Organizational Challenges of SBRT

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Iridium, Antwerp

BESTRO 2025

10th of October

Brussels

What is a normal day at the machine?

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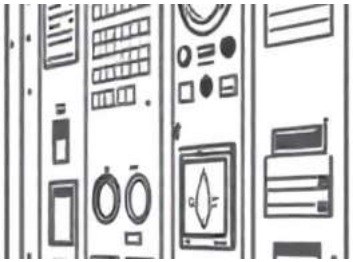
RTT Working Hours	
CLASSIC LINAC	MR LINAC (UNITY)
8h00 → 16h00	8h45 → 16h45
9h00 → 17h00	



Early morning start-up and quality assurance checks performed by the engineers.

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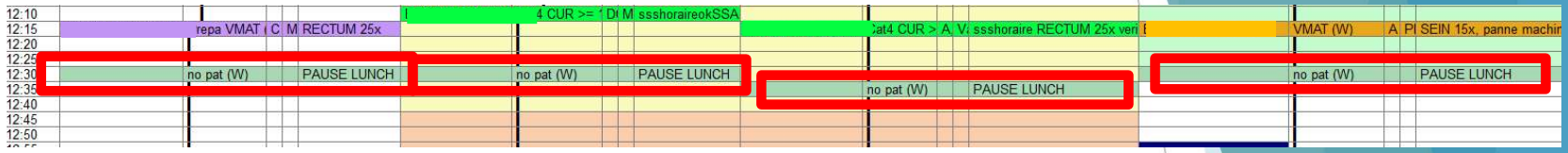
Conventional Linac

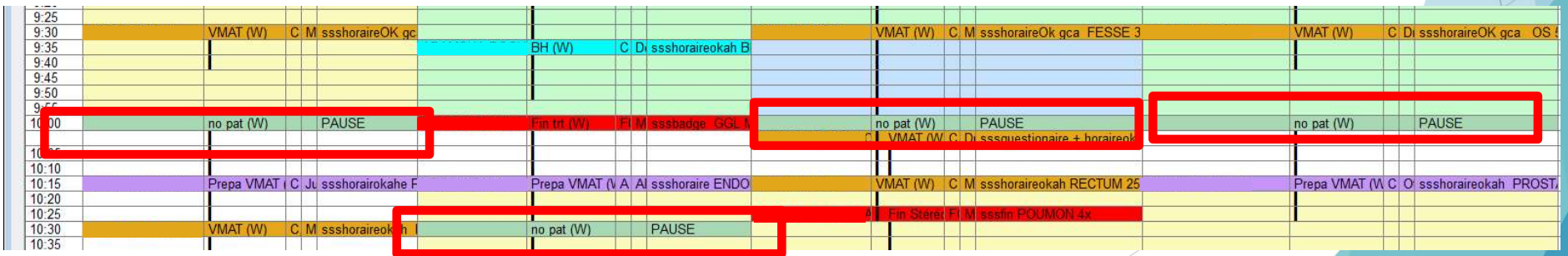


8h00 → 8h15
15-minute daily morning meeting between the RTT team and the secretaries

10h
15minute break during the morning work period

12h00/12h30
30 minute (minimum) for the lunch break

16h00
End of the last treatment



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MR Linac

8h45
The RTT arrives and prepares everything for the first patient (9h00)

12h00/12h30
30 minute (minimum) for the lunch break

16h00/16h30
End of the last treatment

Until 16h45
Individual work
Organization of the following day/week

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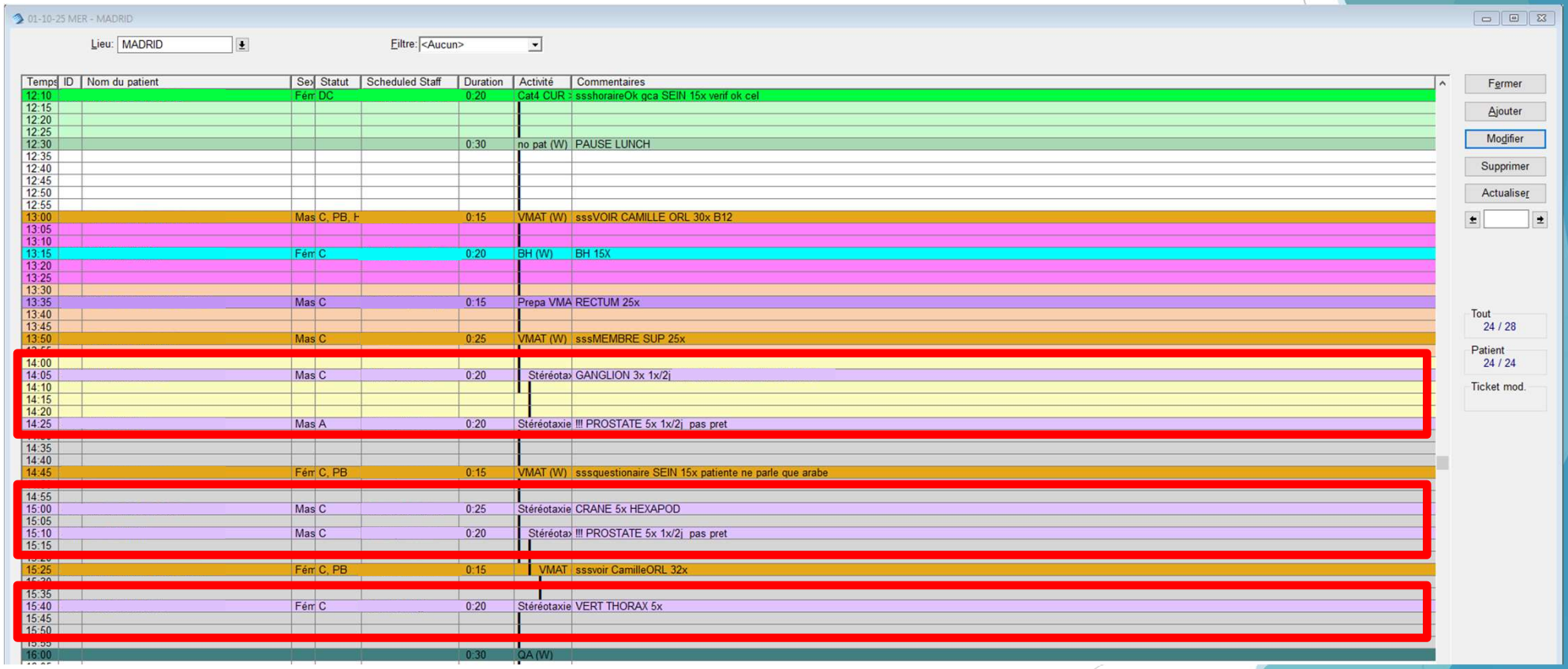
Time Slots for SBRT treatments - Conventional Linac



01-10-25 MER - MADRID

Lieu: MADRID Filtre: <Aucun>

Temps	ID	Nom du patient	Sex	Statut	Scheduled Staff	Duration	Activité	Commentaires
12:10			Fém	DC		0:20	Cat4 CUR >	ssshoraireOk qca SEIN 15x verif ok cel
12:15								
12:20								
12:25								
12:30						0:30	no pat (W)	PAUSE LUNCH
12:35								
12:40								
12:45								
12:50								
12:55								
13:00			Mas	C, PB, H		0:15	VMAT (W)	sssVOIR CAMILLE ORL 30x B12
13:05								
13:10								
13:15			Fém	C		0:20	BH (W)	BH 15X
13:20								
13:25								
13:30								
13:35			Mas	C		0:15	Prepa VMA	RECTUM 25x
13:40								
13:45								
13:50			Mas	C		0:25	VMAT (W)	sssMEMBRE SUP 25x
14:00								
14:05			Mas	C		0:20	Stéréotax	GANGLION 3x 1x/2j
14:10								
14:15								
14:20								
14:25			Mas	A		0:20	Stéréotaxie	!!! PROSTATE 5x 1x/2j pas pret
14:35								
14:40								
14:45			Fém	C, PB		0:15	VMAT (W)	sssquestionaire SEIN 15x patiente ne parle que arabe
14:55								
15:00			Mas	C		0:25	Stéréotaxie	CRANE 5x HEXAPOD
15:05								
15:10			Mas	C		0:20	Stéréotax	!!! PROSTATE 5x 1x/2j pas pret
15:15								
15:25			Fém	C, PB		0:15	VMAT	sssvoir CamilleORL 32x
15:35								
15:40			Fém	C		0:20	Stéréotaxie	VERT THORAX 5x
15:45								
15:50								
16:00						0:30	QA (W)	

Fermer
Ajouter
Modifier
Supprimer
Actualiser

Tout 24 / 28
Patient 24 / 24
Ticket mod.

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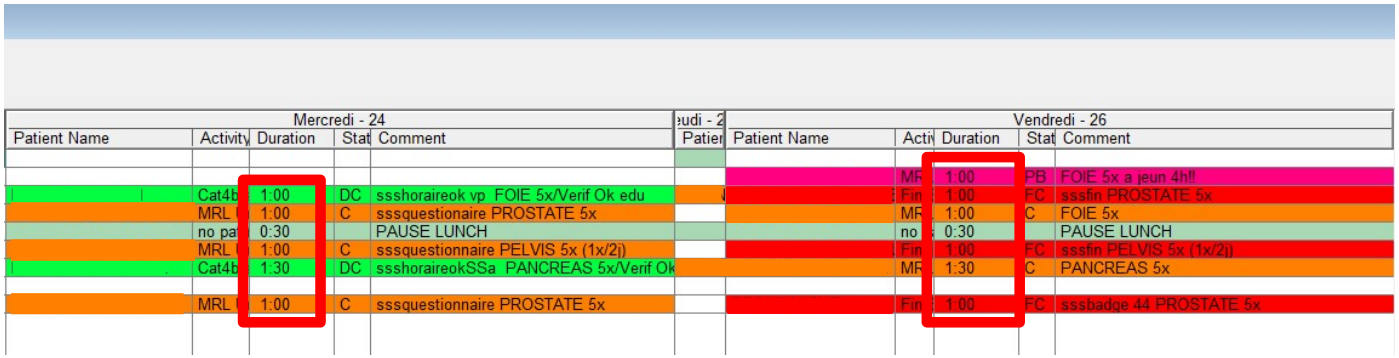
Time Slots for SBRT treatments – MR Linac



Mercredi - 24						Vendredi - 26				
Patient Name	Activity	Duration	Stat	Comment		Patient Name	Activ	Duration	Stat	Comment
							MR	1:00	PB	FOIE 5x a jeun 4h!!
	Cat4b	1:00	DC	ssshoraireok vp FOIE 5x/Verif Ok edu			Fin	1:00	FC	sssfin PROSTATE 5x
	MRL	1:00	C	sssquestionaire PROSTATE 5x			MR	1:00	C	FOIE 5x
	no pa	0:30		PAUSE LUNCH			no	0:30		PAUSE LUNCH
	MRL	1:00	C	sssquestionnaire PELVIS 5x (1x/2j)			Fin	1:00	FC	sssfin PELVIS 5x (1x/2j)
	Cat4b	1:30	DC	ssshoraireokSSa PANCREAS 5x/Verif Ok			MR	1:30	C	PANCREAS 5x
	MRL	1:00	C	sssquestionnaire PROSTATE 5x			Fin	1:00	FC	sssbadge 44 PROSTATE 5x

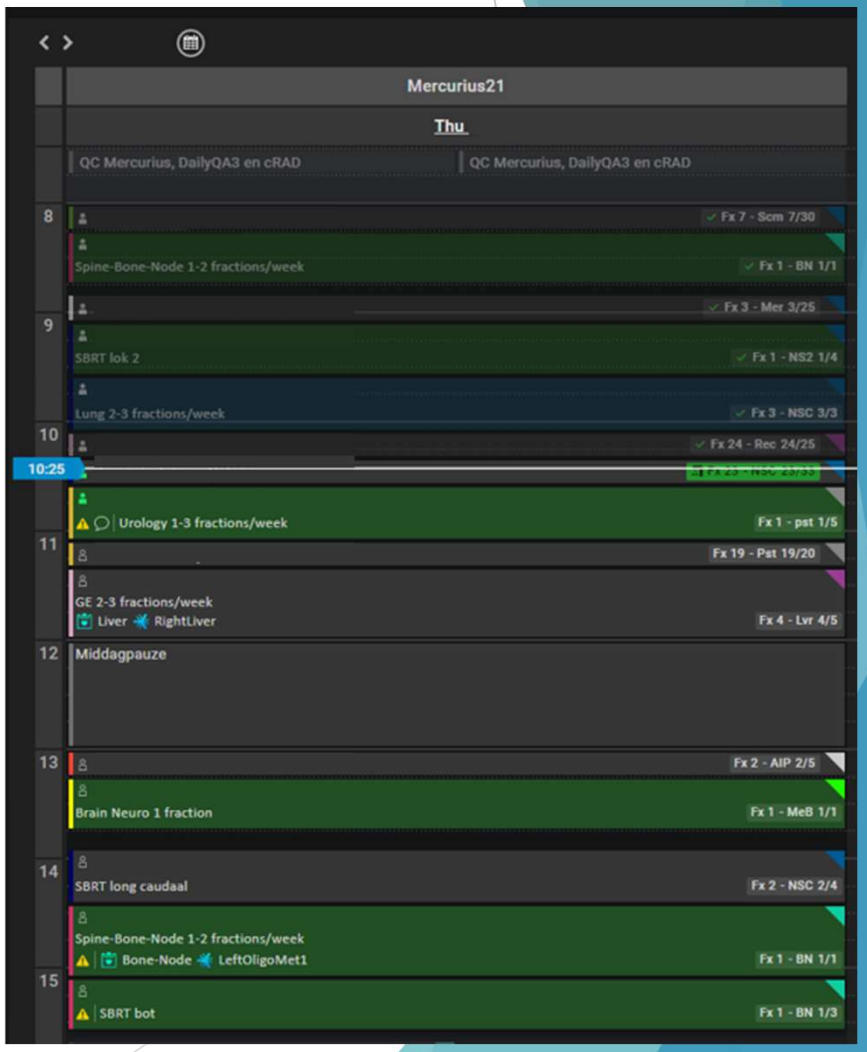
8:00				
8:15				
8:20		no pat		Poste de traitement : Madrid + vol2
12:25				
12:30		no pat (	0:30	PAUSE LUNCH
13:00		MRL Ur	0:45	C sssquestionaire PROSTATE 5x
14:00		MRL Ur	0:45	C PROSTATE 5x 1x/2j Pacemaker
14:30				
14:45		no pat		vol2

Iridium

Working hours from 8h til 16h30 normally we have a **45 min lunchbreak** but is not a non-negotiable, breakdown rescheduling, busy week, etc .

Time slots for the SBRT treatments:

SBRT lung	30 minutes
SBRT Liver	40 minutes
SBRT Prostate	30 minutes
SBRT Spine	40 minutes
SBRT Bone Nodes	40 minutes
SRS Brain	30 minutes
Standard timeslot	15 minutes

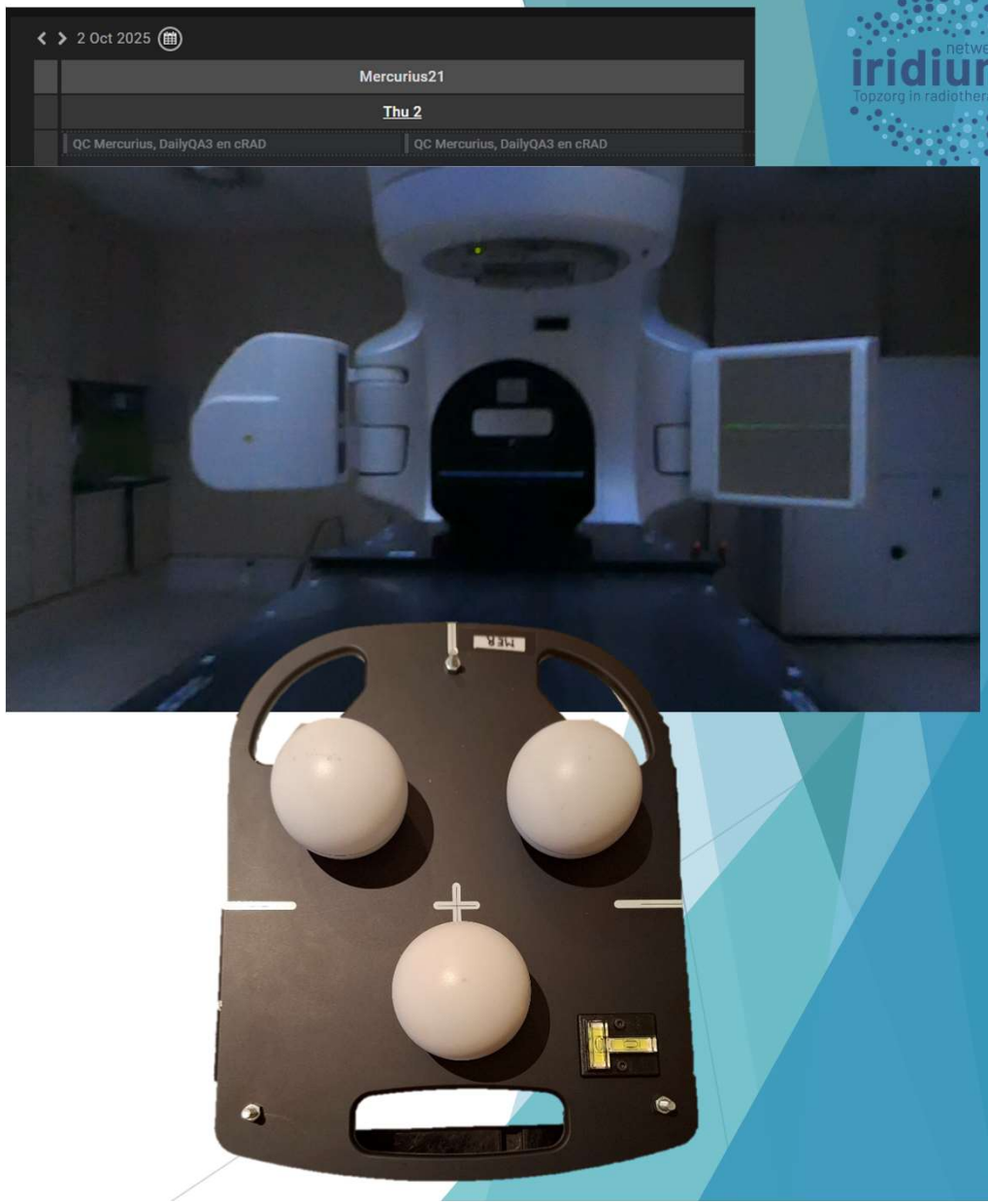


Iridium

<u>Morning startup</u>:
done by RTT's (1 RTT starts at 7h30)

-daily check machine
-SGRT system daily calibration
-pre-treatment QA
(if not succeeded in time, during the day, if unavailable during the day.)

A physicist who has guard will take the measurements (no pre-treatment Q&A on Thursday (extra machine Q&A too much workload otherwise).



Technical comparison between the two radiotherapy departments

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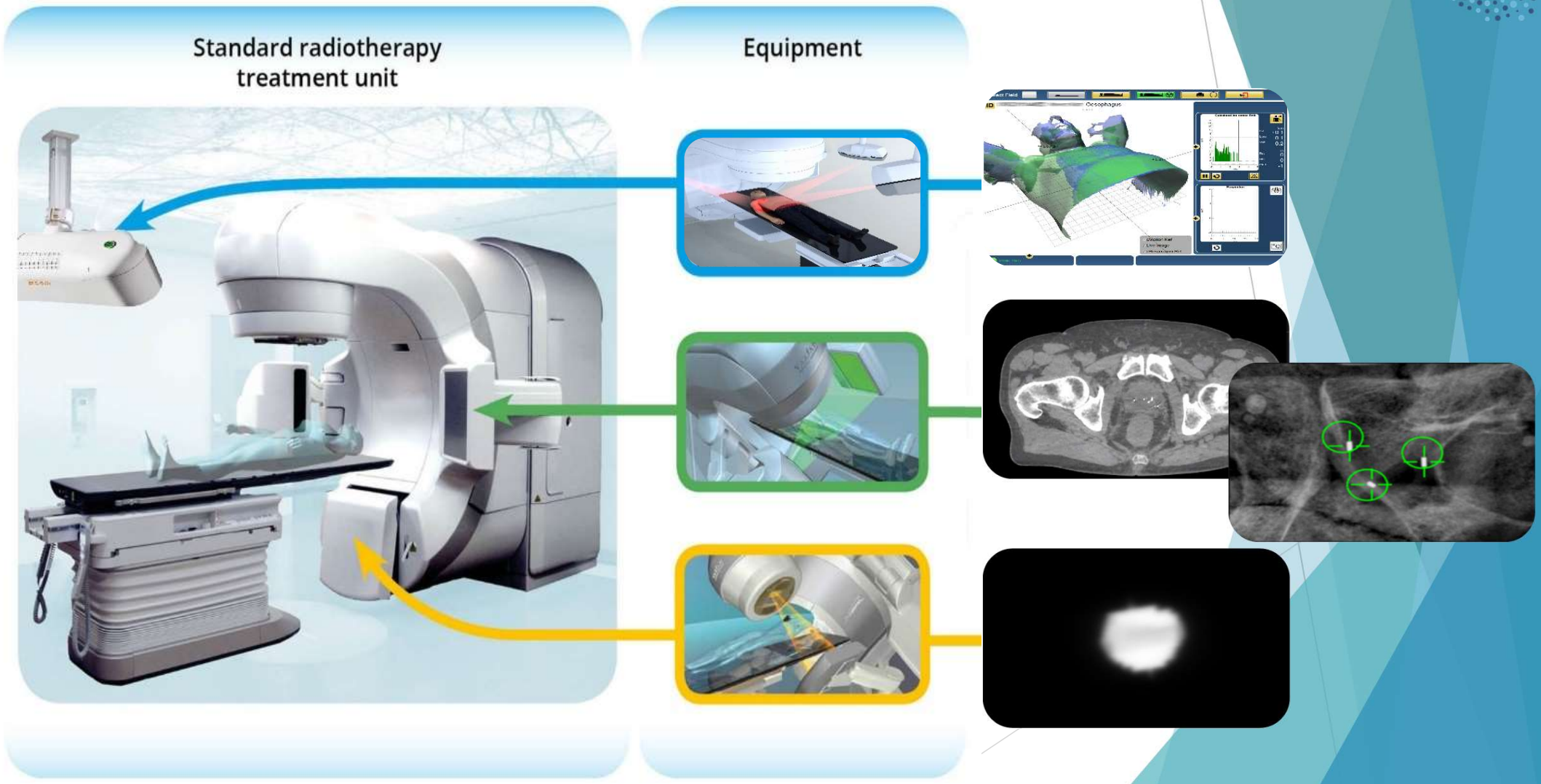

Iridium

- **2 Truebeam STX** (beam matched)

-Raycare fully integrated with Raysearch OIS.
-6MV FFF (flattening filter free)
-HD120 MLC.
This MLC features 120 leaves, with 2.5 mm leaf width in the central region (covering 8 cm at isocenter) and 5 mm leaf width in the periphery.
-SGRT C-Rad Catalyst HD+
-6DOF robotic couch
-Advanced **IGRT** imaging package (markertracking)
-MV portal dosimetry Sun Nuclear

Iridium

Immobilisation material in a fixed(indexed) position on the treatment couch

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Couch parameters are calculated from the isocenter of the treatment plan

Iridium

Contents lists available at ScienceDirect
Technical Innovations & Patient Support in Radiation Oncology
journal homepage: www.sciencedirect.com/journal/technical-innovations-and-patient-support-in-radiation-oncology

Machine learning-based treatment couch parameter prediction in support of surface guided radiation therapy

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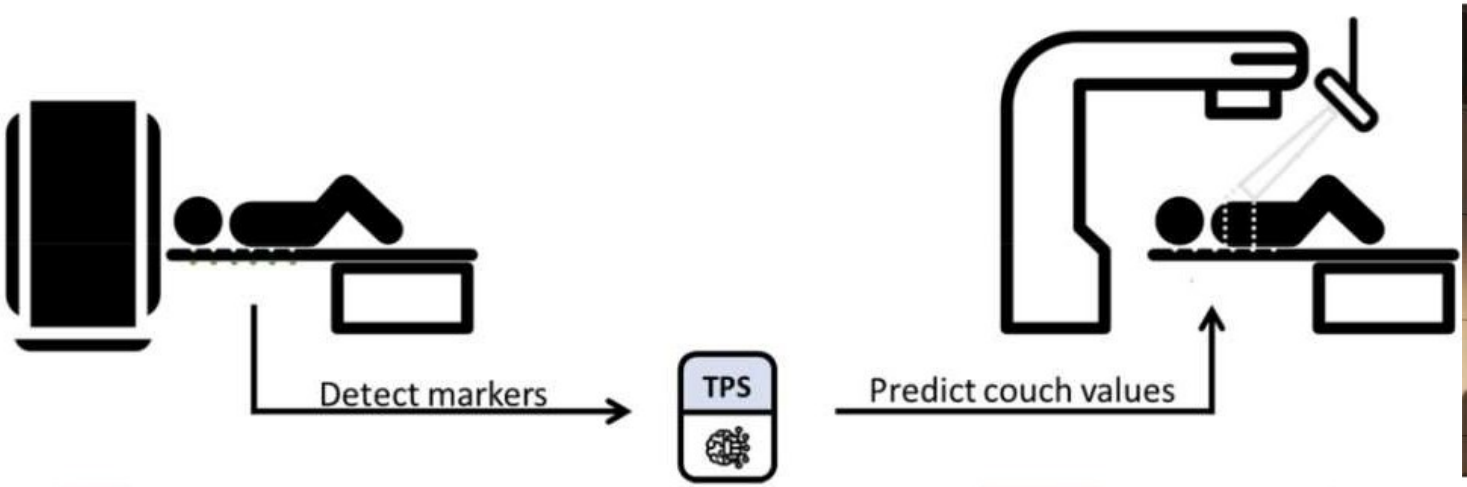
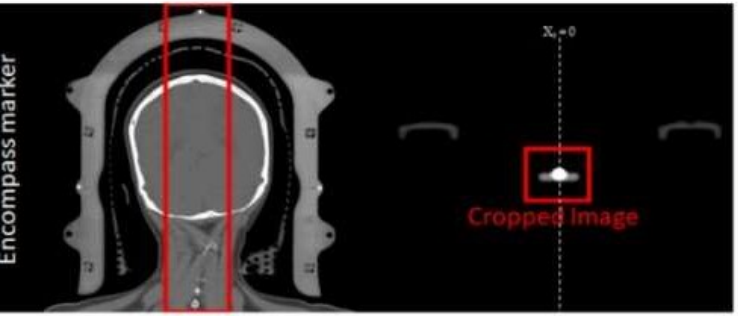
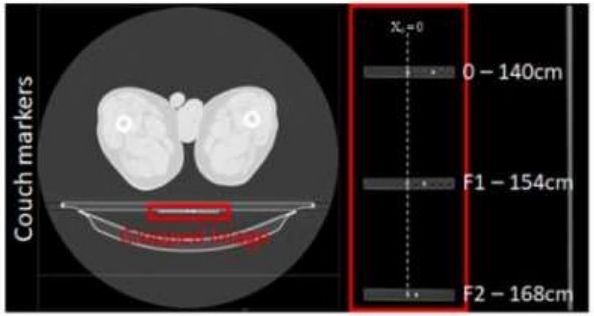
netwerk iridium Topzorg in radiotherapie

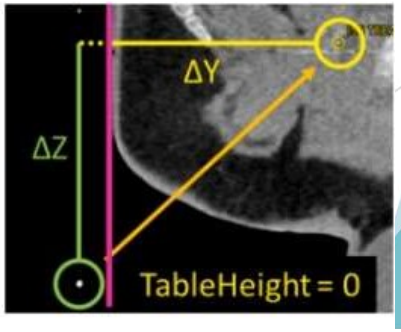
Geert De Kerf · 1e
Medical Physics Expert at GZA
1 mnd

The BHPA Congress had a surprising ending. Many thanks to BHPA and to all my colleagues at the Iridium Netwerk.







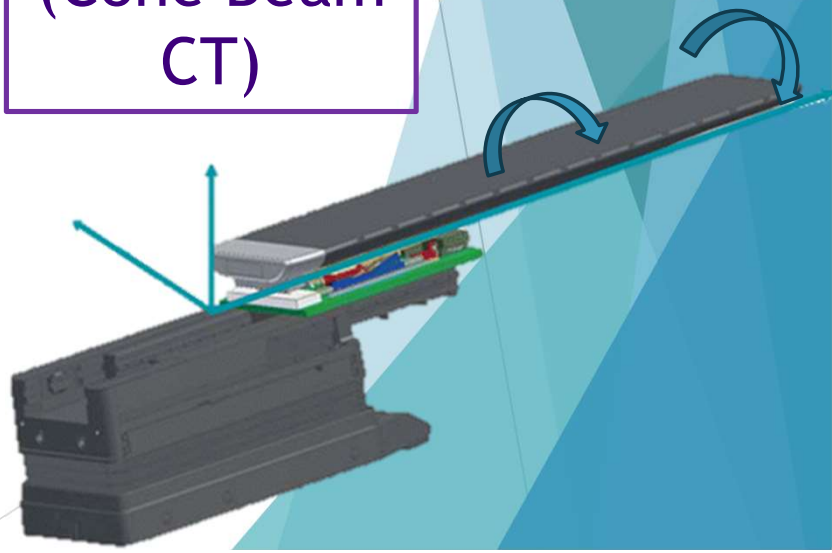


Iridium

Surface scanning to correctly position the patient relative to the isocenter.

Iridium

Daily internal imaging for positioning verification (Cone Beam CT)



Iridium

Surface scanning continuously monitors the patient. If the patient goes beyond preset tolerance → automatic beam stop.

Iridium

Exiting dose is captured by calibrated MV panel. The greyscale is converted to dose and verified by gamma analysis

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Technology

Beam-Matched Linacs

6MV / 6MV FFF

7MV

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Surface Guided Radiotherapy

visionrt
Guiding Radiation Therapy™

Improved patient Positioning accuracy;

Non-ionizing, Real-Time Monitoring;

SGRT complements IGRT protocols.

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Image Guided Radiotherapy

Conventional Linacs

- Daily CBCT
- Anatomy-dependent XVI presets to ensure the lowest possible dose to the patient
- Image analysis by the RTT and MD
- Image approval by the MD

EVO

- The newest machine in the department
- New XVI feature : Iris™
- AI-enhanced images with higher image quality
- Boosts confidence for SBRT treatements

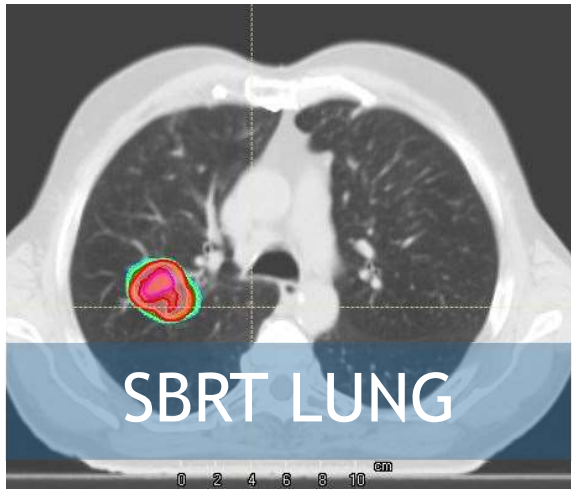
MR-Linac Unity

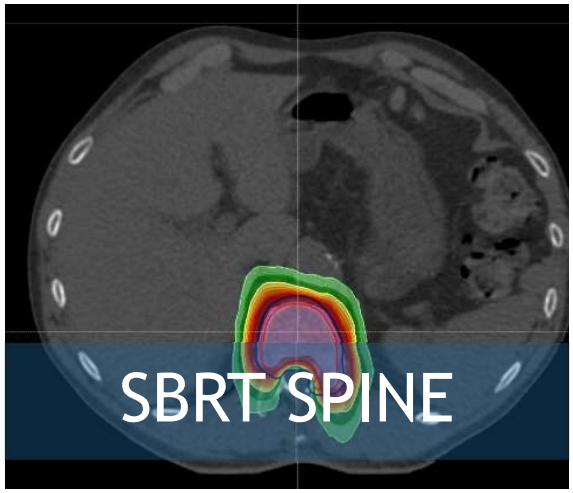
- Dayle MR Image
- Adaptive Radiotherapy
- “IGRT Live” during irradiation - Comprehensive Motion Management (CMM)

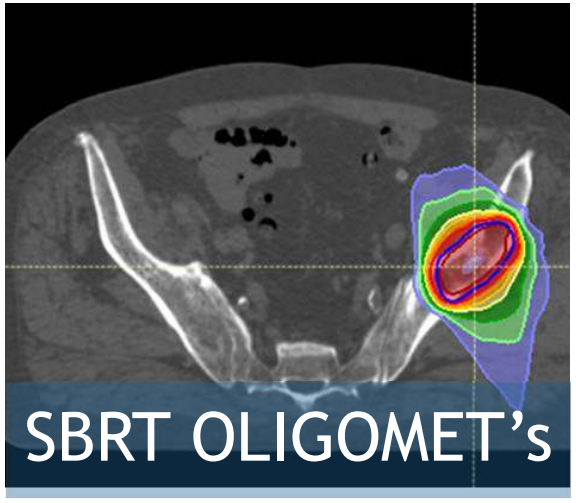
Which clinical indications are you treating?

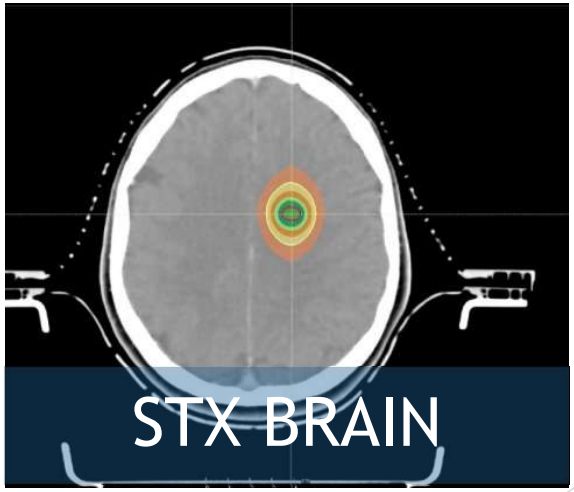
Iridium

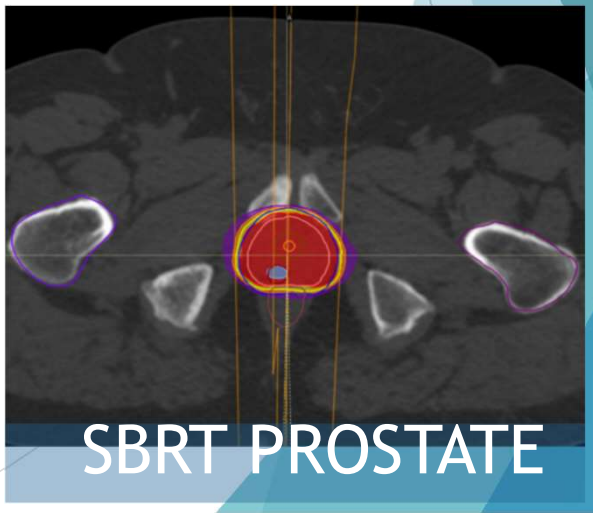
Sub-specialization SBRT/SABR











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Conventional Linac

Prostate
36,25-40 Gy @ 5fr

Prostatic Bed
32Gy @ 5fr (loge) if LN 25Gy @ 5fr (STEREOBED)

Lung
*48Gy @ 4fr **or** 60Gy @ 8fr*

Lymph Nodes
*30Gy @ 3fr **or** 35Gy @ 5fr*

Bones
*30Gy @ 3fr **or** 35Gy @ 5fr*

MR Linac

Prostate
40Gy @ 5fr

Lymph Nodes
*30Gy @ 3fr **or** 35Gy @ 5fr*

Liver
*42Gy @ 3fr **or** 40-45Gy @ 5fr*

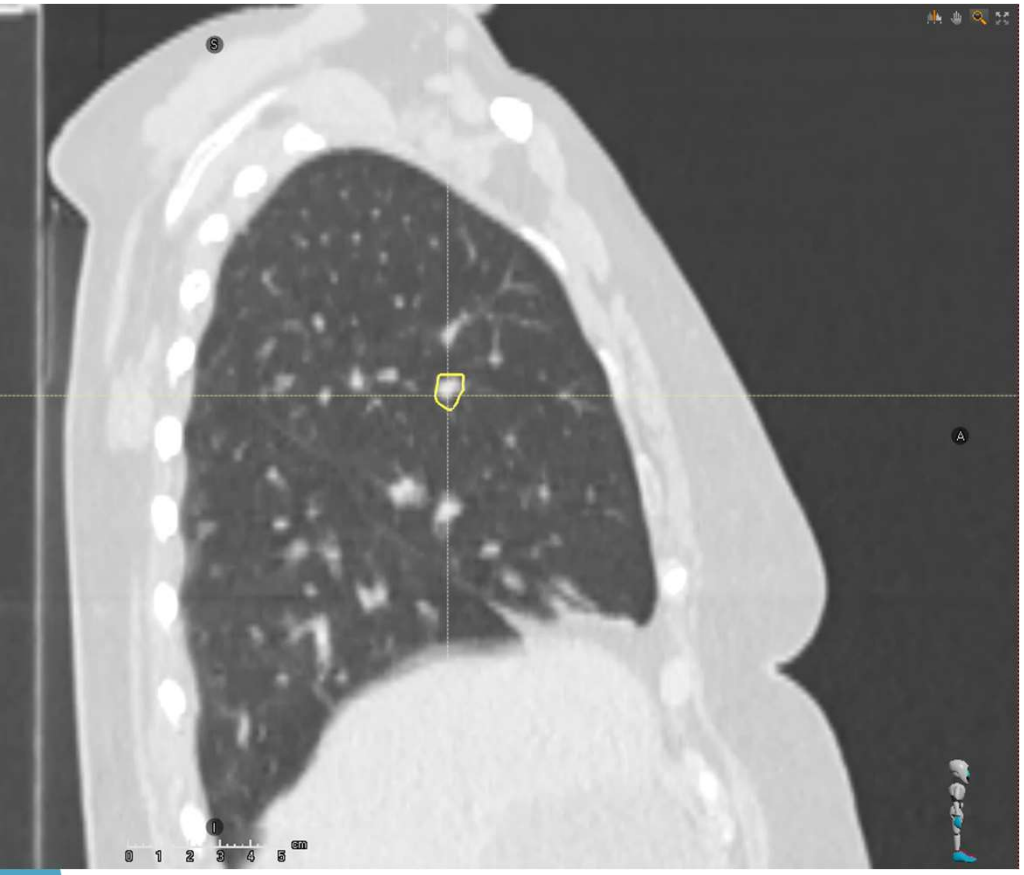
Pancreas
50Gy @ 5fr

Adrenal Gland
35-40Gy @ 5fr

Kidney
*42Gy @ 3fr **or** 50Gy @ 5fr **or** 26Gy @ 1fr*

What is your experience in managing the patient's movement during treatment ?

Iridium



- **<u>Moving Targets</u>**

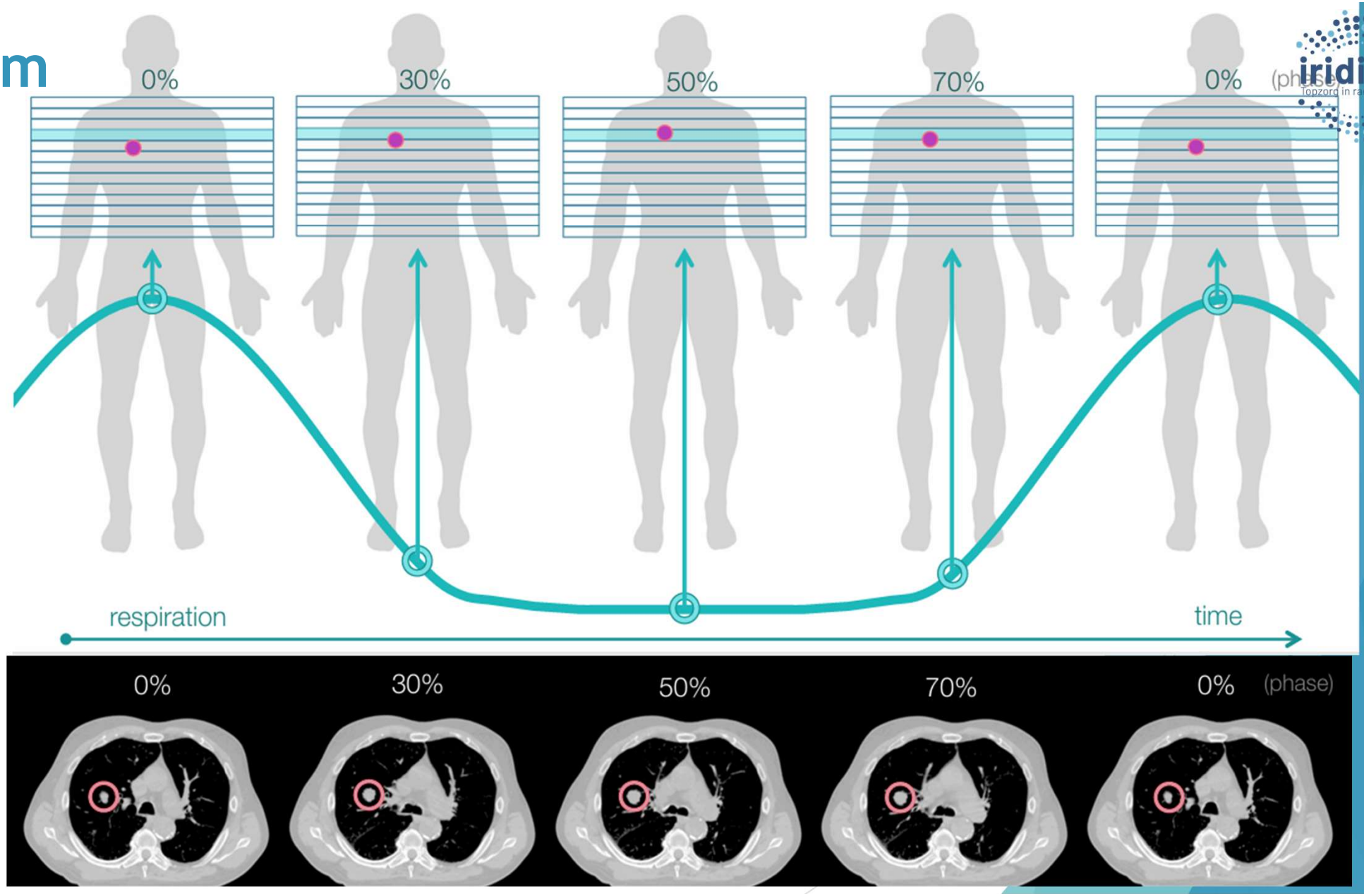
(4DCT): For moving tumors (lungs, liver, abdominal lymph nodes), respiratory-correlated 4D CT is required.

Number of Phases/Bins: The minimum number of reconstructed phases must be ≥ 8

Data Sufficiency: The data sufficiency criteria for 4D scanning (related to table distance, gantry rotation time, and respiratory cycle time) must be met.

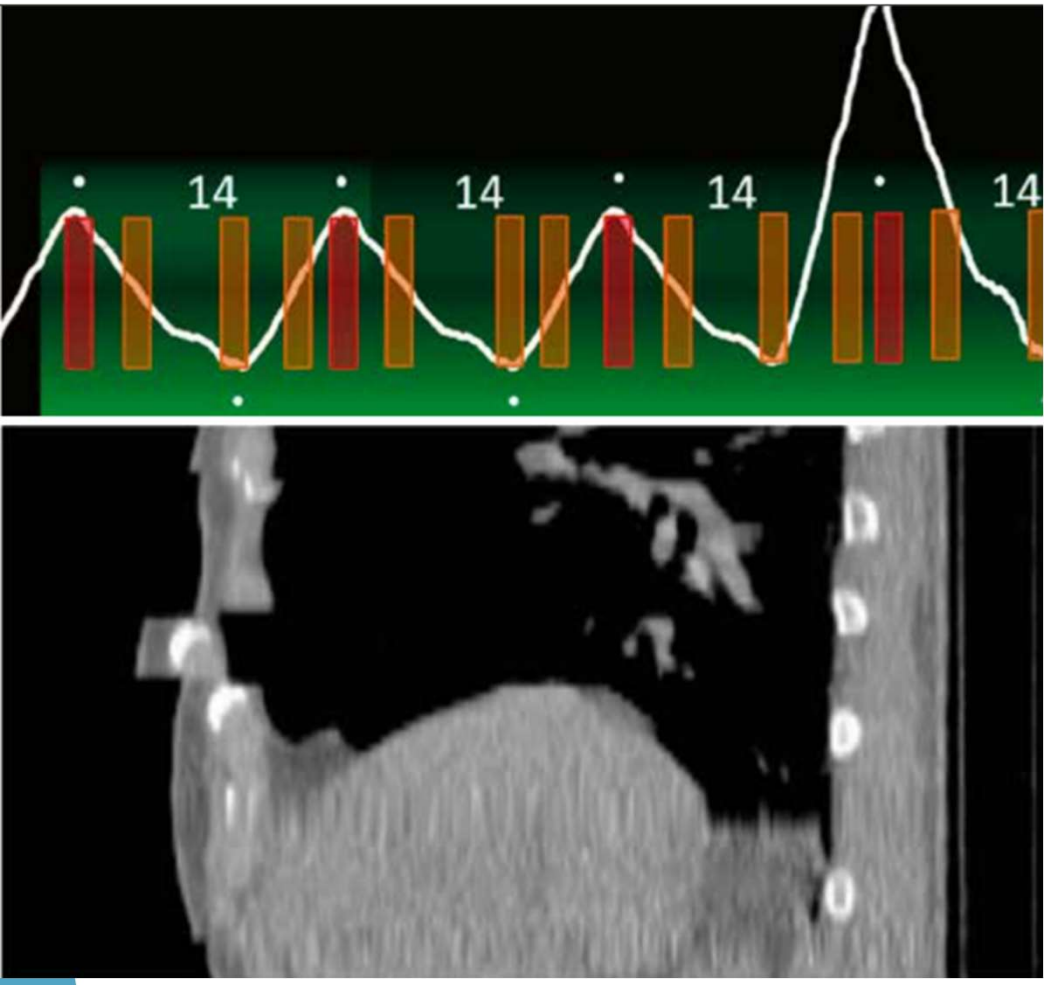
Each 4DCT scan must be assessed for the **presence of artifacts**. A new 4D scan should be performed if significant motion artifacts are found.

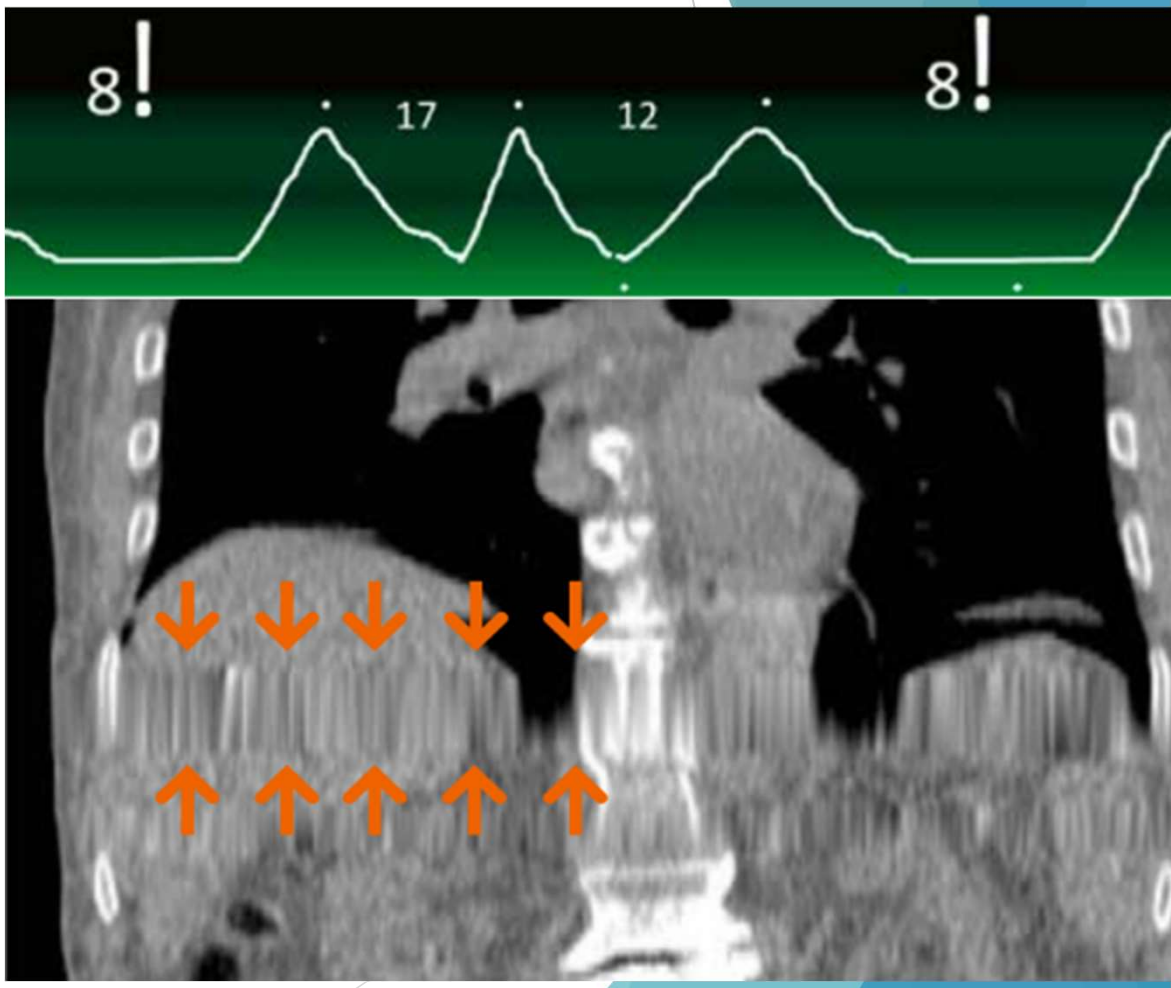
Iridium

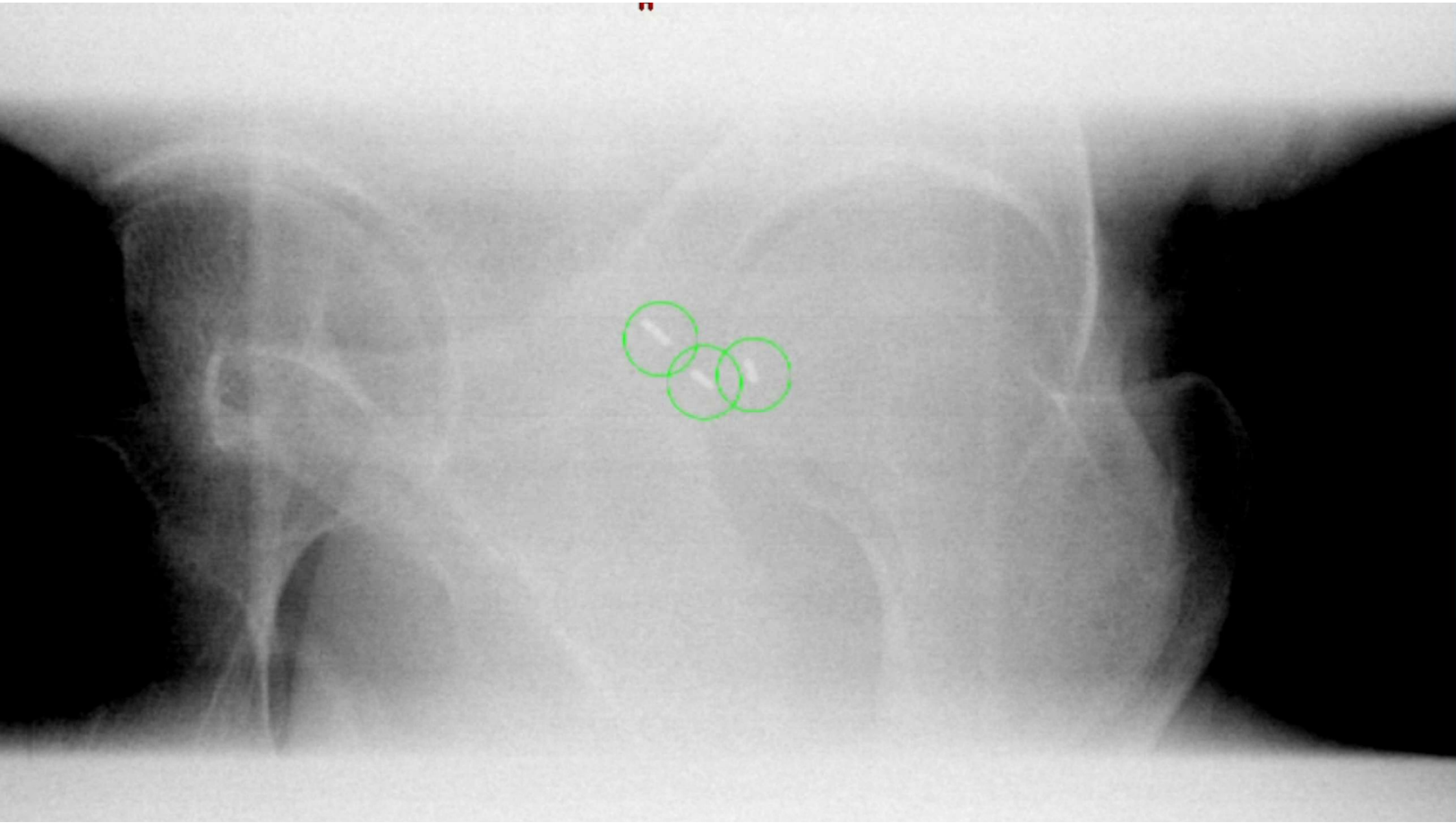


Iridium

- ***Artifacts: amplitude & respiratory rate***







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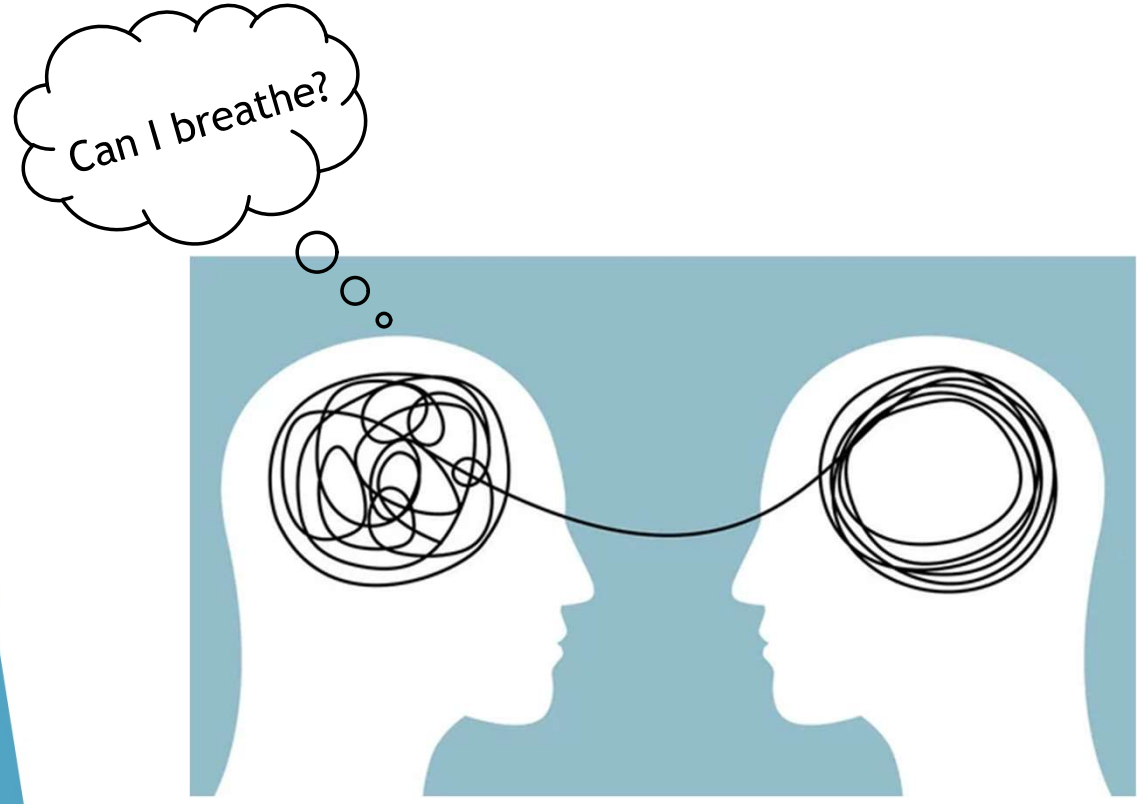

1. Communication
2. Immobilization
3. SGRT
4. IGRT
5. MR Linac

Patient Education + Trust + Empowerment = Success

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The AIO Solution®

Compression Belt

1. Communication
2. Immobilization
3. SGRT
4. IGRT
5. MR Linac

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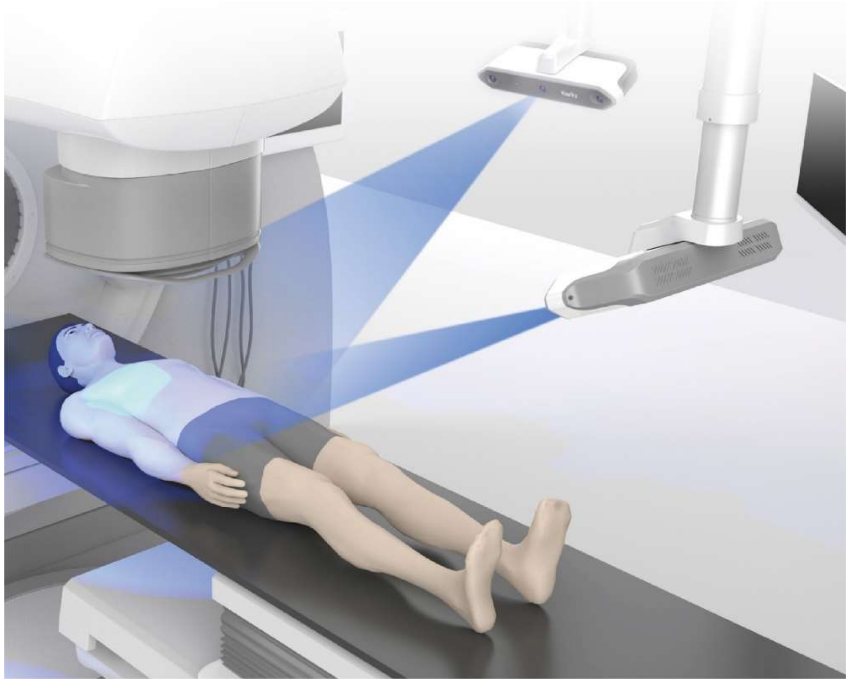

Patient Monitoring

1. Communication
2. Immobilization
3. SGRT
4. IGRT
5. MR Linac

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INSTITUT JULES BORDET INSTITUUT

Intrafraction motion analyses in pancreatic cancer SBRT

Paulo Ferreira[1], Filipa Sousa[1], Sara Poeta[2], Younes Jourani[2], Christelle Bouchart[1].
1. Department of Radiation Oncology; 2. Department of Medical Physics
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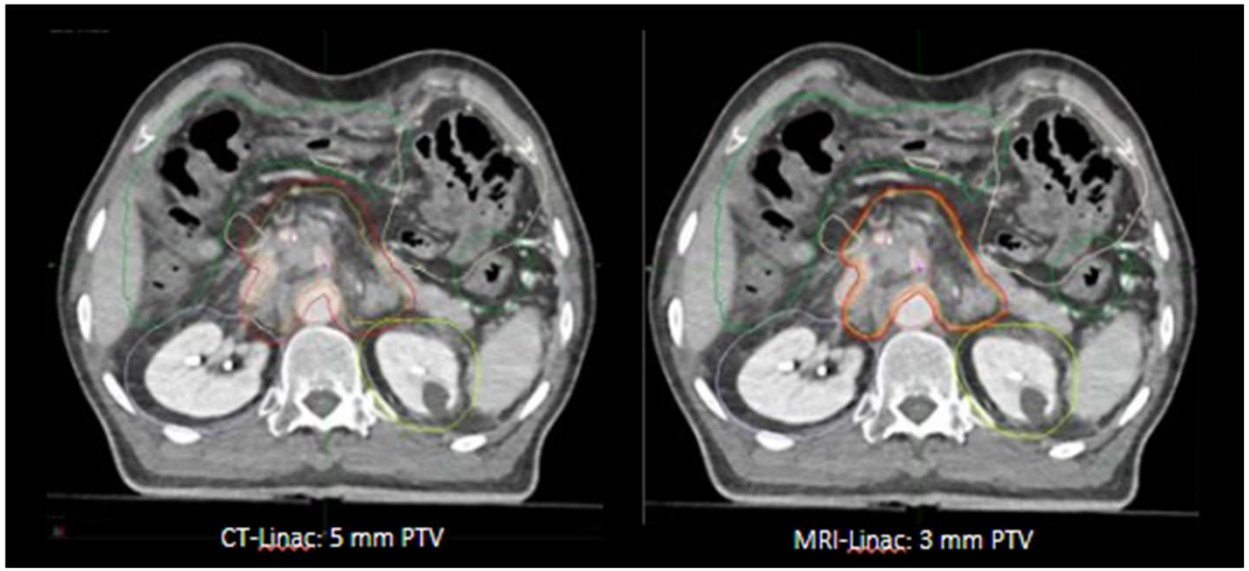
ESTRO 2025



1. Communication
2. Immobilization
3. SGRT
4. IGRT
5. MR Linac

Daily CBCT
Margins : 3mm or 5mm (PTV)

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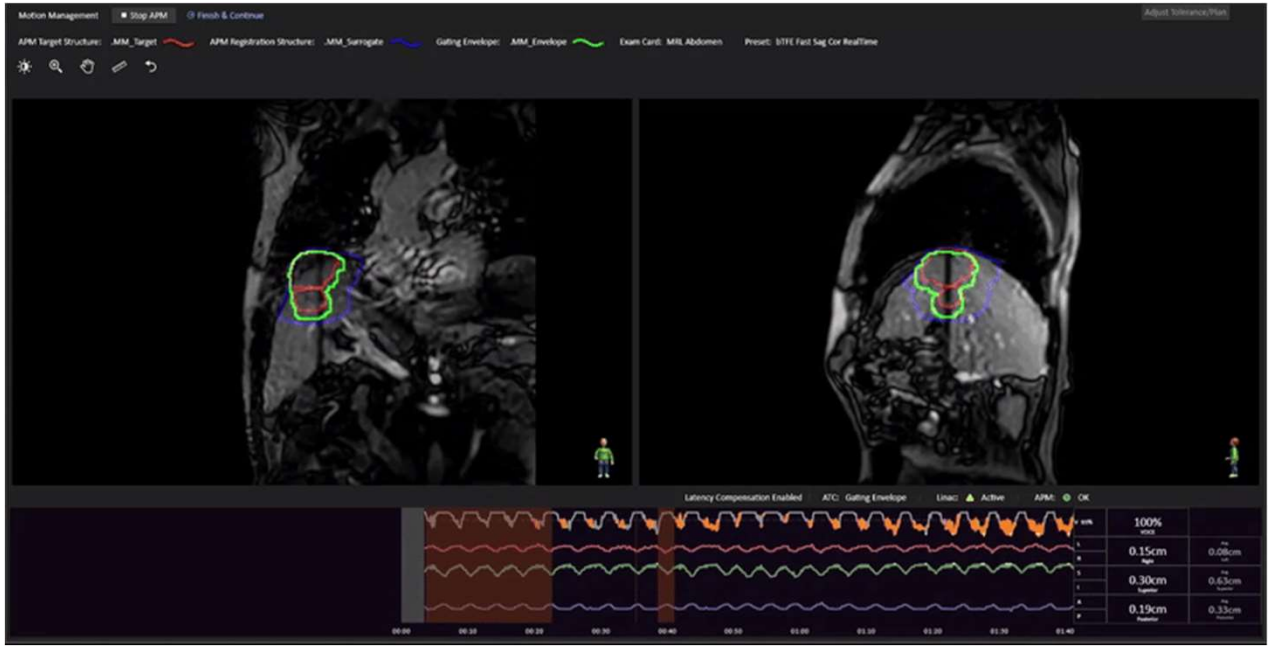

Gating System

If the tumor shifts outside the Gating Envelope → *Base Line Shift*

1. Communication
2. Immobilization
3. SGRT
4. IGRT
5. MR Linac

How do you manage rectal and bladder protocols for SBRT patients, ensuring compliance and handling related challenges?

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Patient Education		
RT Coach and RTTs	Clear instructions	Educational leaflets

↓

Standardized Protocol	
Conventional Linac vs MR Linac	Adjustment of the protocol

↓

Daily IGRT Verification	
Images aproved by MD	TLP and TAP

↓

Dealing with Issues		
Flexibility in treatment scheduling	Multidisciplinary support	Adaptive planning

Iridium

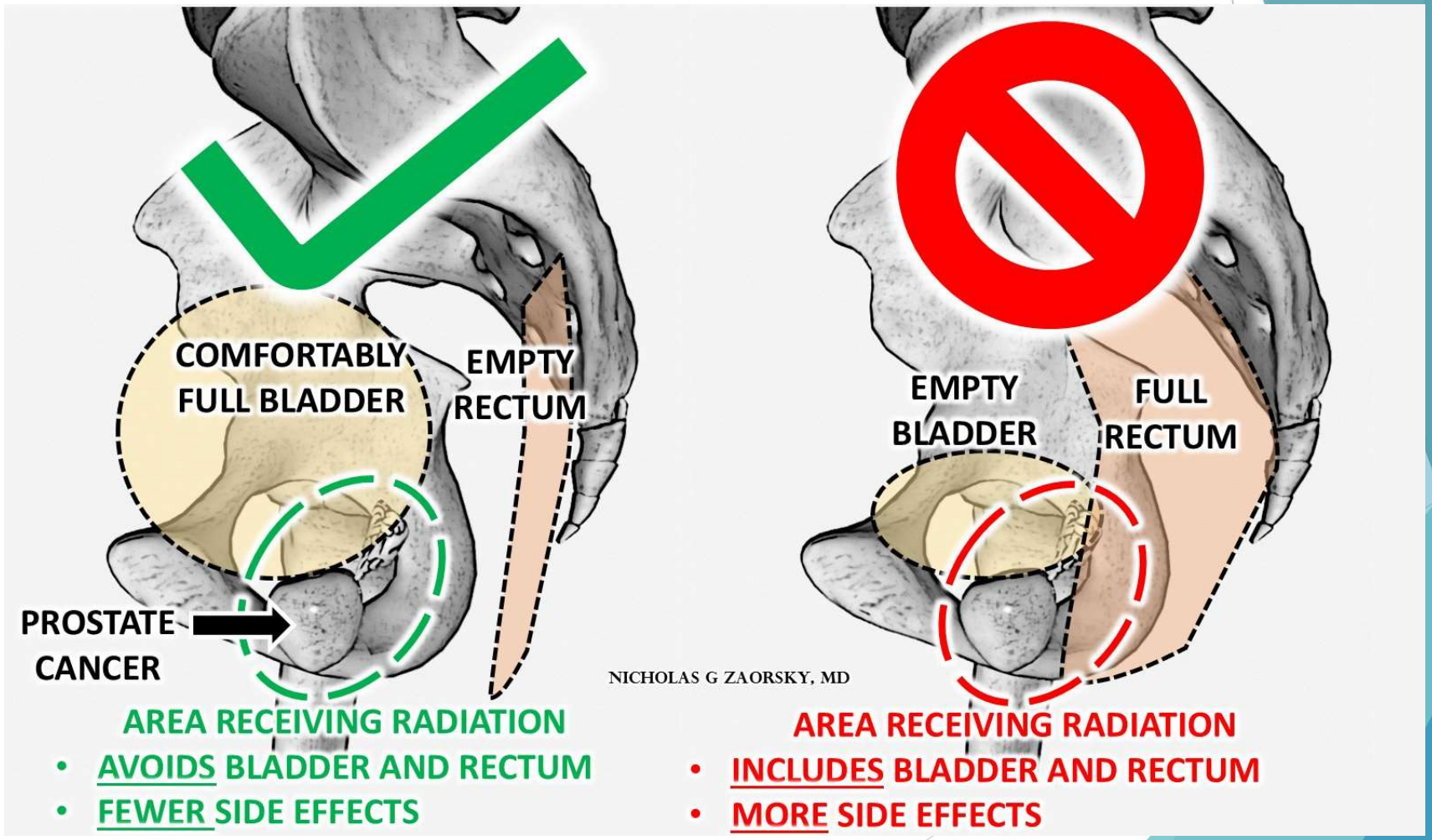
- **<u>Instruction for patients</u>**

-At home 1 hour 30 minutes before the simulation appointment
-Administer Microlax yourself,
even if you have already had a bowel movement
» Retain Microlax for 5 to 10 minutes
-Have a bowel movement and urinate, followed by
-1 hour before the simulation appointment
-Drink 2 glasses of water (= 400ml)
Afterwards, do not urinate again

-Take a seat in the waiting room
-Wait for the nurse's signal
-If you’re unable to hold it contact staff !!!

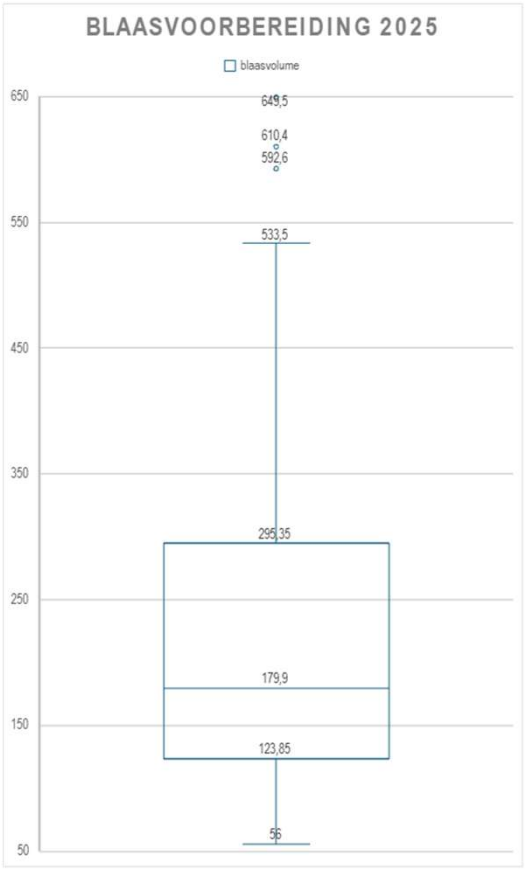
Iridium

Patients need feedback on their bowel prep



Iridium

Bladder volume



2023

↑90 % fractions good prep @ linac
Motion detected in 15% of cases (n=9/60)

Have all the employees involved in SBRT undergone specific training for this technique?

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Conventional Linac

- **No specific training for SBRT**
  - » General Elekta trainings
  - » Previous work and academic background
- Preference for an **internal training model**
  - » Based on mentoring and peer learning
  - » Practical training

MR Linac

- **Elekta Trainings**
- Physics team had a key role in our training
  - » Workflow and machine-specific details
- **RTT training initiative**
  - » Training database for contouring and revision by a RO

Strong focus on **external theoretical courses**

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Iridium

No not really. We have a dedicated team so we'll try to have **new team members one by one**. The team already consist of RTT's from Belgium (recent), the Netherlands and Portugal who had SBRT in their primary education.

But it remains basic. We like to think of it as a license to fly but how to fly is actually learned on the job.

The new member wil be a 4 member of the group until the group decides the new member is capable of the new techniques

We believe that national education is necessary.

Thank you, BESTRO for organizing this.