Evolution of Surface Guided Radiation Therapy

A Journey Through Innovation and Precision

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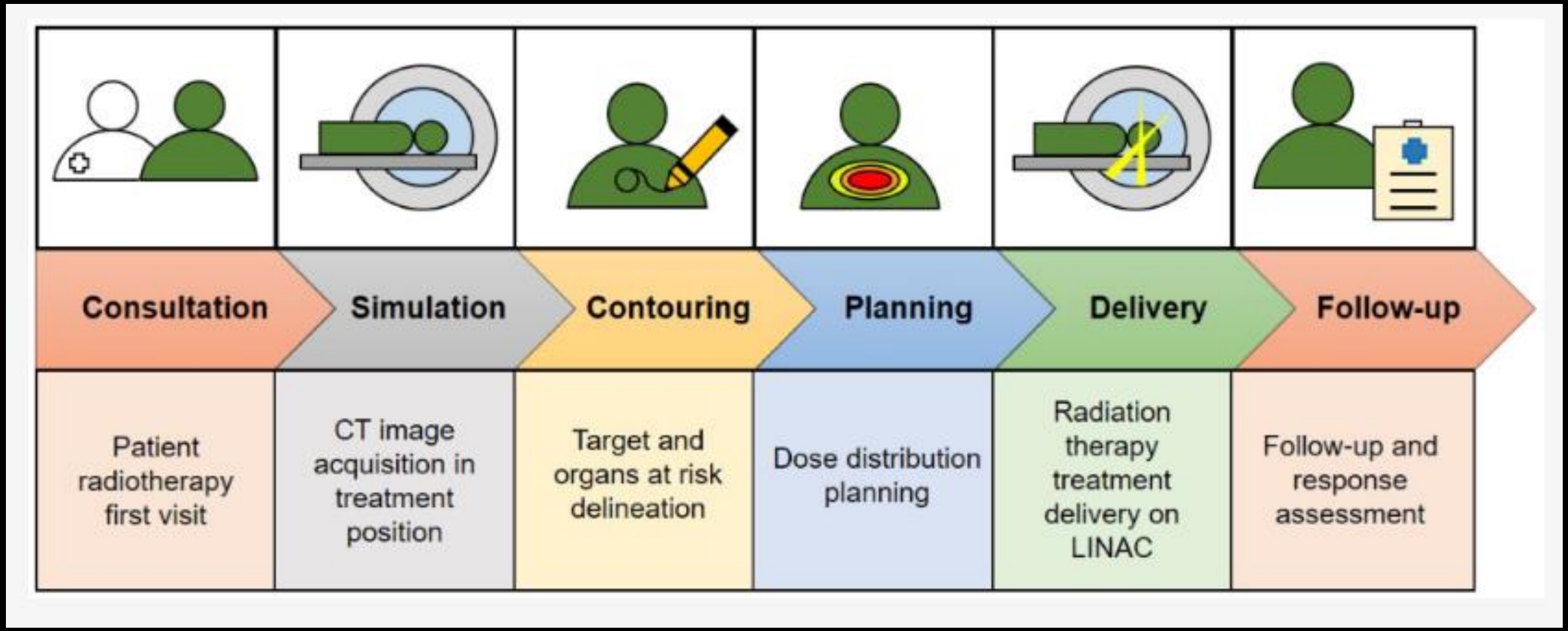
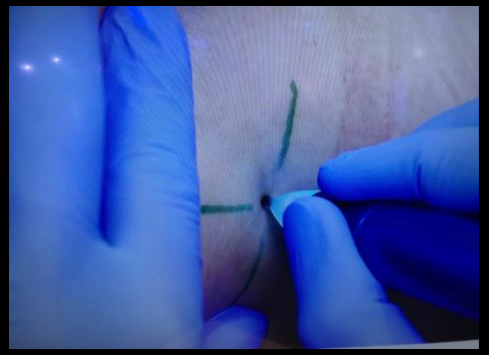
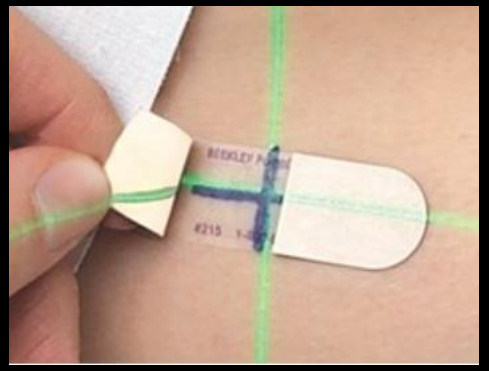
CURRENT PRACTICE



PROBLEMS WITH TATTOOS

- Only 3 reference points, in a single plane
- Patient discomfort
- Permanent marks on body
- Needle stick injury to staff
- Problems with alternatives to tattoos:
  - ➢ Skin mark with Tegaderm application
  - ➢ Thermoplastic mask





INTER AND INTRA FRACTIONAL VARIABILITY

POSITIONAL

Set up inaccuracies

Patient posture

PHYSIOLOGICAL

Breathing

Bladder filling

Bowel/rectal filling

TUMOR/PATIENT

Tumor change

Flap shrinkage

Edema

Weight loss/gain

TIMELINE

Planar/2D imaging

Port films

EPID

Volumetric/3D imaging

Fan beam CT

CBCT

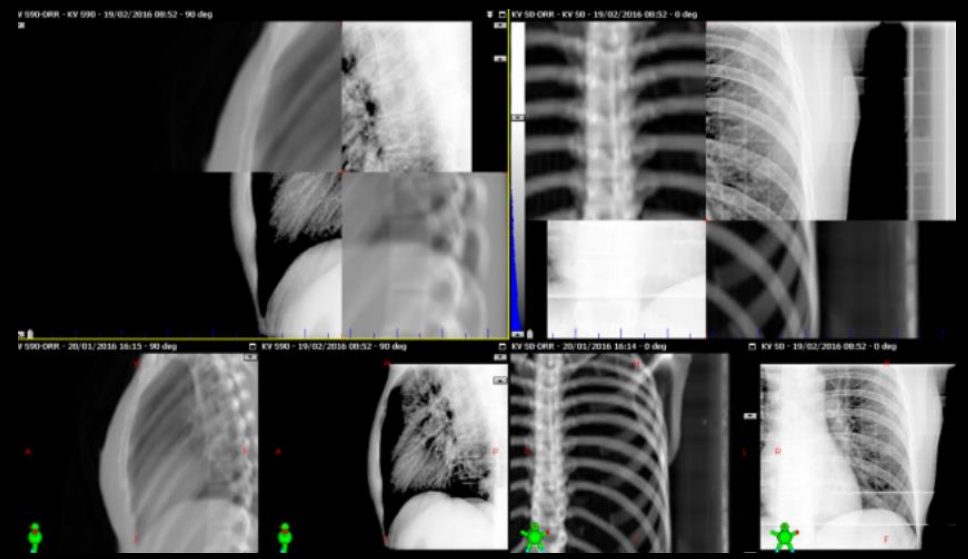
4D imaging

SGRT

Exactrac

Calypso


PORTAL
LOCALIZATION



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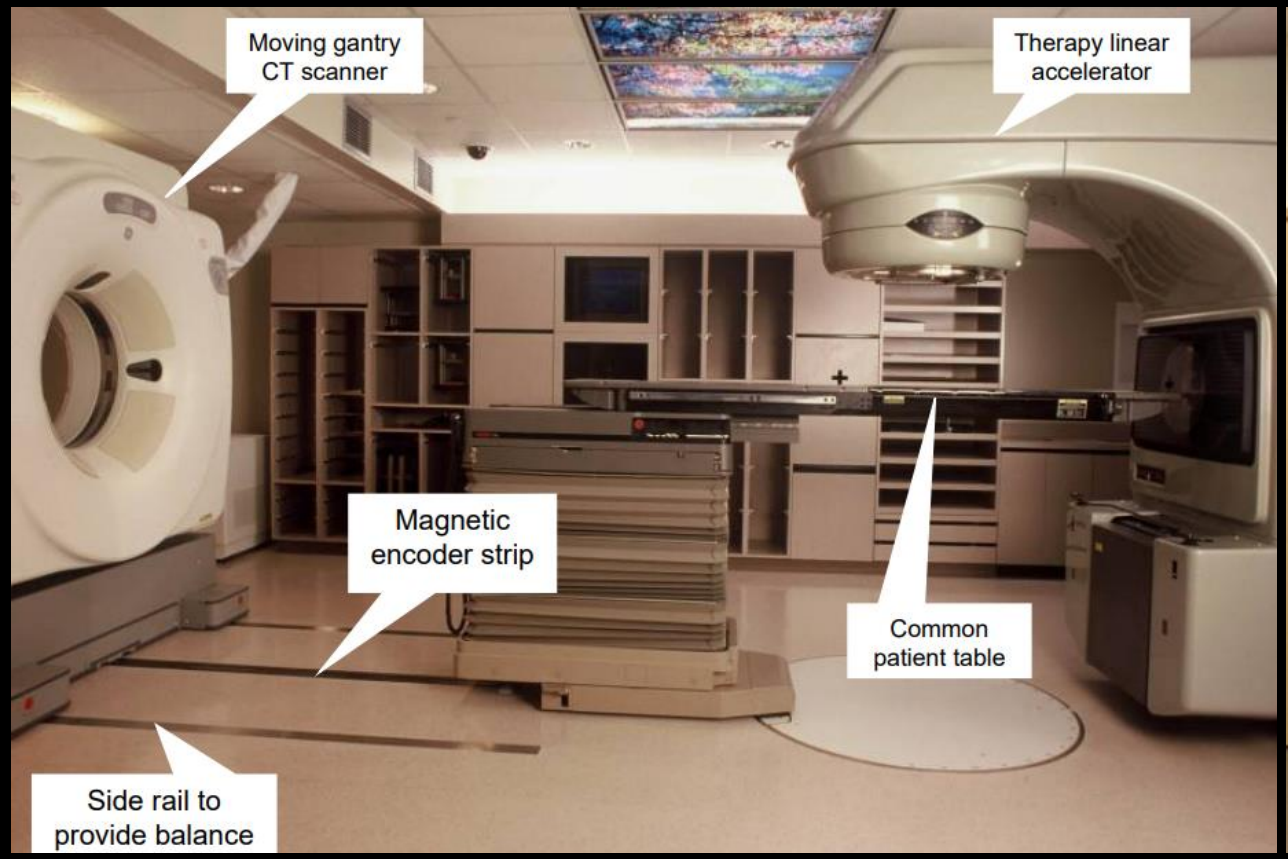
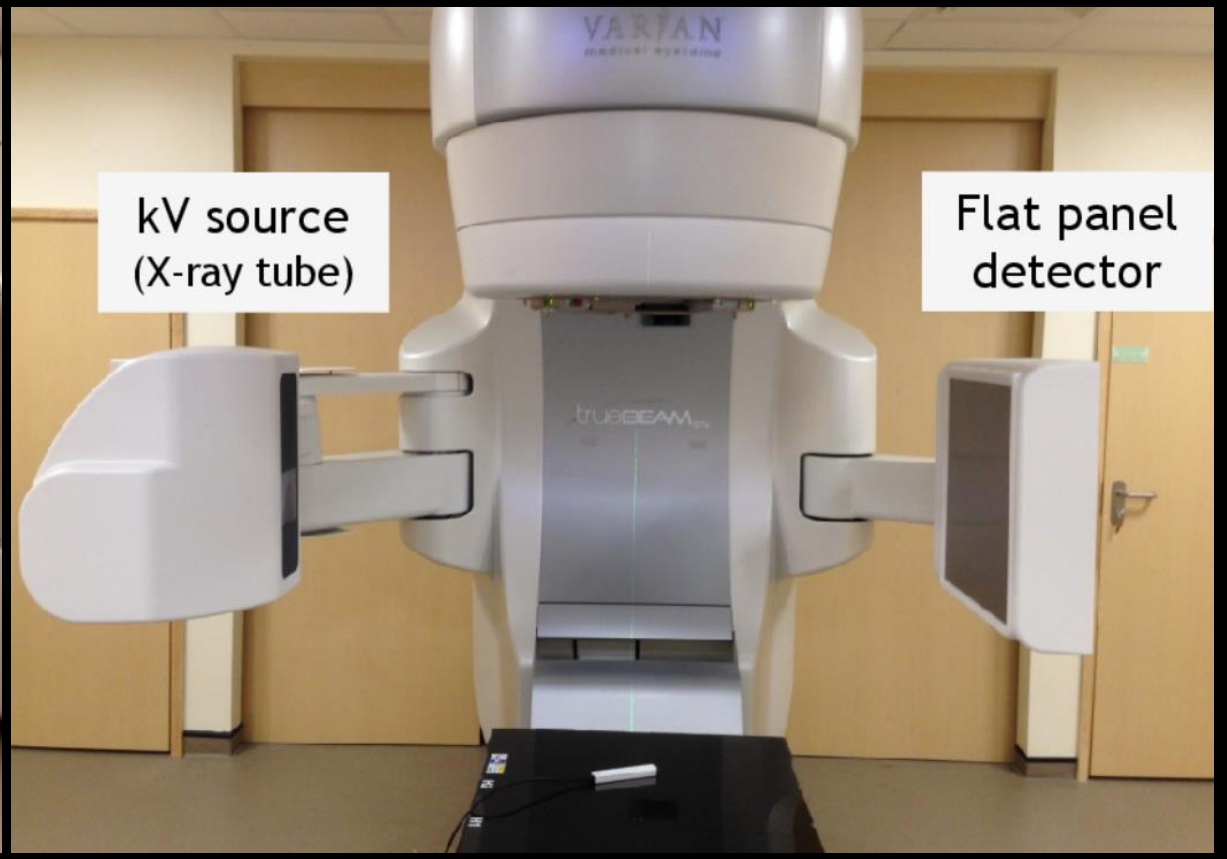

Moving gantry
CT scanner
Therapy linear
accelerator
Magnetic
encoder strip
Common
patient table
Side rail to
provide balance


VARIAN
kV source
(X-ray tube)
Flat panel
detector

TIMELINE

Planar/2D imaging

Port films

EPID

Volumetric/3D imaging

Fan beam CT

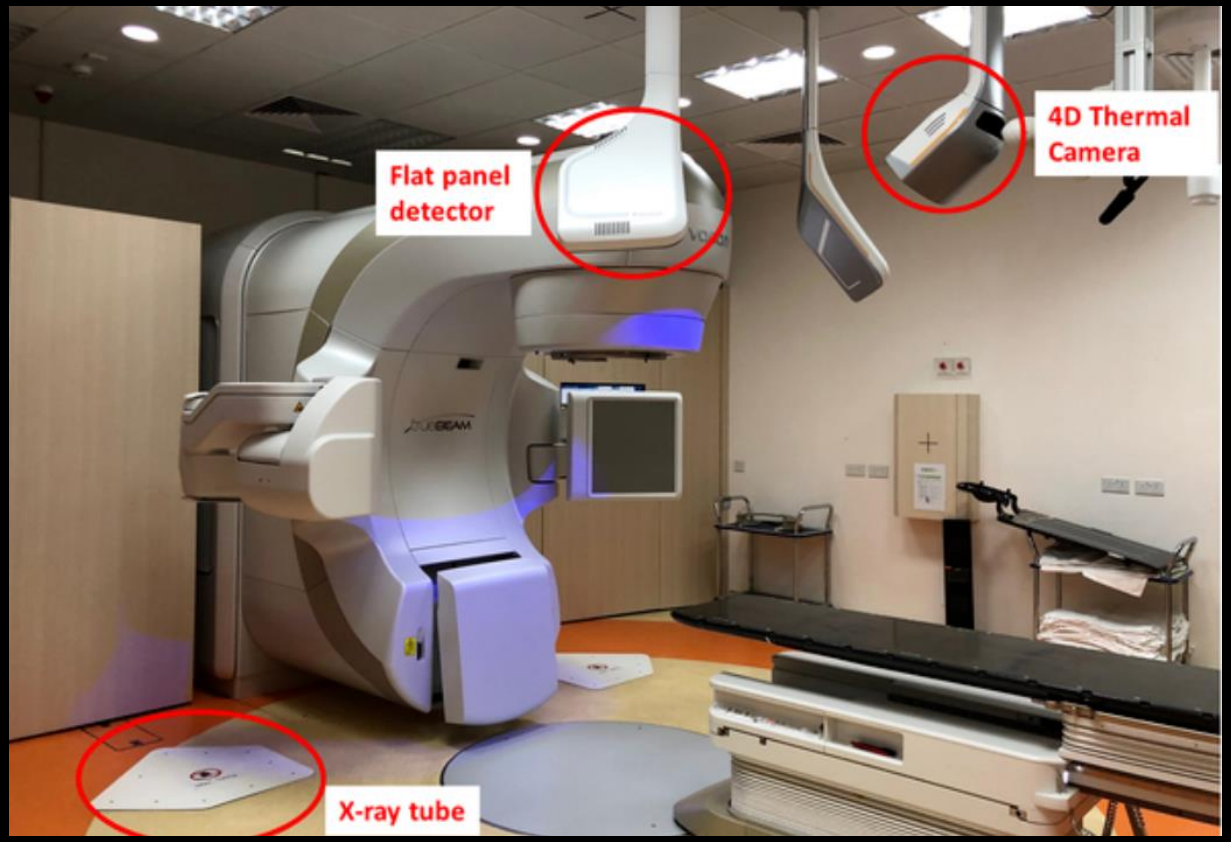
CBCT

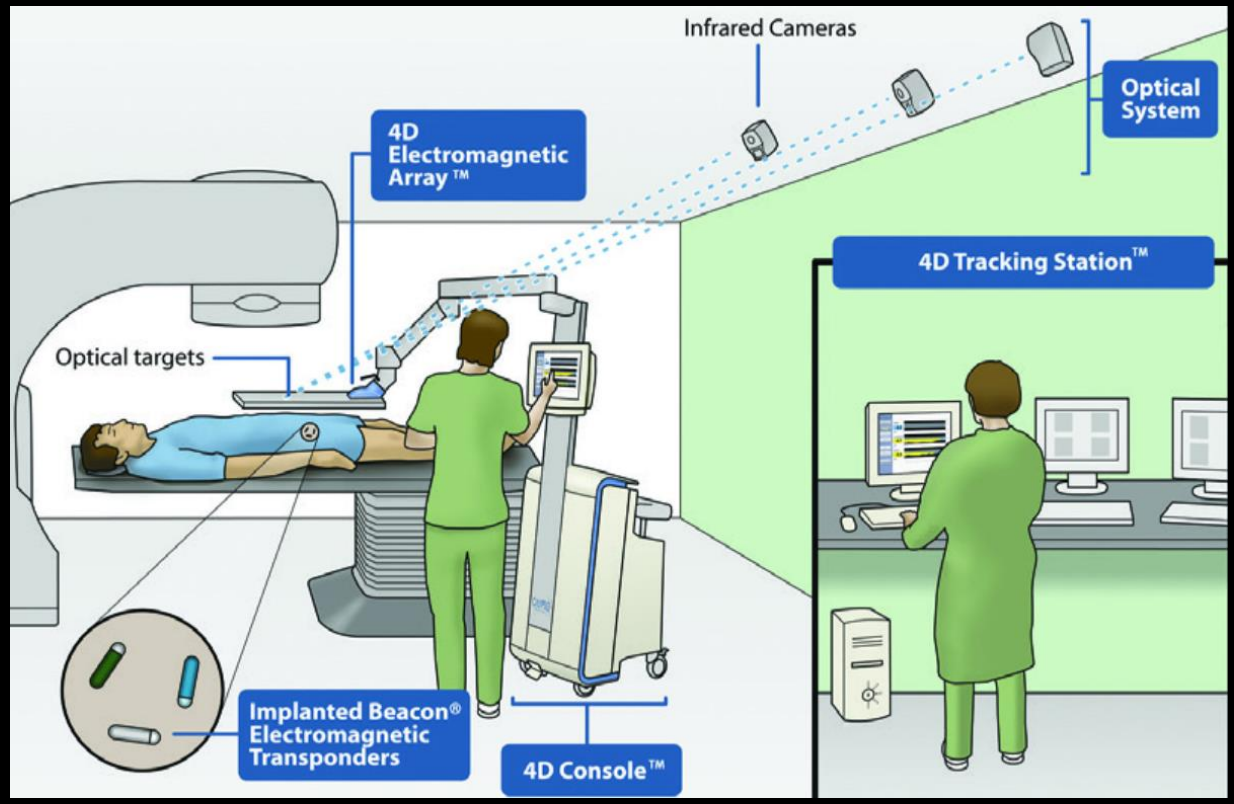
4D imaging

SGRT

Exactrac

Calypso

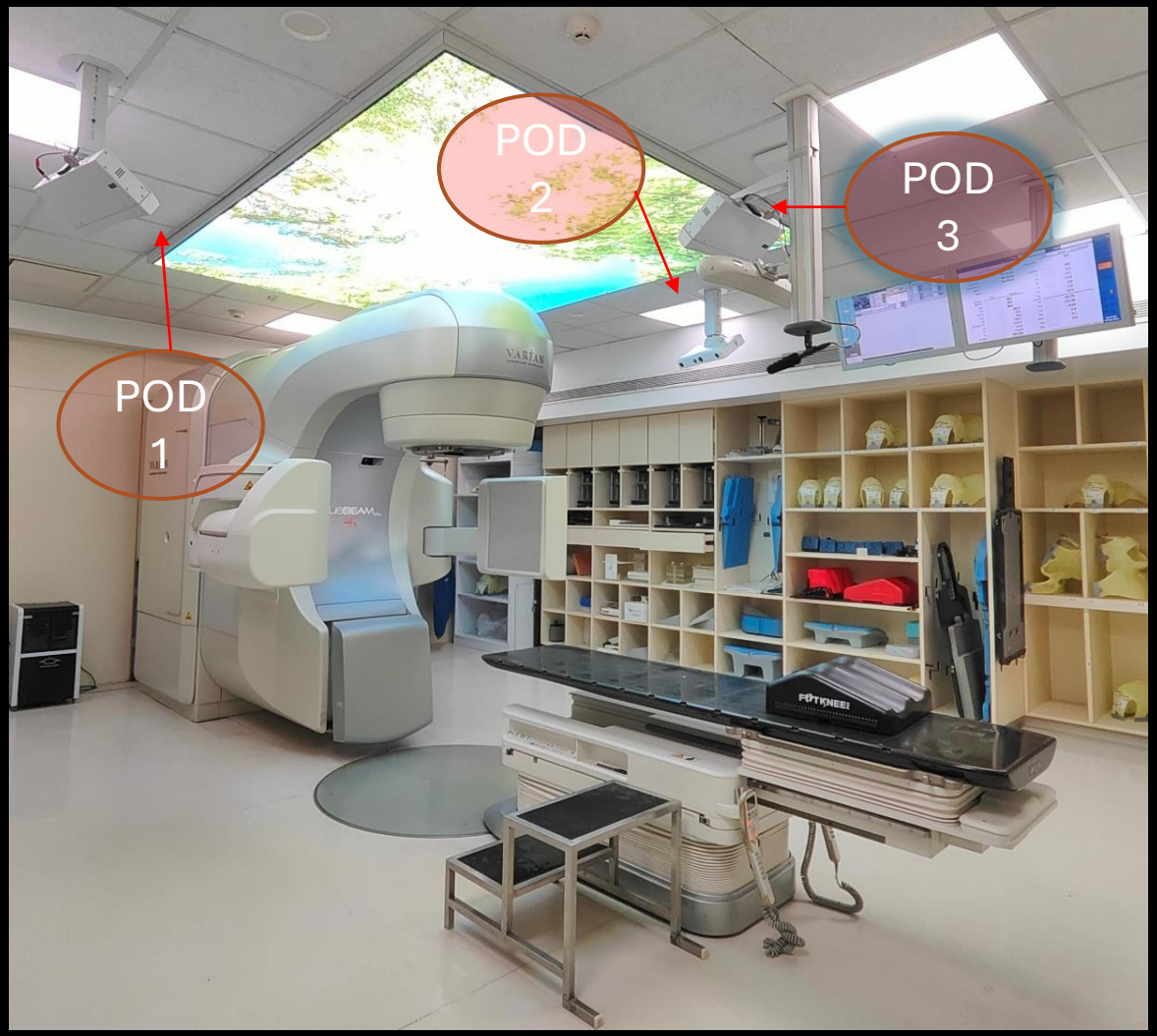

Flat panel detector
4D Thermal Camera
X-ray tube


Infrared Cameras
Optical System
4D Electromagnetic Array™
4D Tracking Station™
Optical targets
Implanted Beacon® Electromagnetic Transponders
4D Console™

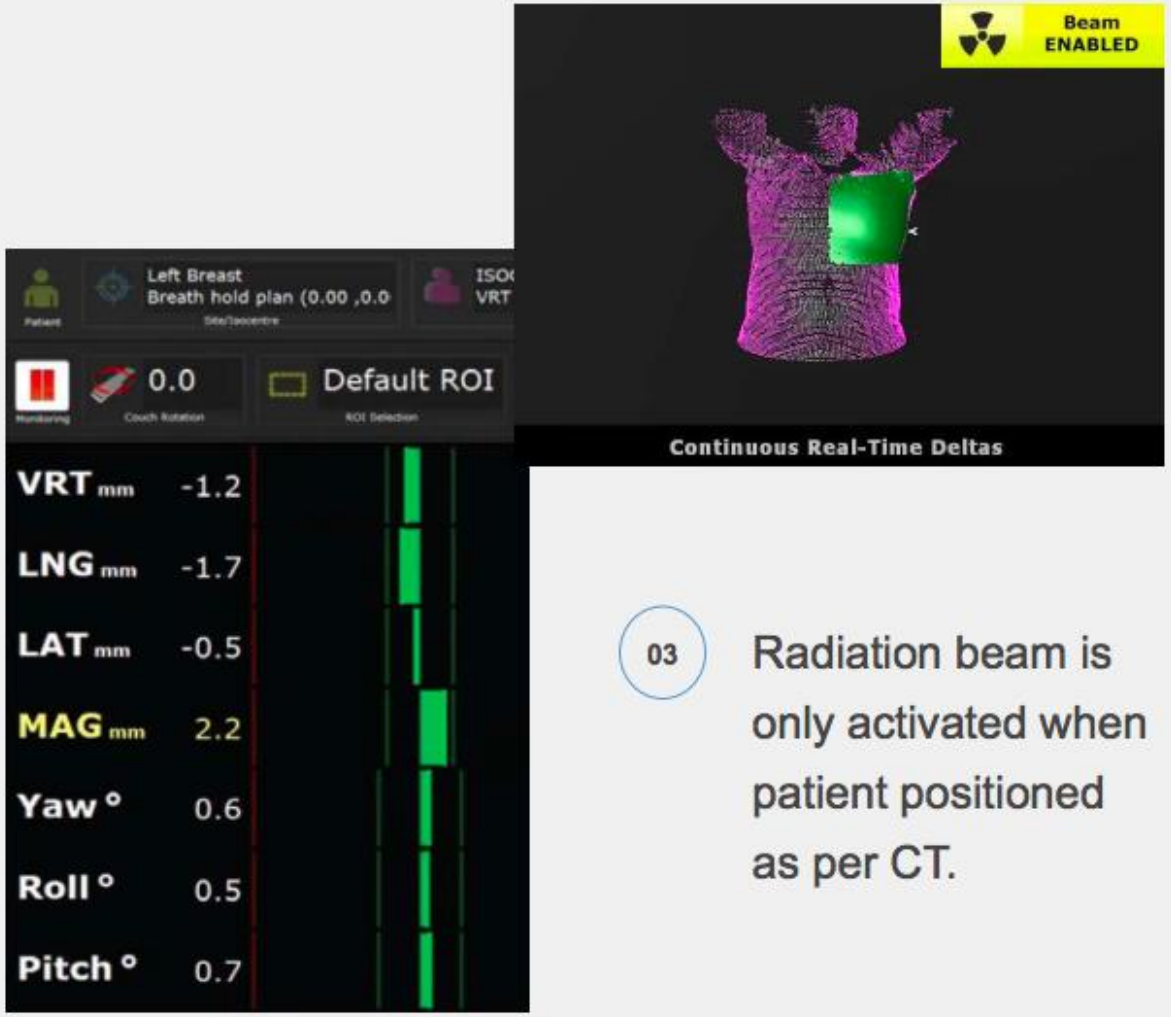
WHAT IS SGRT?

Surface Guided Radiation Therapy (SGRT) is a rapidly growing technique that uses stereo vision technology to track patients' surface in 3D, for both setup and motion management during radiotherapy.

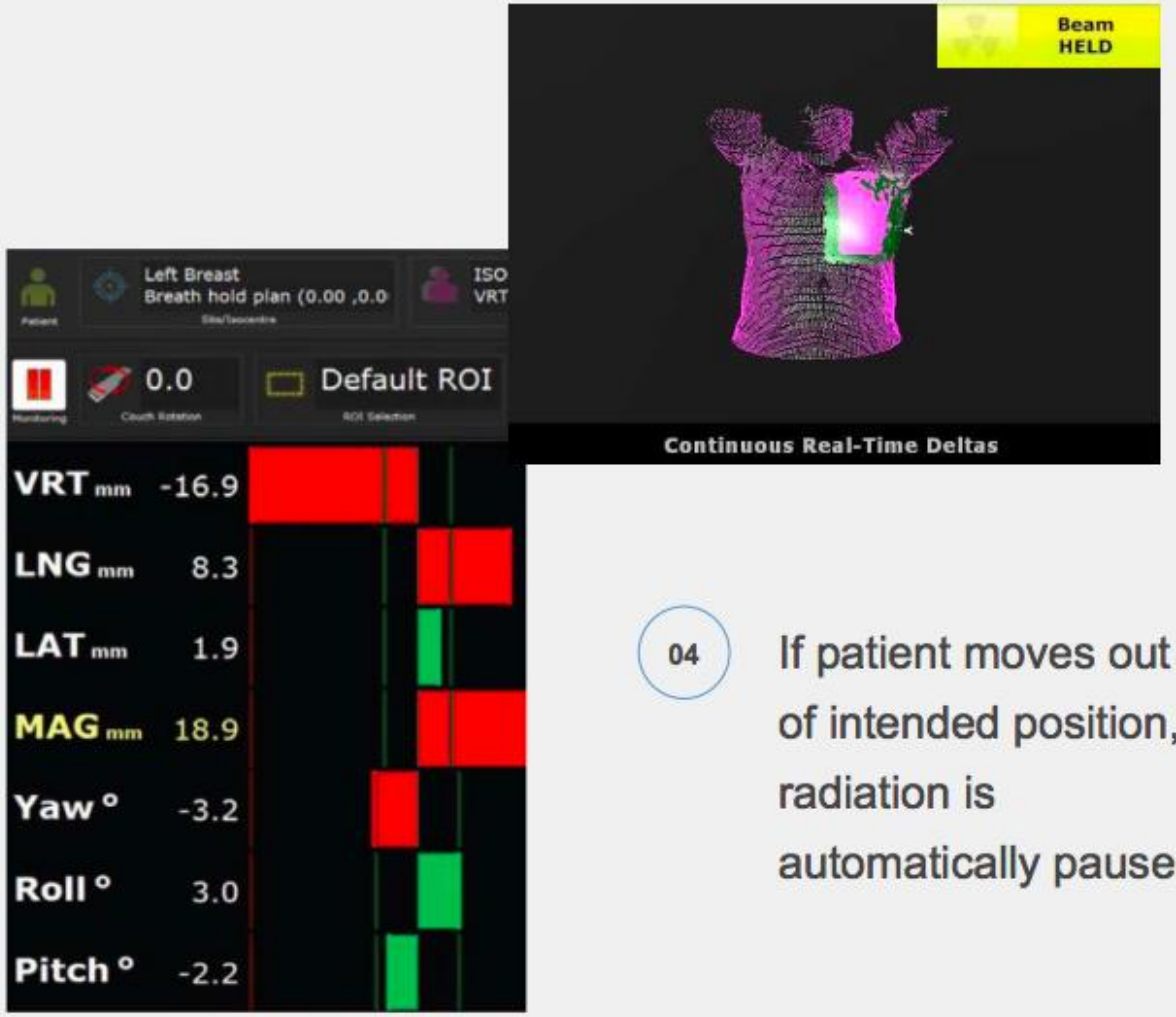
SGRT SET-UP



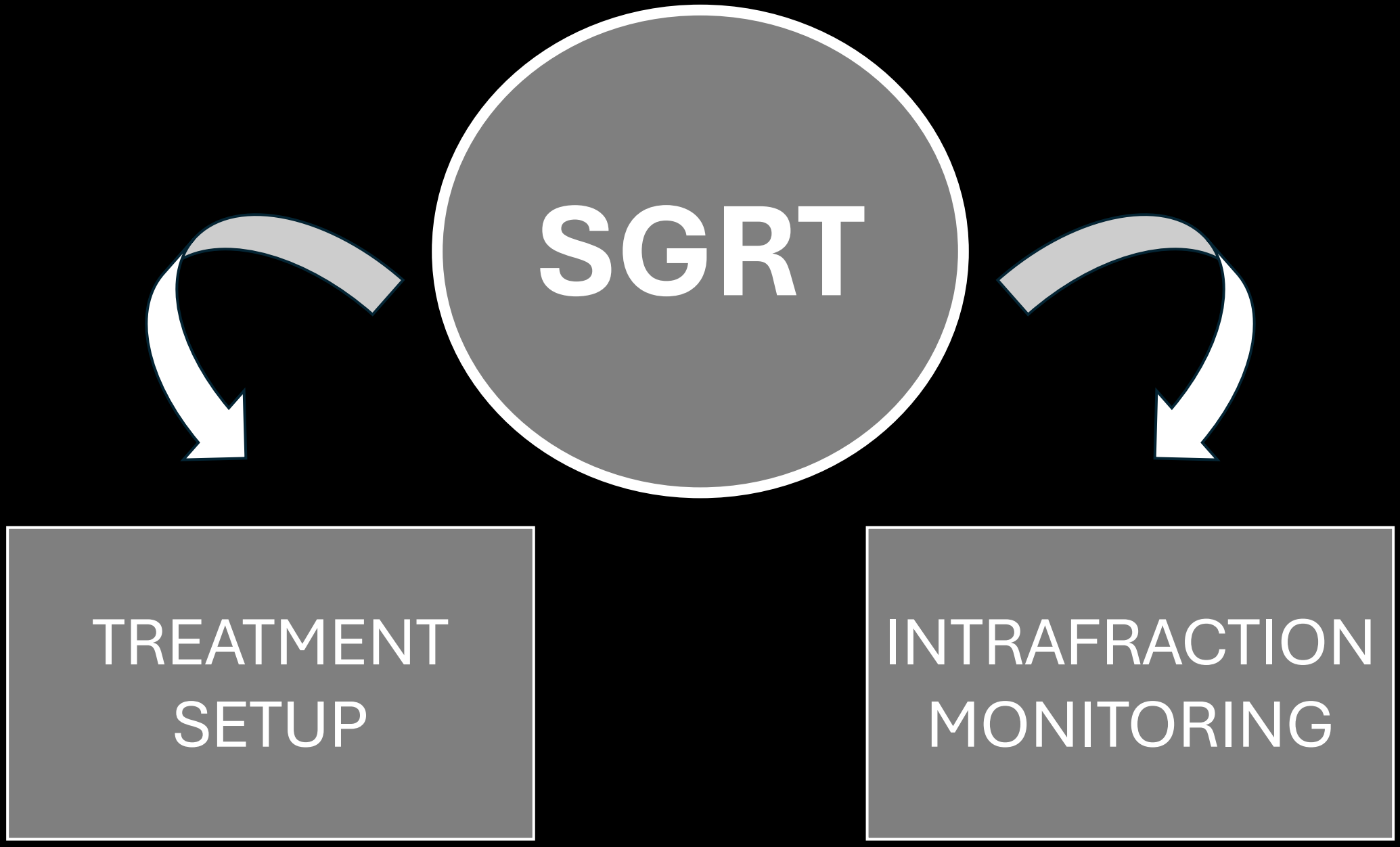
SGRT SET-UP



03 Radiation beam is only activated when patient positioned as per CT.



04 If patient moves out of intended position, radiation is automatically paused.


SGRT
TREATMENT SETUP
INTRAFRACTION MONITORING

BENEFITS OF SGRT

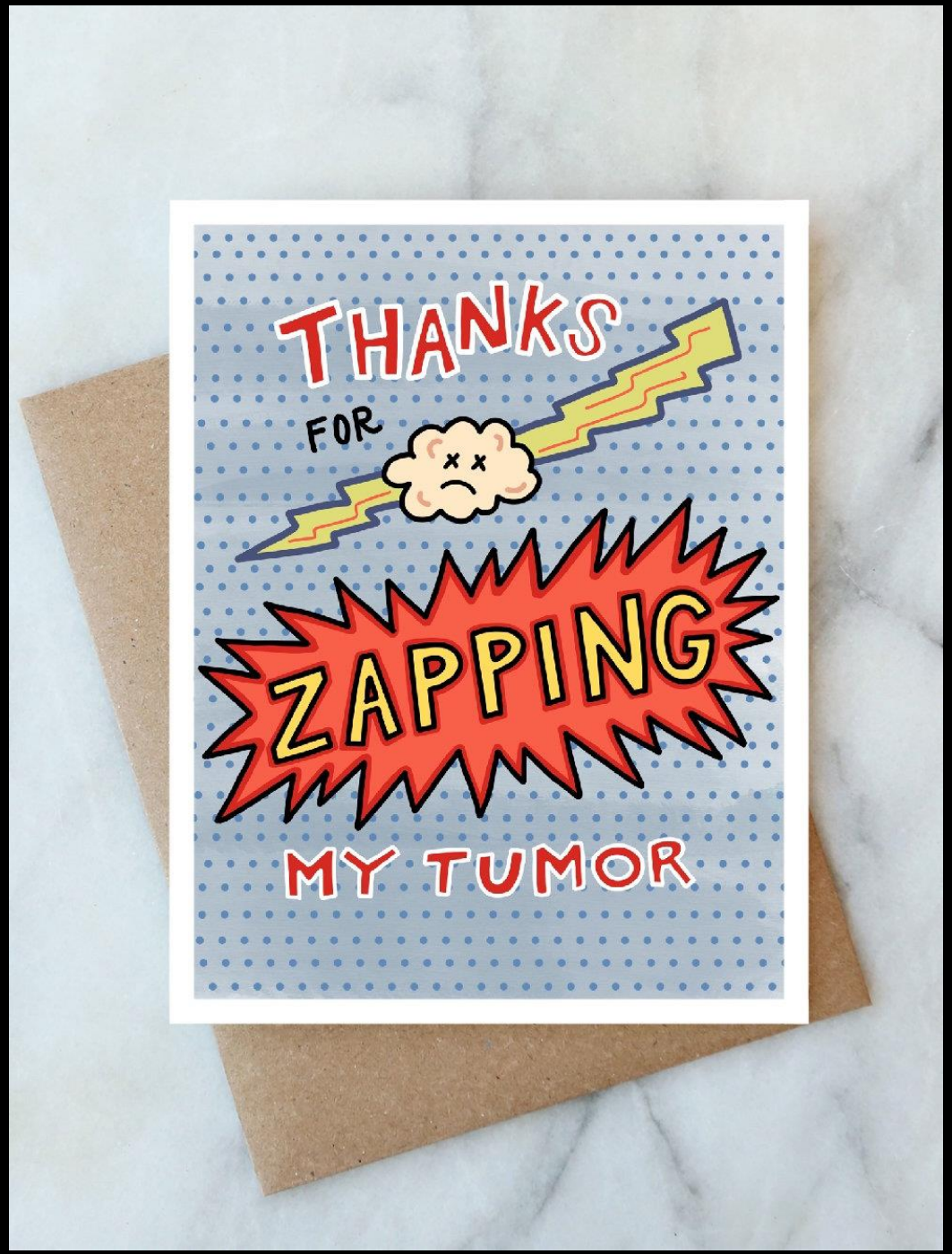
- Non-ionizing radiation
- Non-invasive, tattoo less
- Actual surface mapping
- Reduces set up time
- Reduces RT exposure
- Rx isocenter calibration
- Collision avoidance
- Intra-fraction monitoring

LIMITATIONS OF SGRT

- Thermoplastic masks
- Patient surface visibility
- Correlation with internal anatomy
- Tumor motion correspondence
- Prone breast set ups
- Daily imaging needed

TAKEAWAYS

- SGRT is complementary to IGRT
- Tattoo less, patient friendly
- Reduces radiation exposure
- Reduces set up time, improves accuracy
- Continuous intrafraction monitoring
- Improves target precision
- Simplifies gating and DIBH processes



THANK YOU!

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