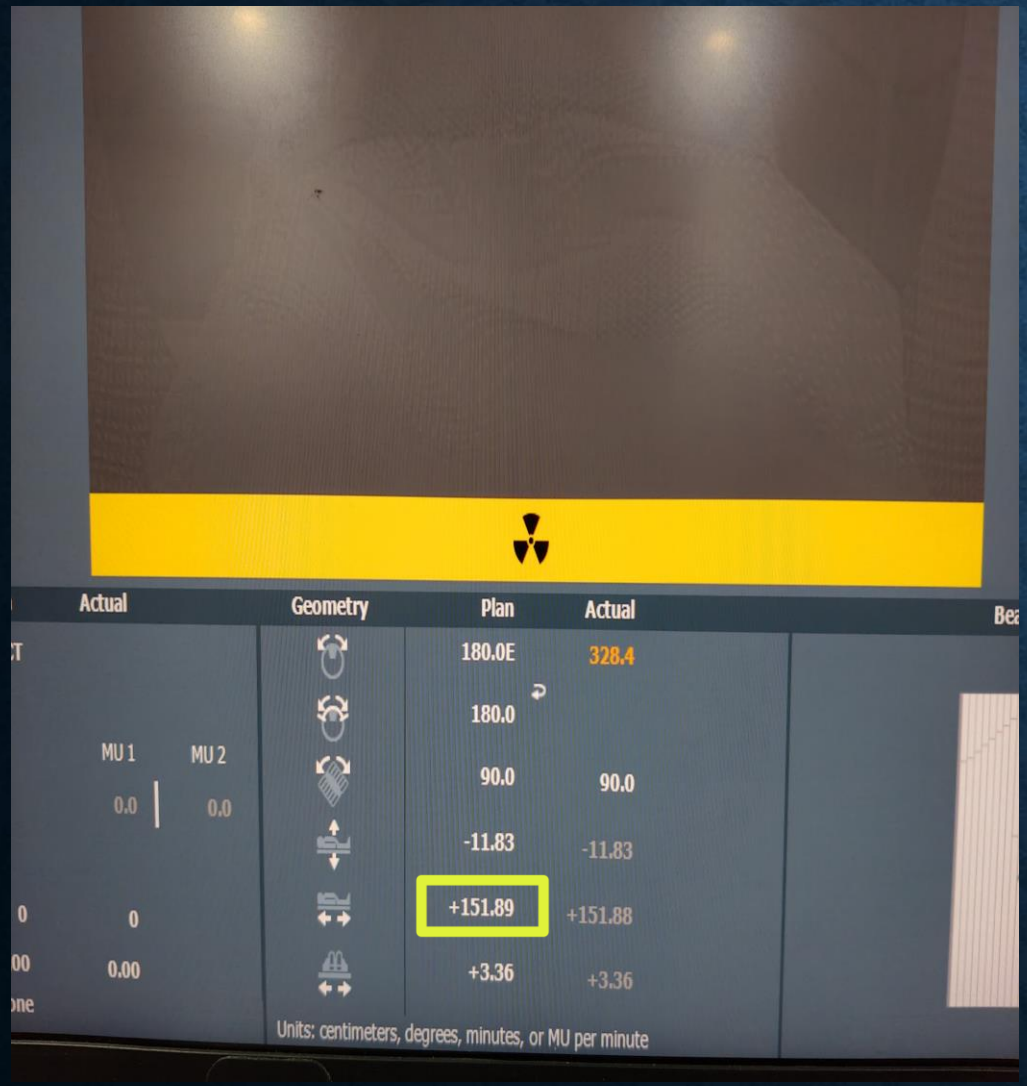
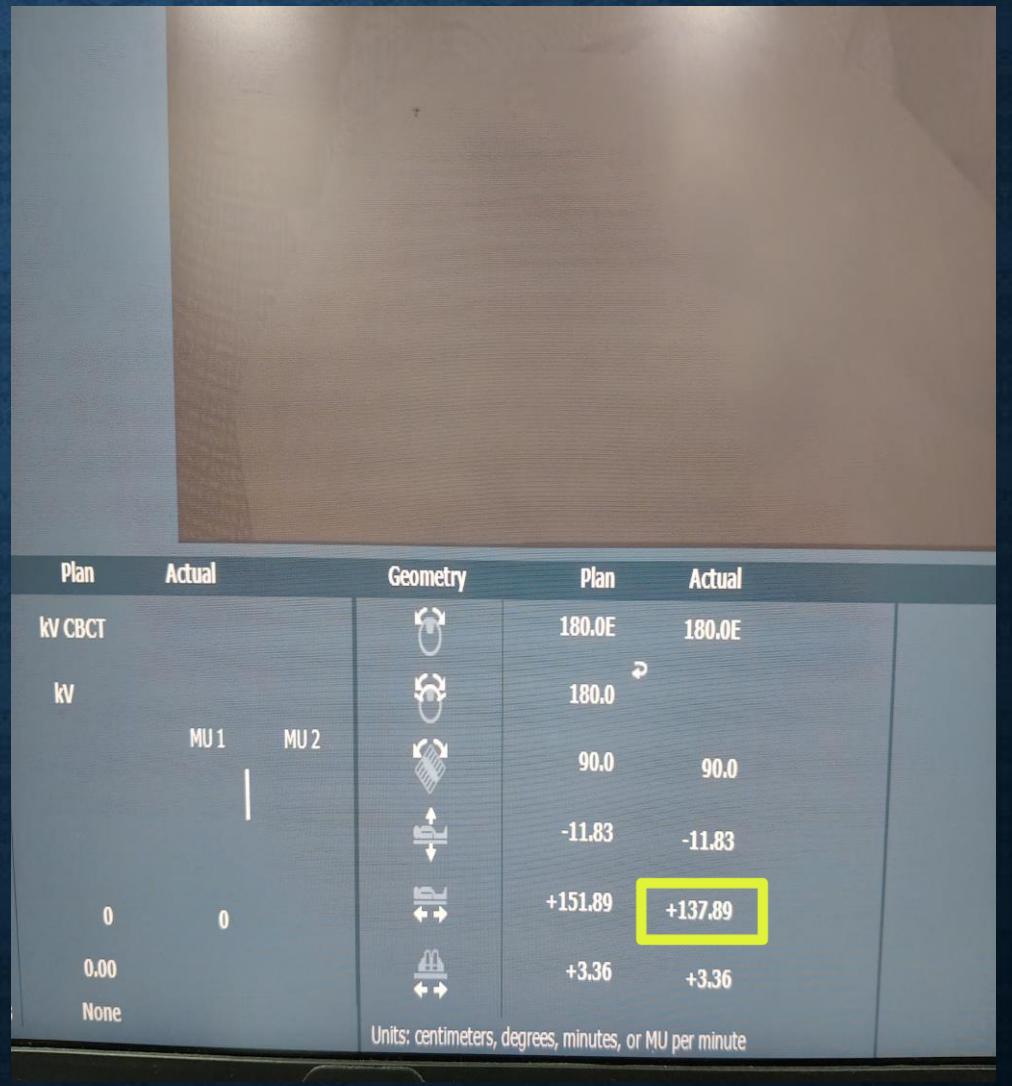


Table Value of CBCT Second Iso



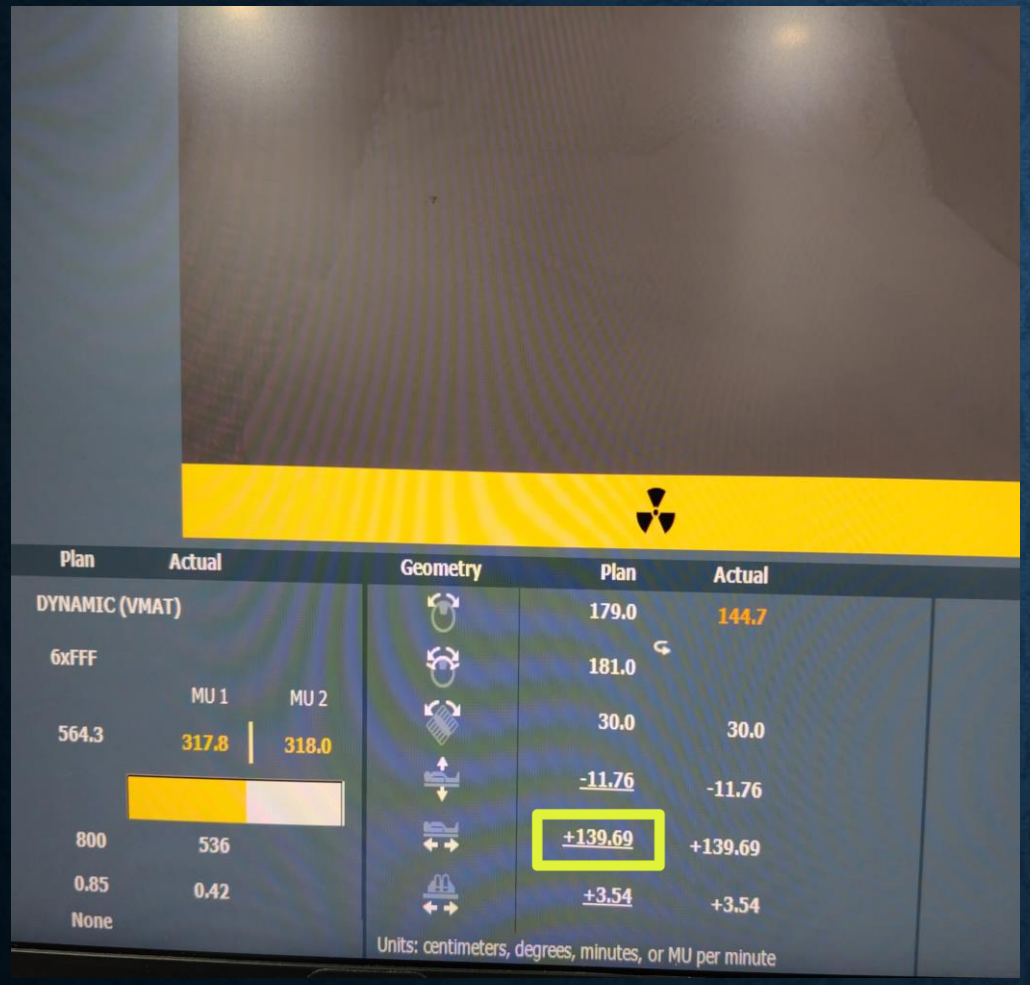
SGRT Value after CBCT first Iso

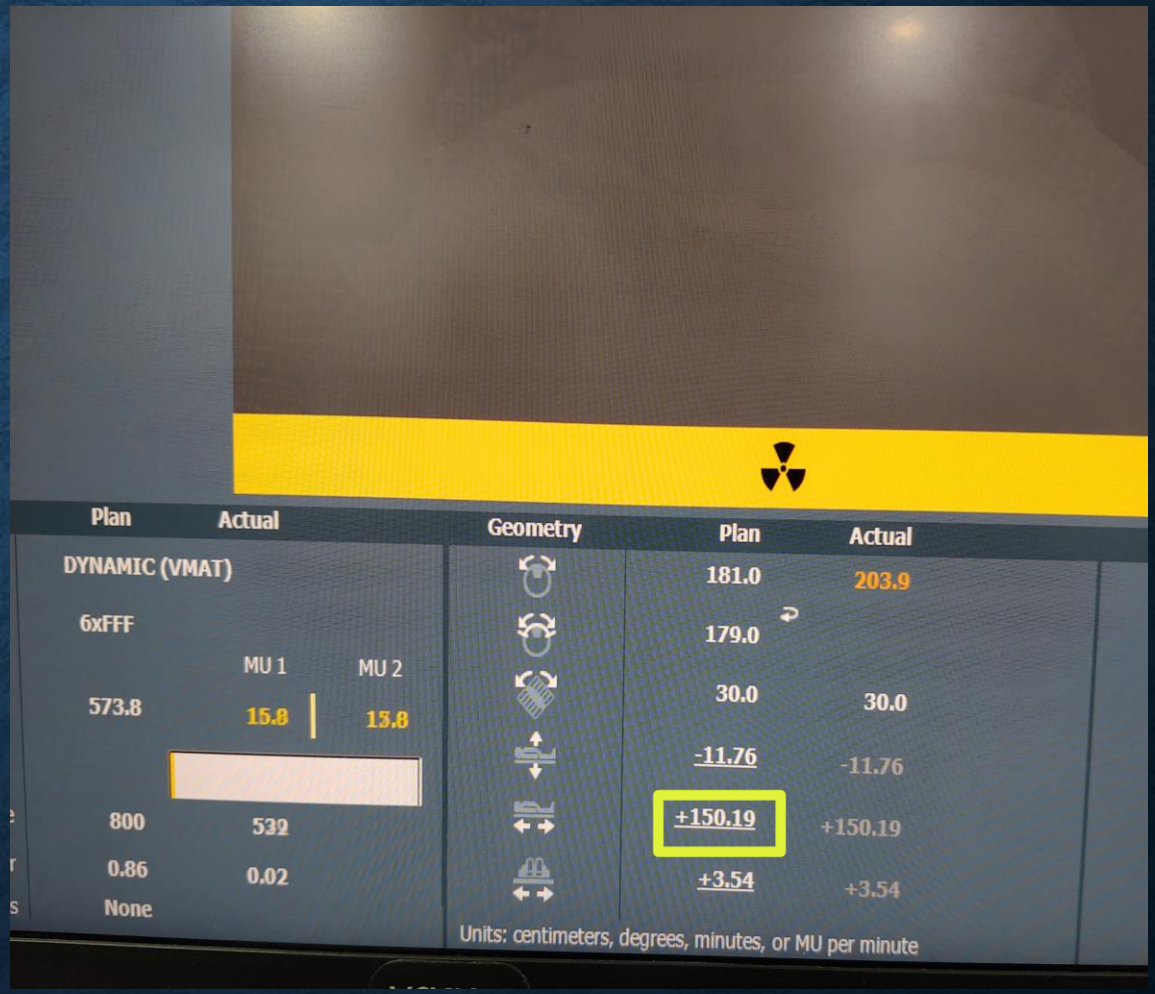
SGRT Value after CBCT second Iso

LONG= 5.75 + 4.86 CM

Difference is 10.61 cm in Longitudinal

TREATMENT TABLE VALUES





LONG- 150.19 – 139.69 CM
Difference is 10.5 cm in Longitudinal

OBSERVATION TABLE

TREATMENT COUCH	CBCT FIRST ISO TABLE VALUE	CBCT SECOND ISO TABLE VALUE	DIFFERENCE BETWEEN CBCT	SGRT FIRST CBCT iso 1 VALUE	SGRT SECOND CBCT ISO 2 VALUE	SGRT TREATMENT value ISO 1	SGRT Treatment value ISO 2
VERTICAL	-11.83	-11.83		0.07	0.44	0.49	0.15
LONG.	151.89	137.89	14 CM	-6.51	7.60 = 14.11 CM	5.75	-4.86 = 10.61 CM
LATERAL	3.36	3.36		0.23	0.43	0.19	0.01
YAW				-0.2	-0.8	-0.8	-0.5
ROLL				-0.6	-0.7	-0.7	-0.7
PITCH				1.3	1.5	2.0	1.7

DISCUSSION & CONCLUSION

- Align RT system is an independent verification for the couch position shifts that are done during multiple iso centre treatments.
- There is a small mismatch to the level of 1to 4mm in the longitudinal values. This indicates the small errors that is either systematic or due to the day to day variation of the surface(deformation), Which can be monitored and controlled.
- In a simple way, the error propagation between two iso centres and two imaging isocentres is monitored and can be kept under control.
- There is a real satisfaction from the ‘Radiation Therapist’ point of view to follow up the so much of couch data in a way summarises the quality of positioning and treatment.

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WE ARE
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Together We Are Unstoppable

THANK YOU