MESTRO
Middle East Society for Therapeutic Radiation Oncology

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Emerging role of SGRT application in Pediatric cancer patients

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Incidence of Pediatric cancer in World and India

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- As per NCI- Cancer diagnosed in 0-14 years age group are defined as Pediatric cancer

- Worldwide approximately 215,000 Paediatric cancers are diagnosed per year with an estimated 80,000 cancer related deaths annually.

(WHO. International childhood cancer day: Much remains to be done to fight childhood cancer. WHO Press Release No. 241. Lyon, France: World Health Organization; 2016.)

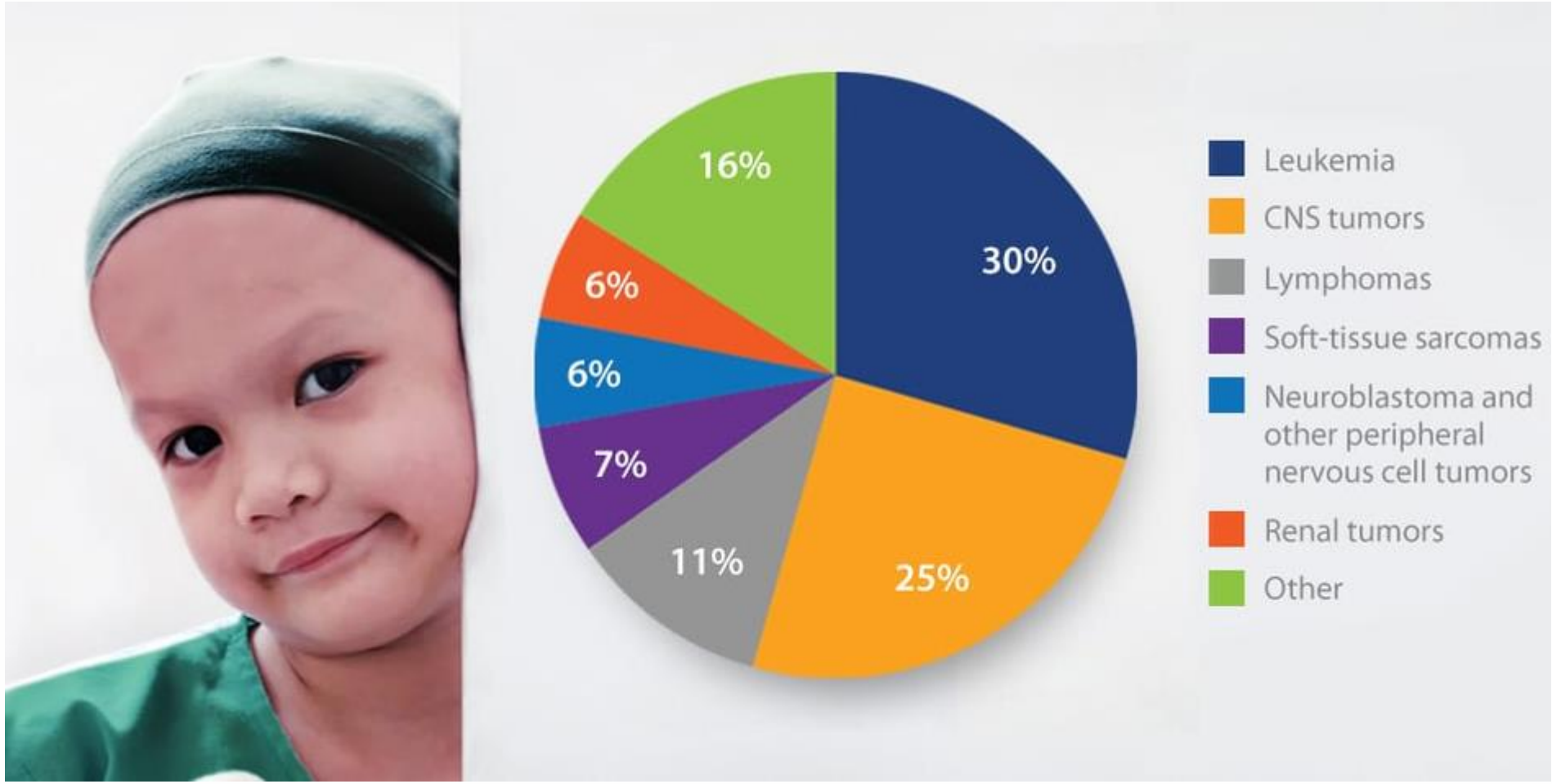
- In India cancer is the 9th common cause for the deaths among children between 5 and 14 years of age.

  (Summary-Report on Causes of Death: 2001-2003 in India. Available from: http://www.censusindia.gov.in/Vital_Statistics/Summary_ Report_Death_01_03.pdf. [Last accessed on 2013 Sep 24).

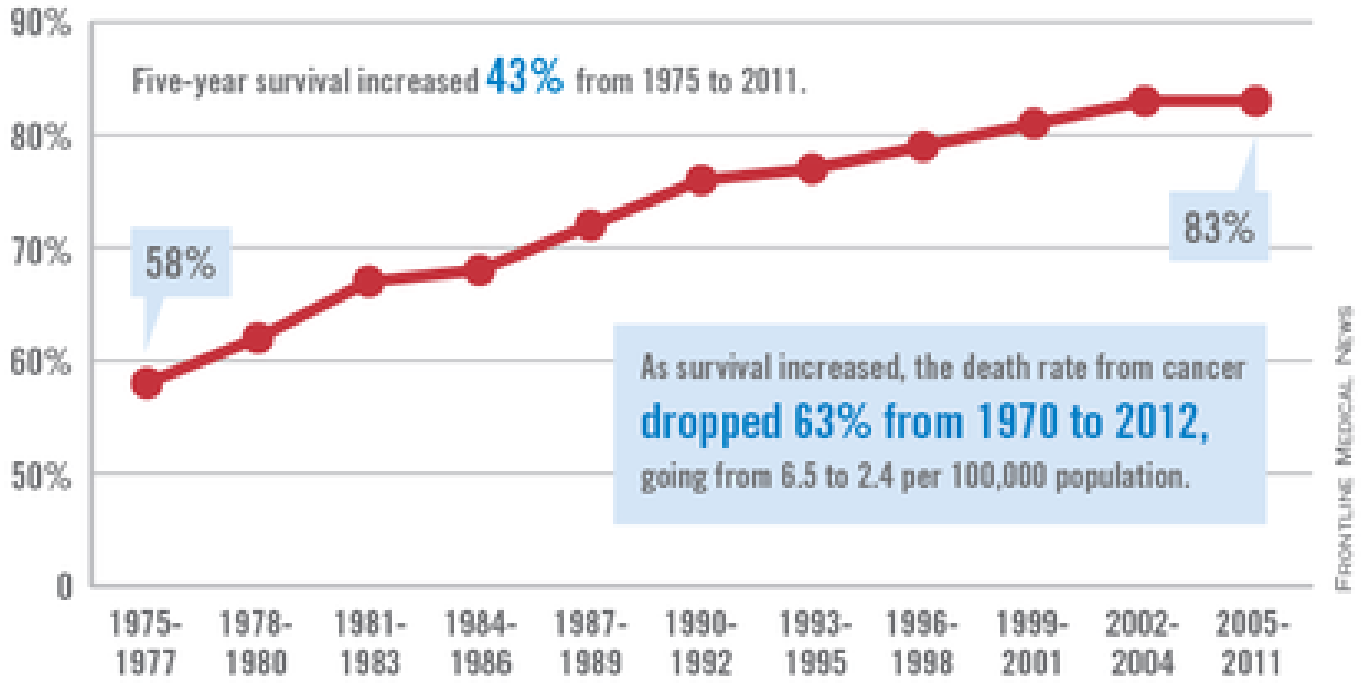
- This data comes from PBCRs established by ICMR since 1981 and has 29 PBCRs under NCRP.

- As per PBCRs - Childhood cancer in India forms 0.7 – 5.8% cases of all age group malignancies.

Incidence


16%
30%
6%
6%
7%
11%
25%
Leukemia
CNS tumors
Lymphomas
Soft-tissue sarcomas
Neuroblastoma and other peripheral nervous cell tumors
Renal tumors
Other

Five-year cancer survival for children by year of diagnosis



Note: Based on data for children from birth to age 14 years from the Surveillance, Epidemiology, and End Results Program.

Source: CA Cancer J Clin. 2016 Jan;66(1):7-30

Survival in childhood cancers

- High income countries have 1 % of childhood cancers of all malignancies with a survival rate of around 80%.

- LMICs survival rate is around 30%.

- 5 year survival rates: Leukemia (92%), Lymphoma (91%), Brain tumours (Diffuse Intrinsic pontine glioma 2 year survival < 10%).

SGRT in Pediatric cancer

Major concerns for treating pediatric patients

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- Use of painless, stress and anxiety free methods.
- Quick Setup
- Need for good immobilization during treatment for accuracy and precision.
- Anesthesia requirement, That adds into overall cost, burden on resources and substantially increases treatment time.
- Robust intra-fraction motion management after acquiring CBCT.
- Re-setup and exposure to repeated imaging.

Benefits of SGRT in Pediatric patients

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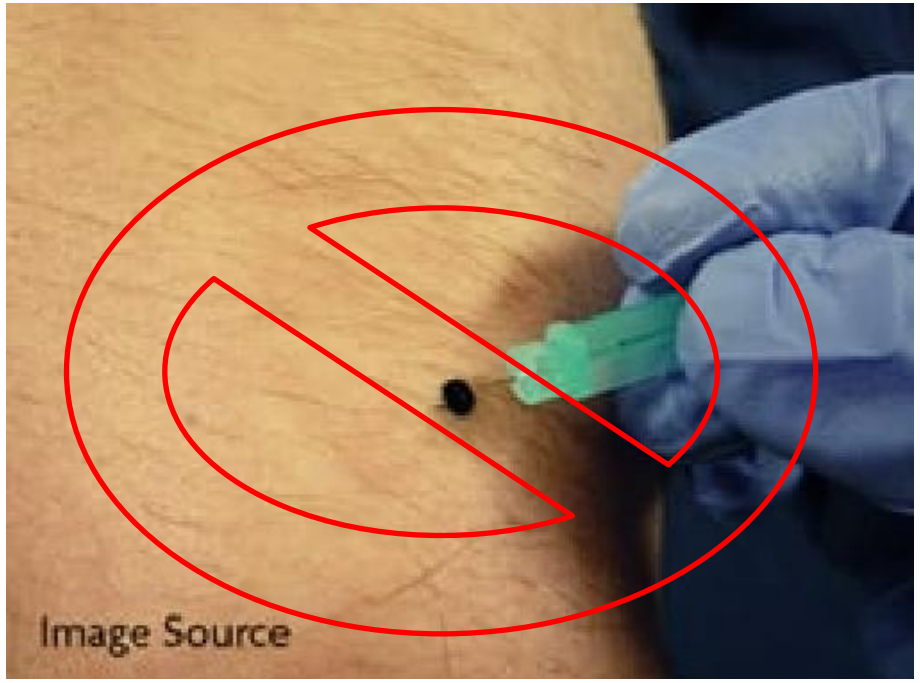
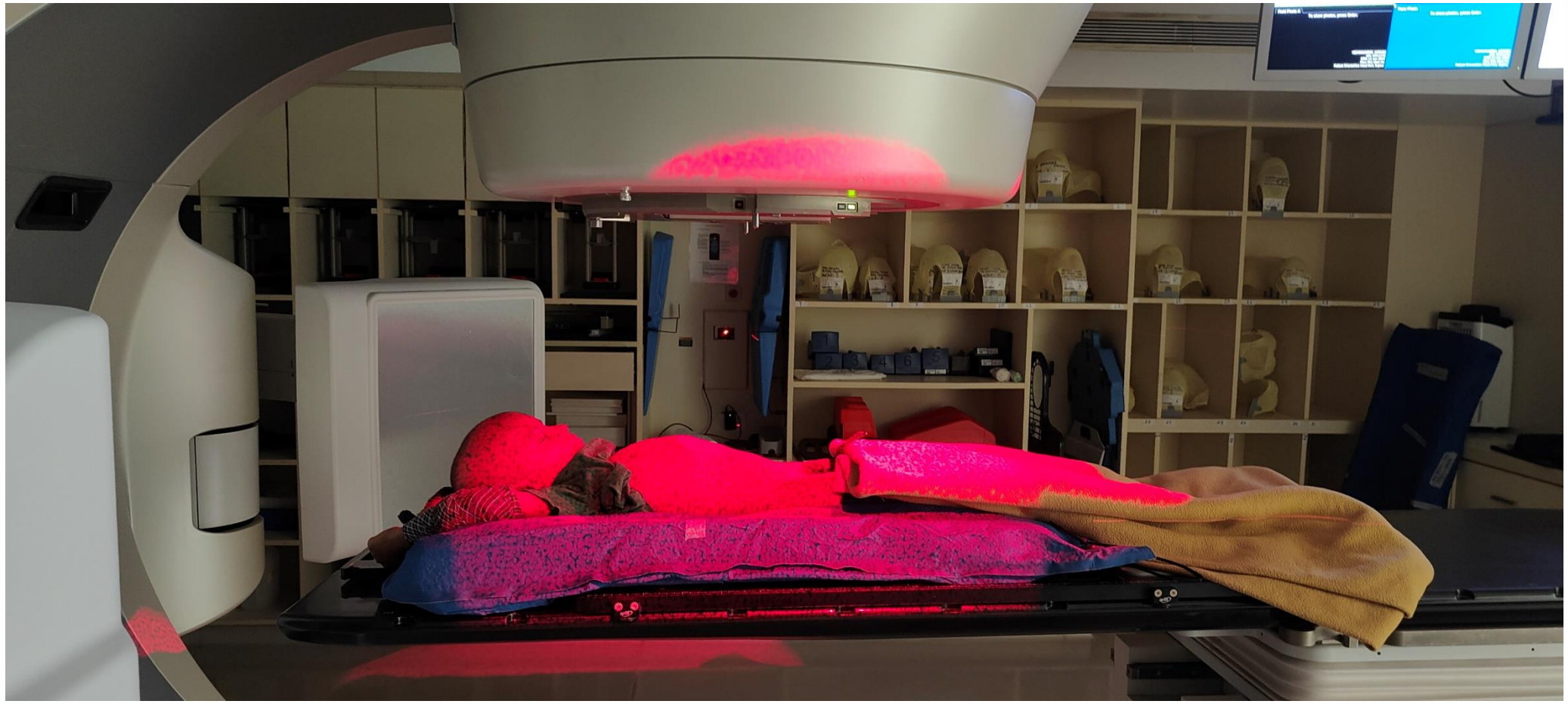
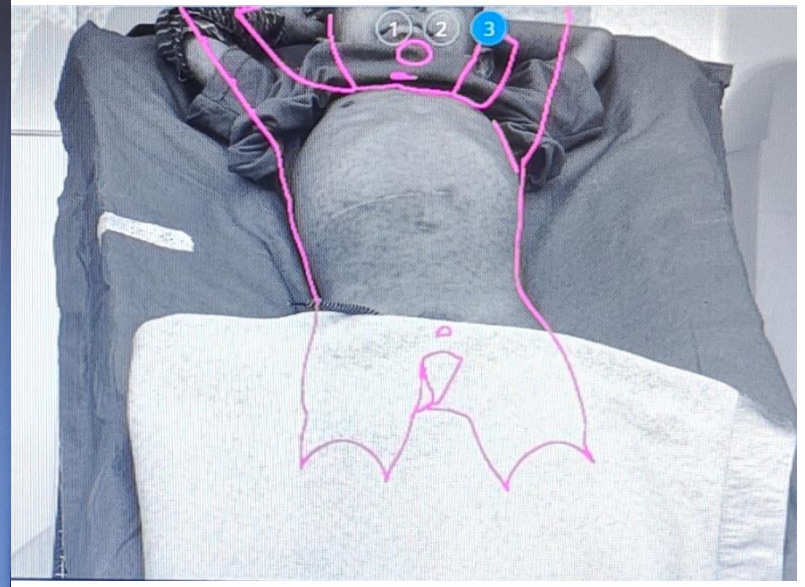


Non-Ionizing Imaging

Benefits of SGRT in Pediatric patients



Benefits of SGRT in Pediatric patients



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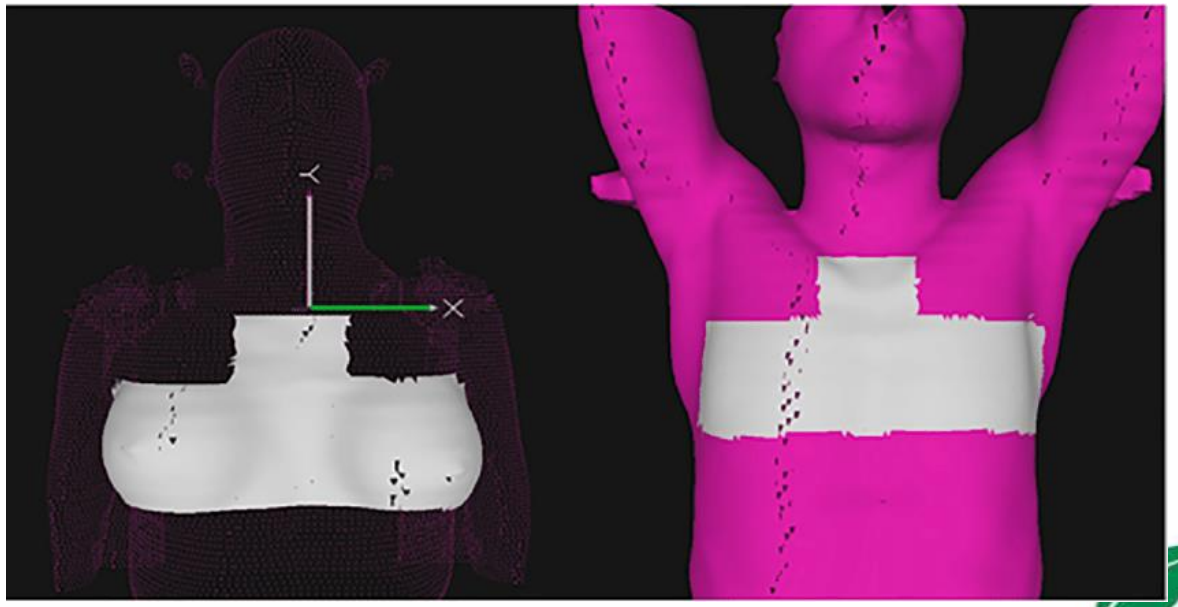
Autobeam hold

3D Topographic imaging spatial resolution



Compatibility with Anesthesia

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- Minimize the use of accessories
- Reduce the errors and uncertainties of accessories.
- Effective further reduction in setup time.
- SGRT usage decreased the need of making thermoplastic mold for Non head neck malignancies such as chest, abdomen and pelvis.

Preliminary data of SGRT in Pediatric cancer patients

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	Shifts		Shifts of Gamma index (Acceptance value 3% /3mm)		
Site/Region	Planned Gamma index		3mm	5mm	7mm
	value	Tolerance			
Abdomen	97.5	95	93.8	85.7	82.8
Abdomen	97.4	95	93.8	86.3	81.9
Thorax	98.7	95	96.5	89.5	86.5
Abdomen	99.5	95	97.3	86.1	80.5
Abdomen	99	95	96.1	89.5	86
Abdomen	95.4	95	74.4	50	40.8
Abdomen	95.6	95	87.1	74.1	64.6
Abdomen	98.3	95	83	58.7	42.7
Pelvic	100	95	80.2	56.4	42.8
Pelvic	99.7	95	97.1	90.2	86.8
	98.11	95	89.93	76.65	69.54

To Summarize

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- Imaging without Radiation dose
- Auto-beam hold and Real time feedback features
- Spatial resolution in 3D topographic imaging.
- Largest FOV available and submm immobilisation accuracy
- Track the respiratory movement for chest and abdomen (Potential for replacing the RPM system)
- Intra-fraction motion management
- Robust system that works in complementary with IGRT.
- Significant reduction in set up time.
- It reduces inter-operator variability and compels a rigid workflow. Additional benefits of collision avoidance, bolus positioning.

Future direction

- Use of SGRT for patient identification and safety
- Identification of correct immobilization devices as well as its correct positioning.
- Augmented reality.

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Thank You