



Klinische ervaringen met MR-gestuurde radiotherapie bij rectum-tumoren

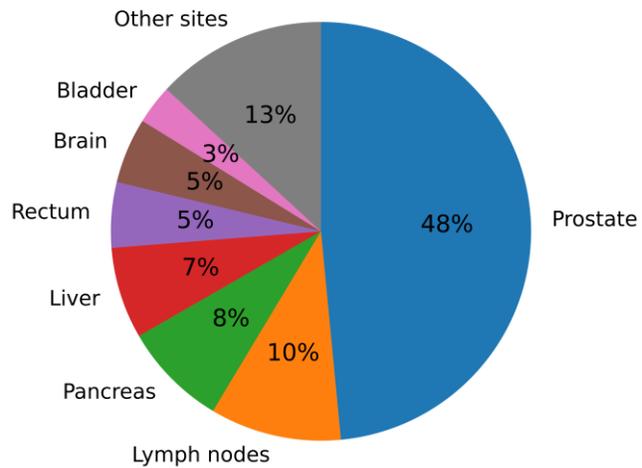
Gert Meijer

klinisch fysicus

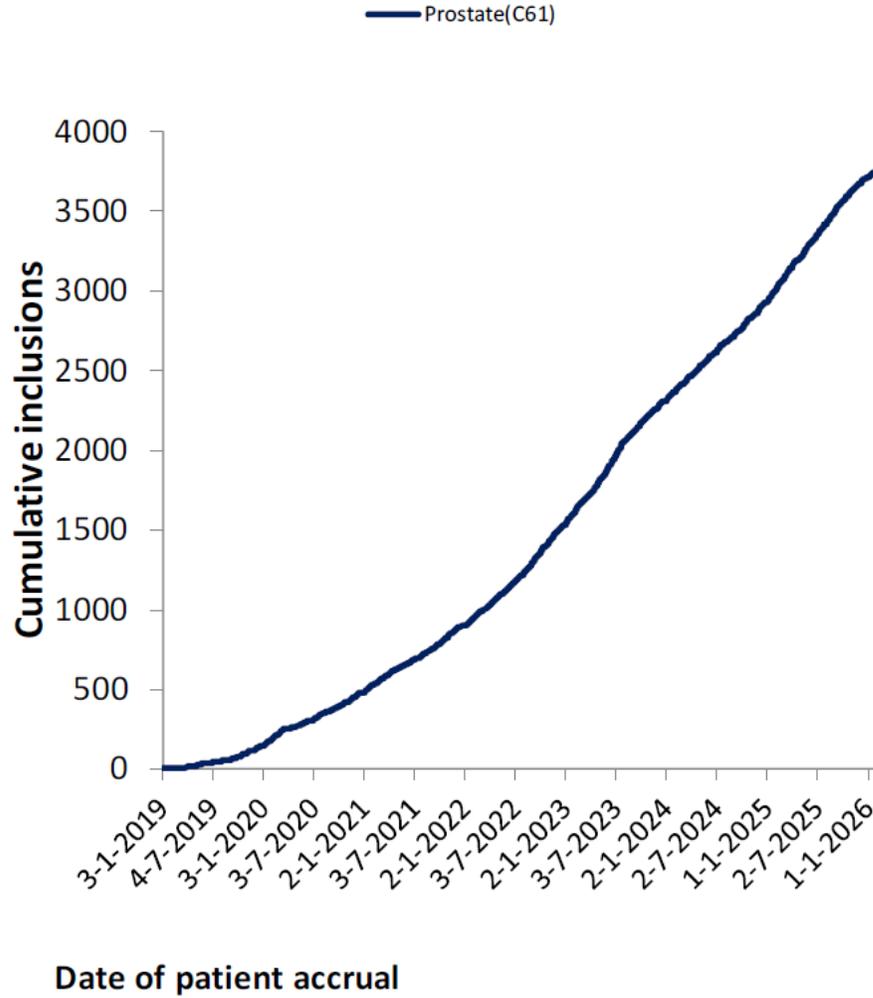


UMC Utrecht

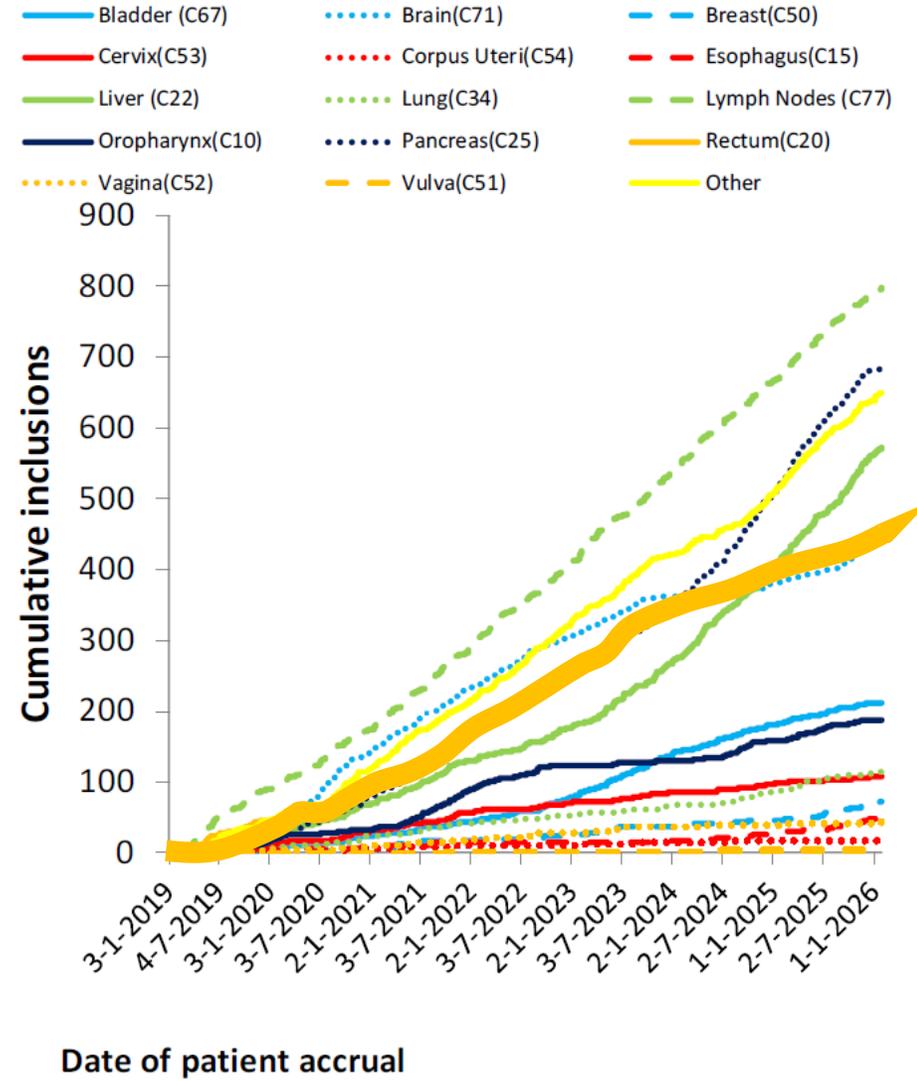
MOMENTUM



Cumulative inclusions Prostate @ 02 February 2026

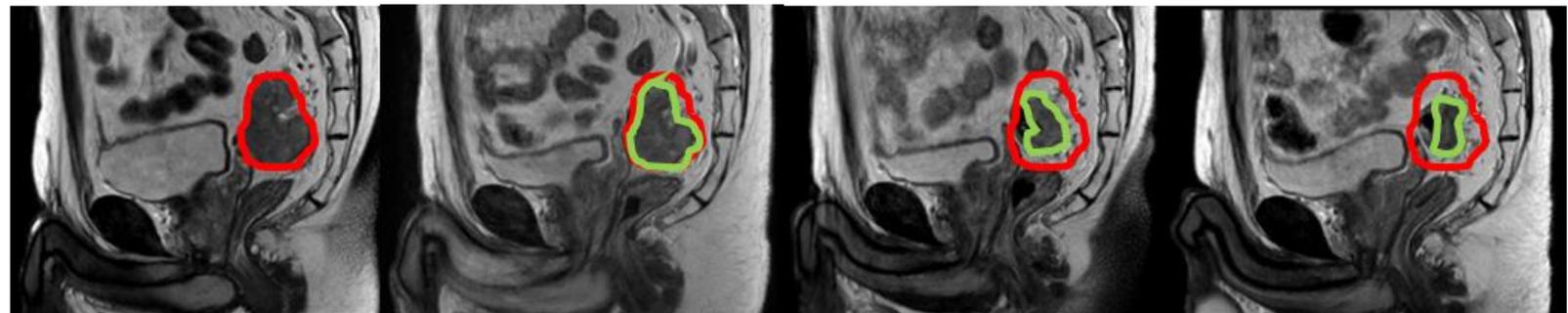
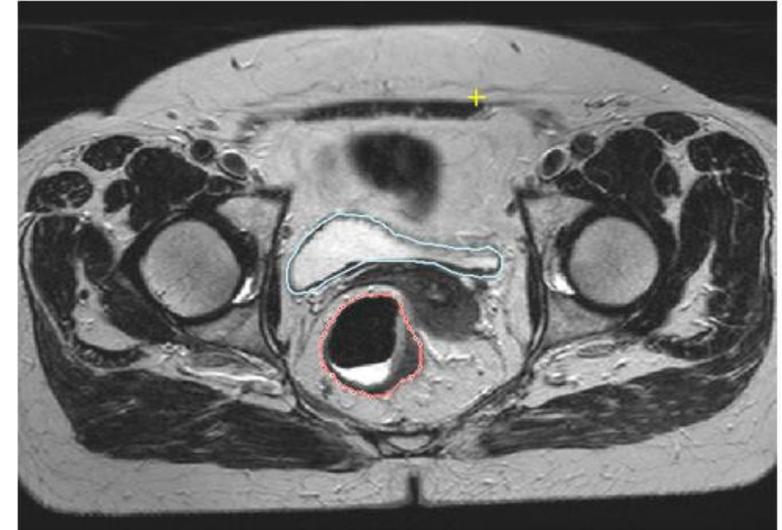
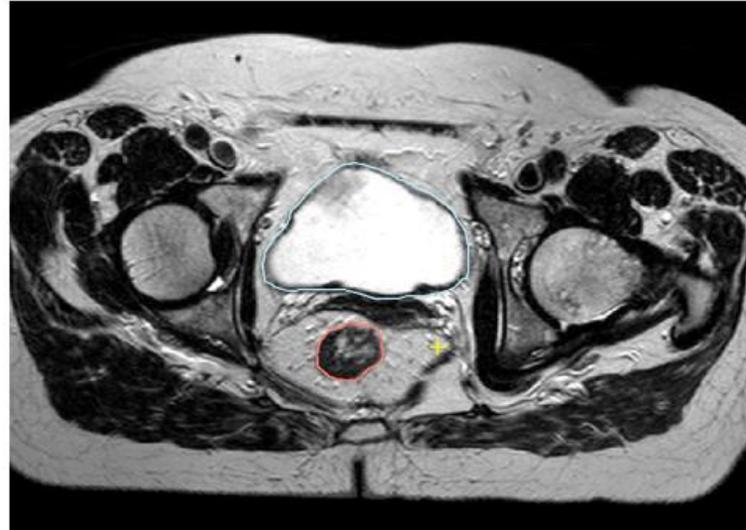


Cumulative inclusions per TSG @ 02 February 2026

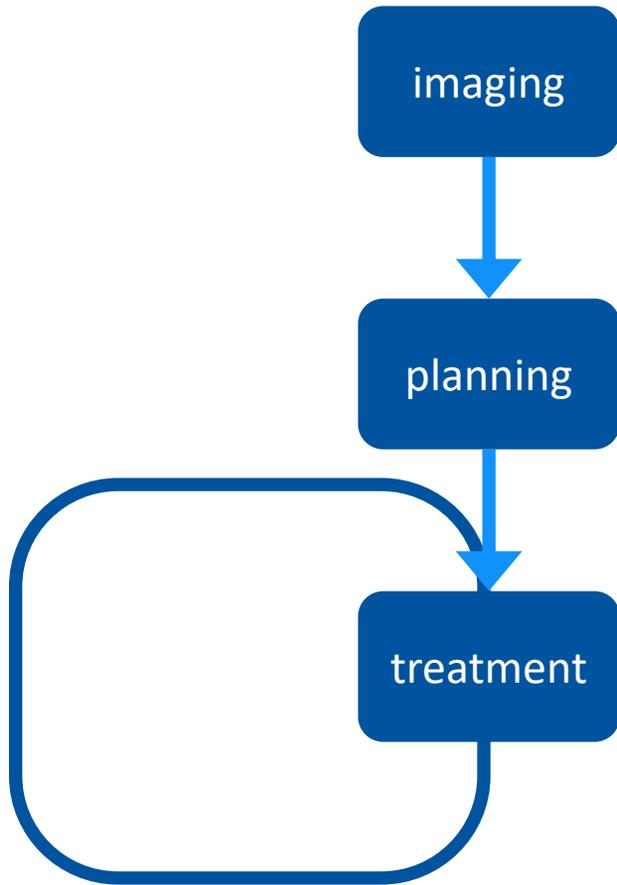


Rationale

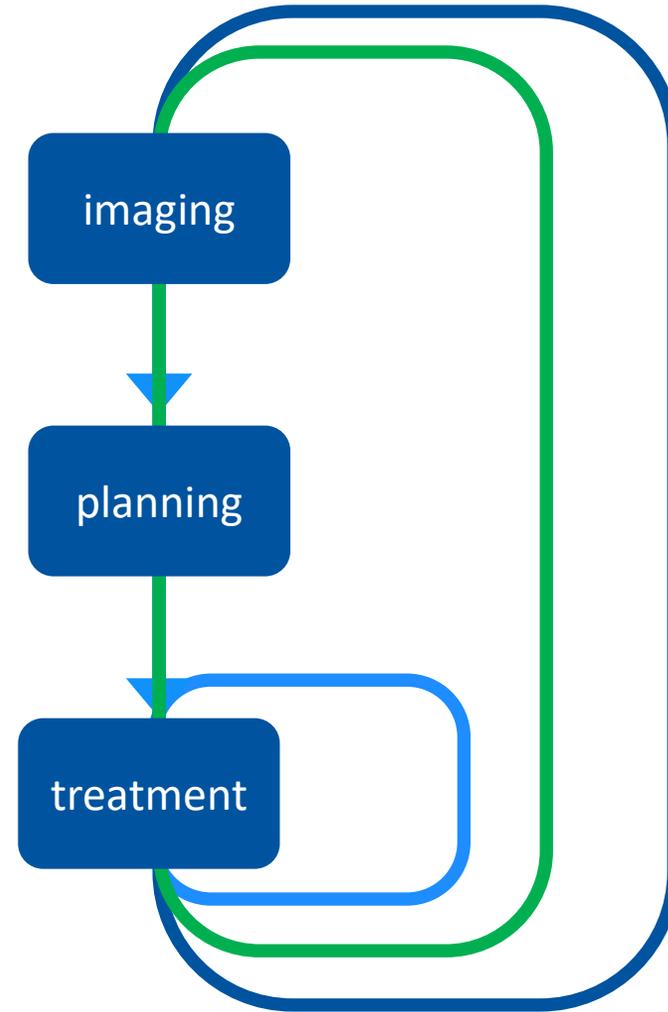
interfraction motion



contemporary CT based RT



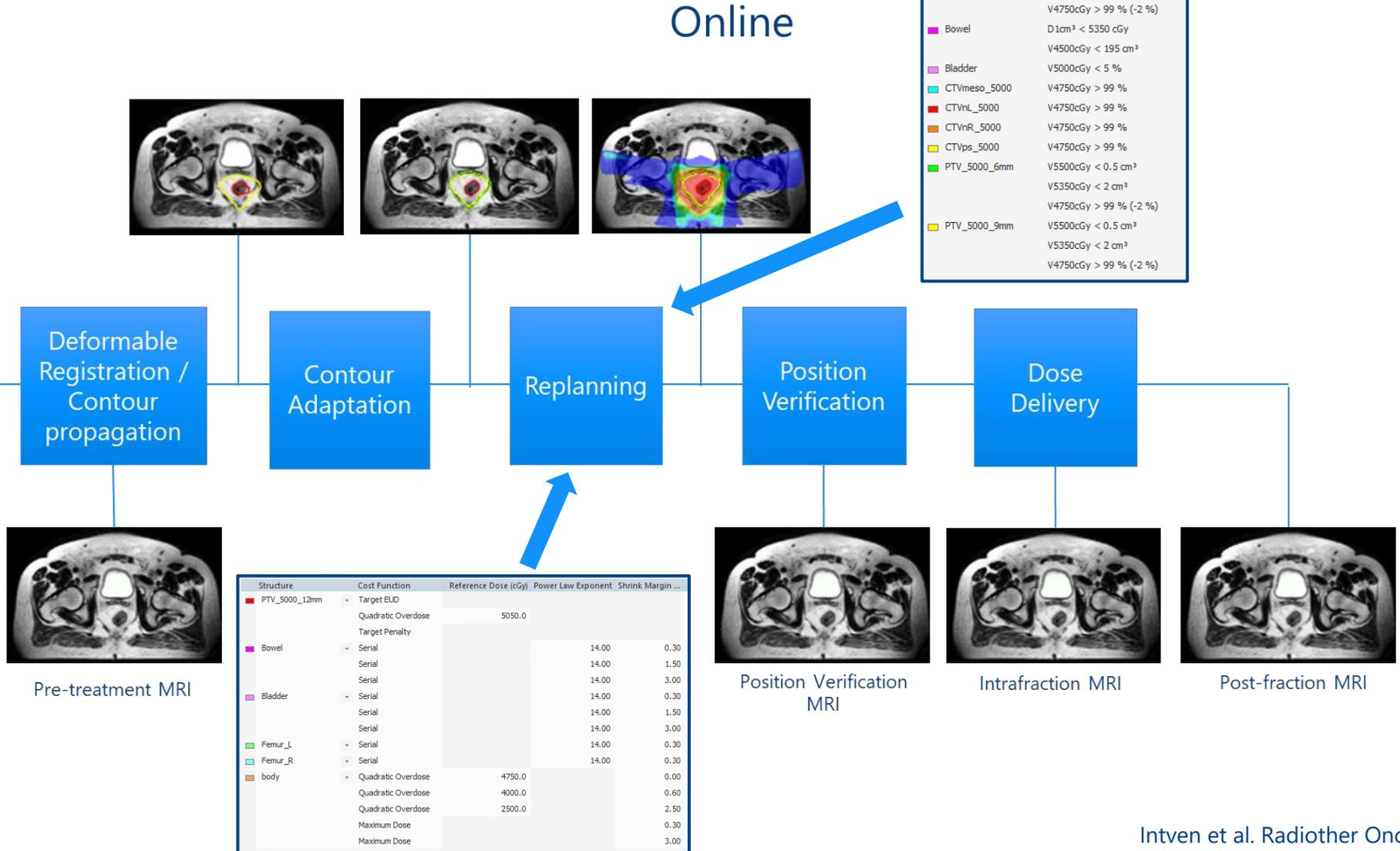
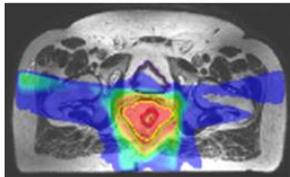
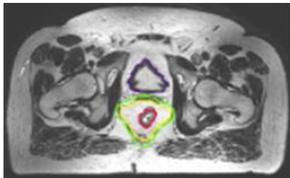
online MR guided RT



Adapt to shape workflow 5x5Gy

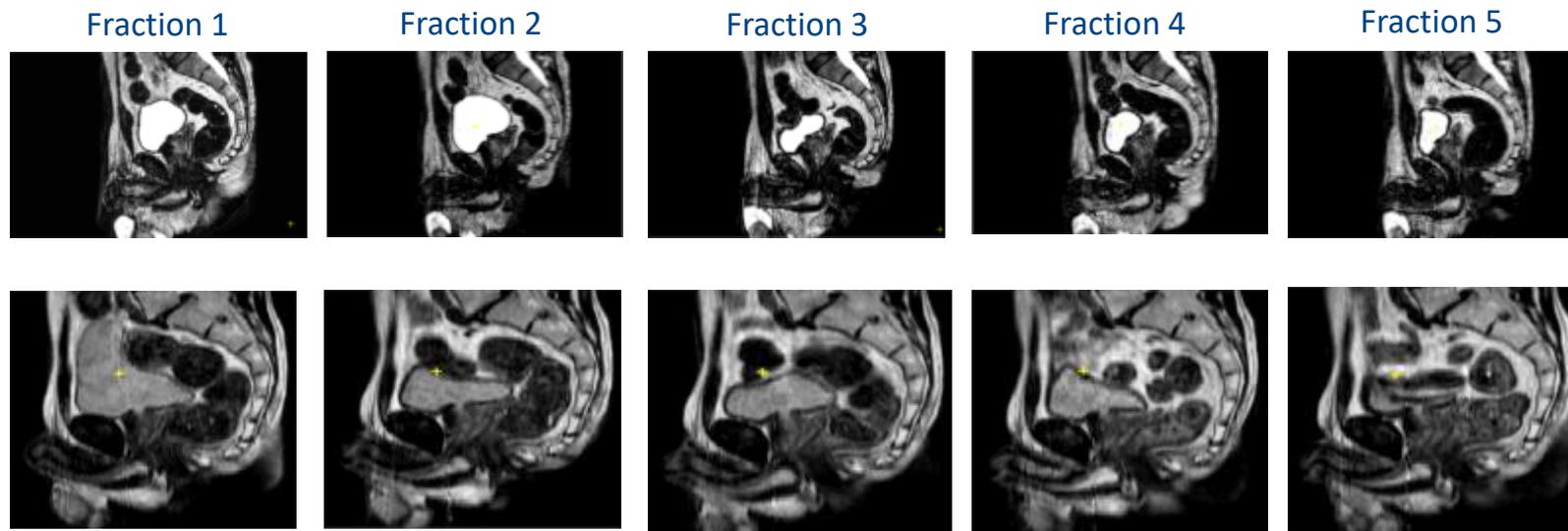
Simulation

MRI-simulation



In 2018..

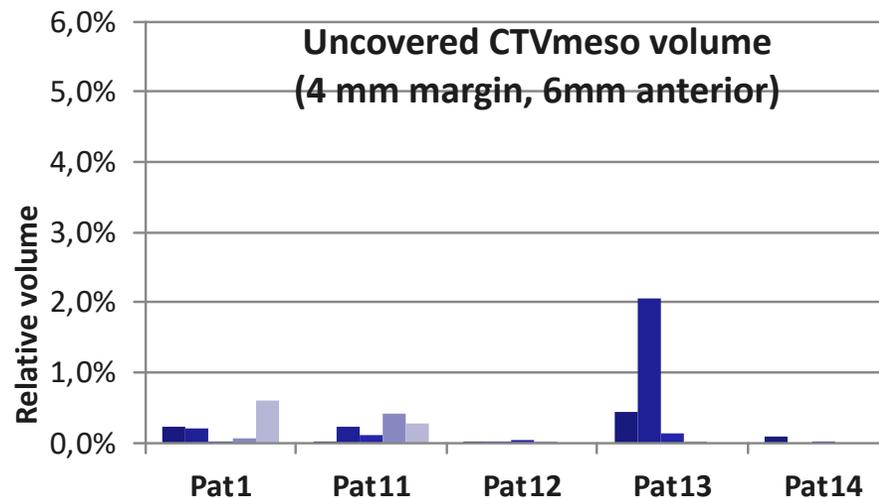
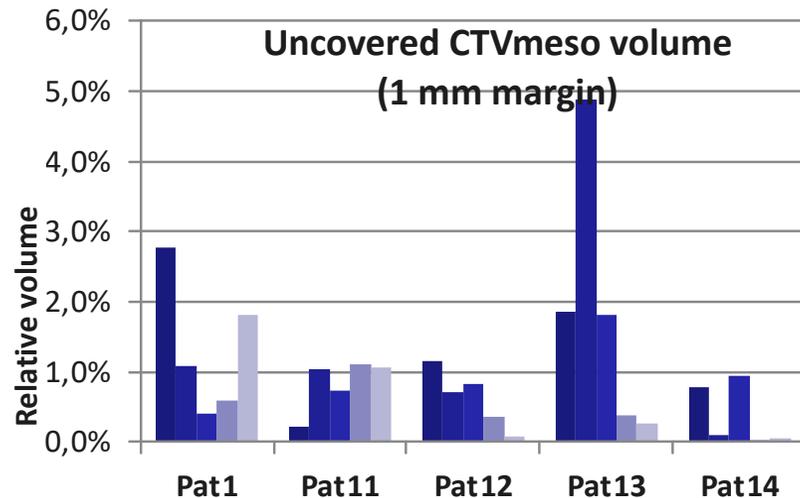
- Started with conventional used margins
- 10 mm PTV margin around mesorectal CTV
- 8 mm around lymph node CTV
- Assessed intrafraction movements

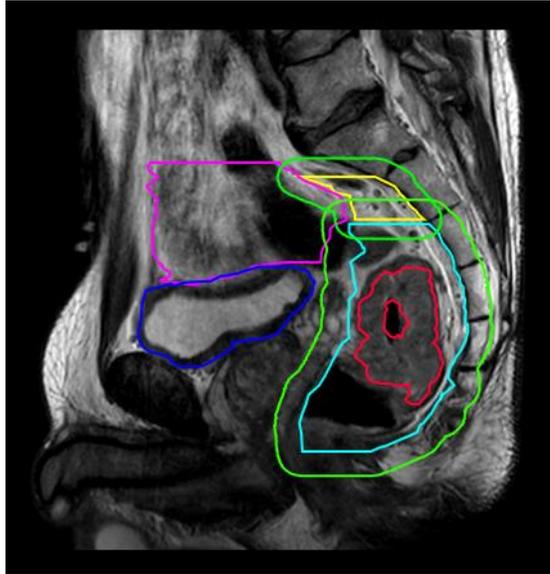


Margin reduction

After 25 patient reduced the margins based on analysis of the intrafraction motion of 6 patients.

- 4 mm mesorectum, 6 mm anterior
- 4 mm elective lymph node areas

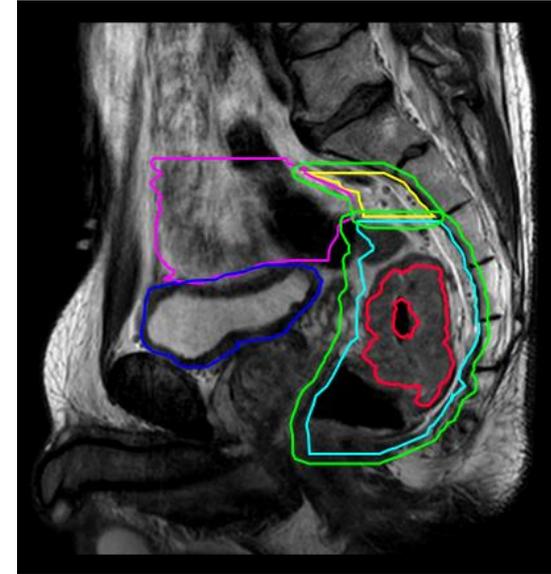




Margin 1 cm / 8mm
Volume CTV 351 cc
Volume PTV **774 cc**



31% reduction
in PTV volume

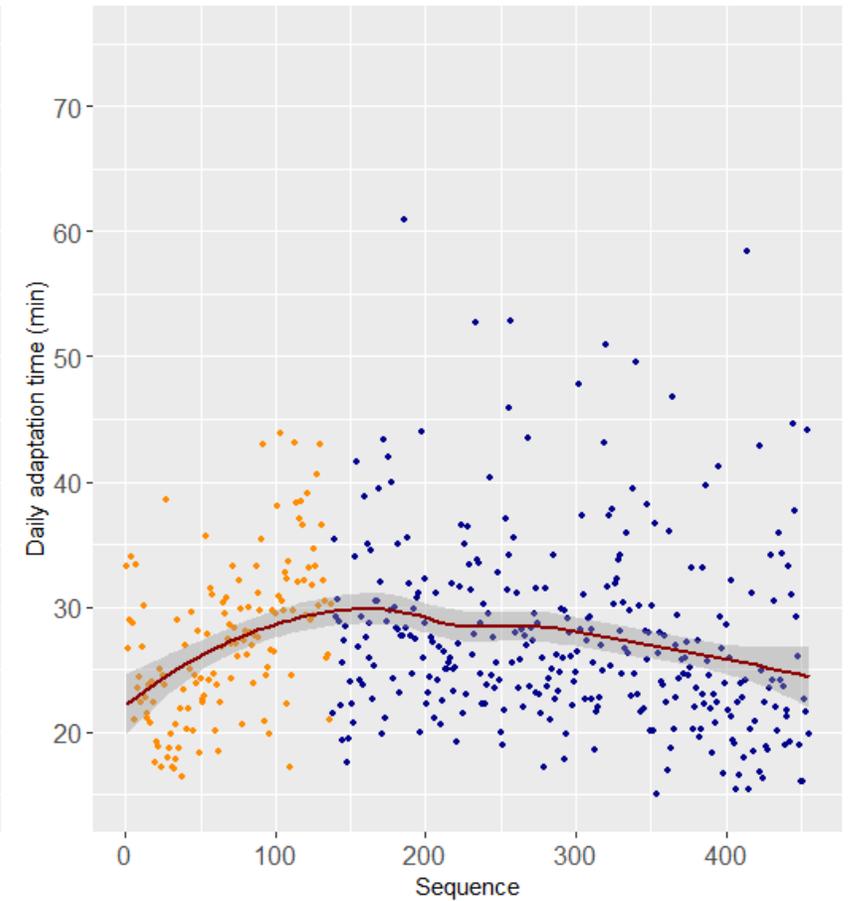
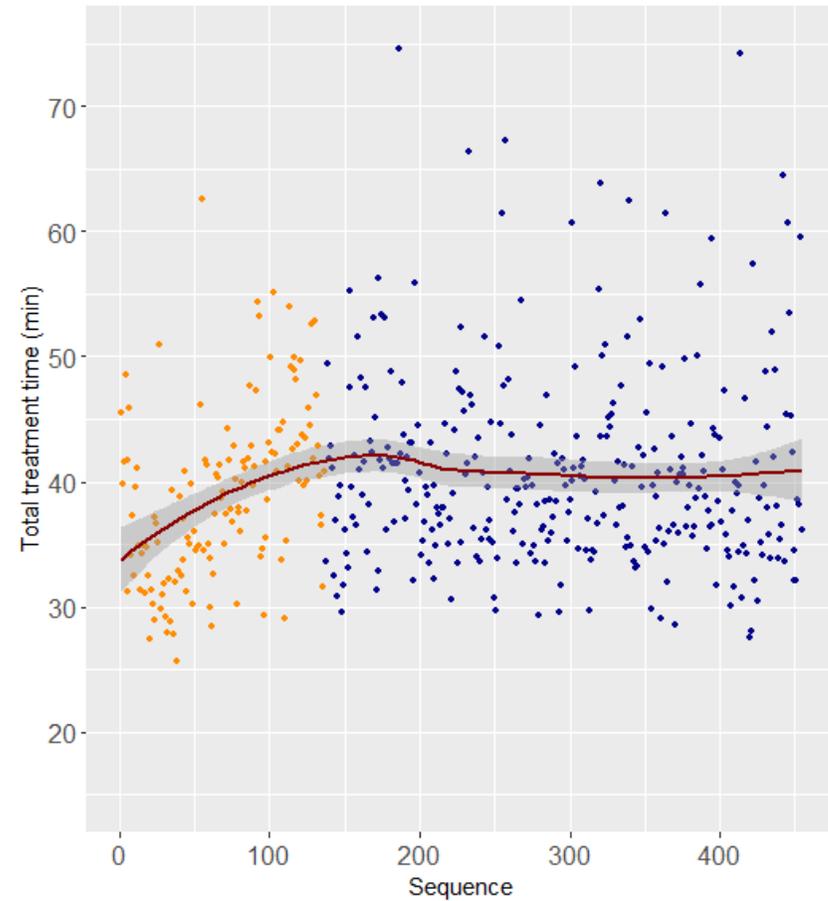


Margin 4 mm / 6 mm
Volume CTV 351 cc
Volume PTV **536 cc**

Transition RO led to RTT led treatments

Treatment fraction

- Led by Radiation Oncologist (RO)
- Led by Radiotherapy technologists (RTT)



Van ATS naar ATS-lite

Workflow: Adapt to Shape-Lite (ATS-L)

Omschrijving

Een volledig nieuw plan optimaliseren aan de hand van een gedeformeerde intekening (of met kleine aanpassingen) gemaakt op de MRI van de dag.

Doel

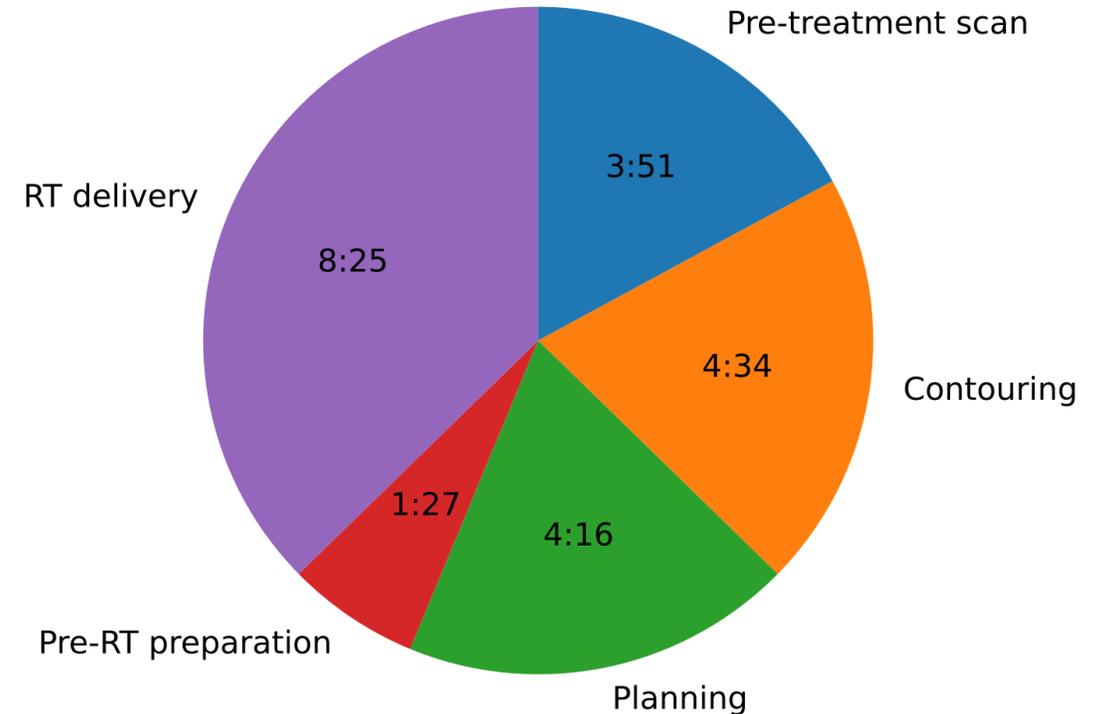
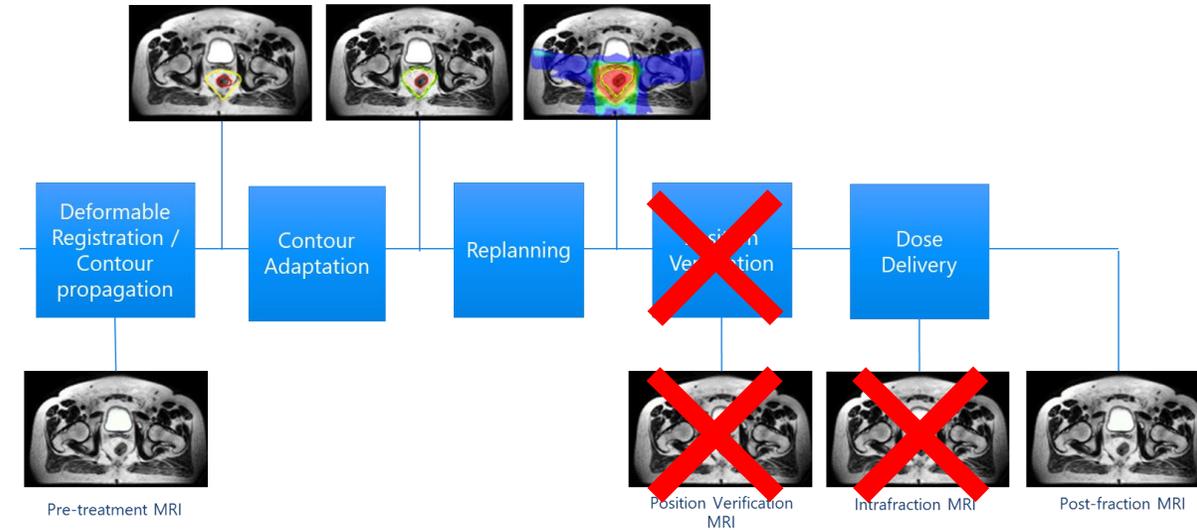
Dagelijks de intekening deformeren en het bestralingsplan aanpassen voor een optimale bestralingsbehandeling. Om tijd te besparen worden de automatisch gedeformeerde contouren gebruikt voor een plan optimalisatie. Intekeningen worden door de laborant na deformatie alleen aangepast als doelgebied niet binnen PTV ligt.

Bevoegdheid

Deze handeling wordt met minimaal 2 laboranten uitgevoerd, zodat ze elkaar kunnen controleren. Er is geen arts aanwezig tijdens de behandeling.

on-table time
42 min → 22 min

Online



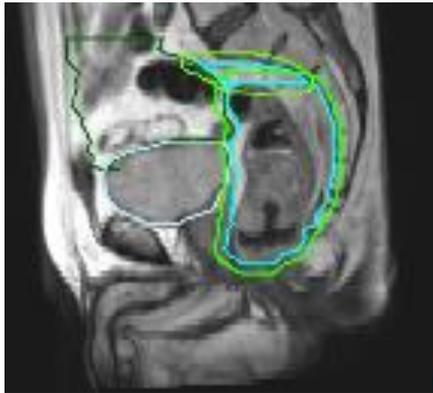
External Boost

preRADAR trial: Radiotherapy dose escalation trial

- Phase I radiotherapy dose escalation, 6+3 design
- > cT3cdN0 or cT1-3N1, MRF-, EMVI-

3 dose levels

- 5x5 Gy SCRT followed by 3-5 boost fractions of 5 Gy

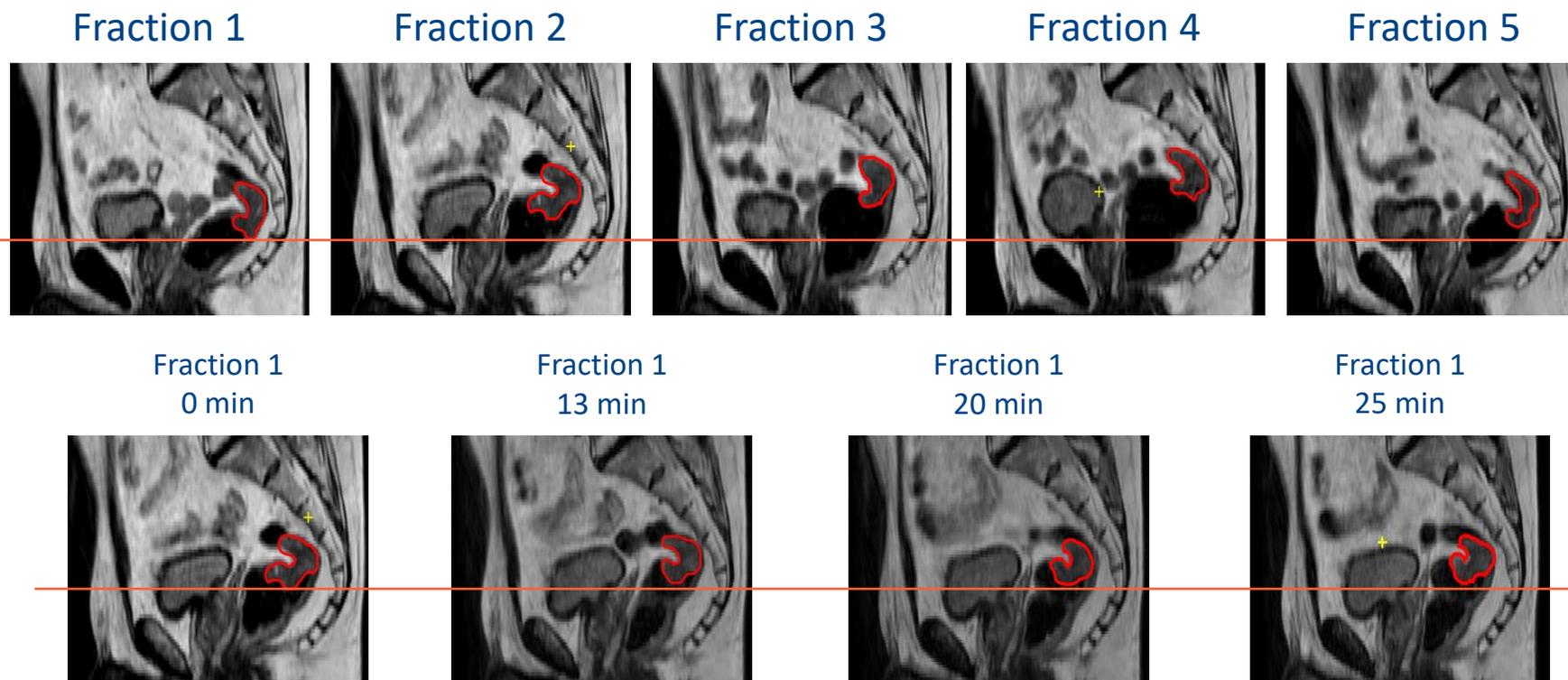


	Week 1					Week 2						
Standard treatment	Mon	Tue	Wed	Thu	Fri	Weekend						Weekend
Dose level 0	Mon	Tue	Wed	Thu	Fri		Mon	Tue				
Dose level 1	Mon	Tue	Wed	Thu	Fri		Mon	Tue	Wed			
Dose level 2	Mon	Tue	Wed	Thu	Fri		Mon	Tue	Wed	Thu		
Dose level 3	Mon	Tue	Wed	Thu	Fri		Mon	Tue	Wed	Thu	Fri	

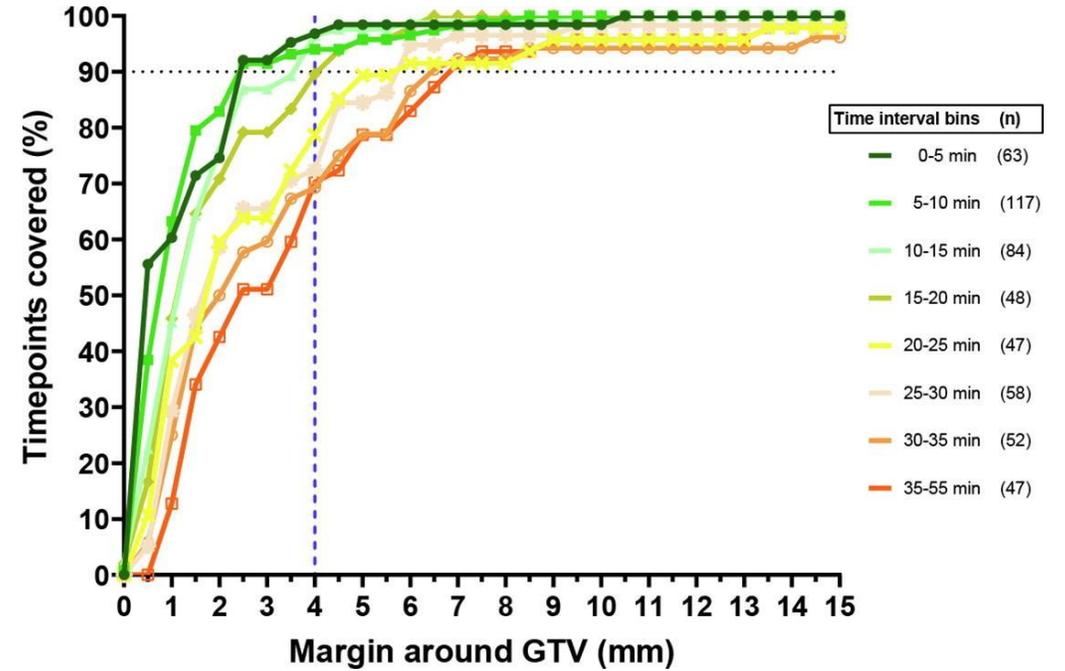
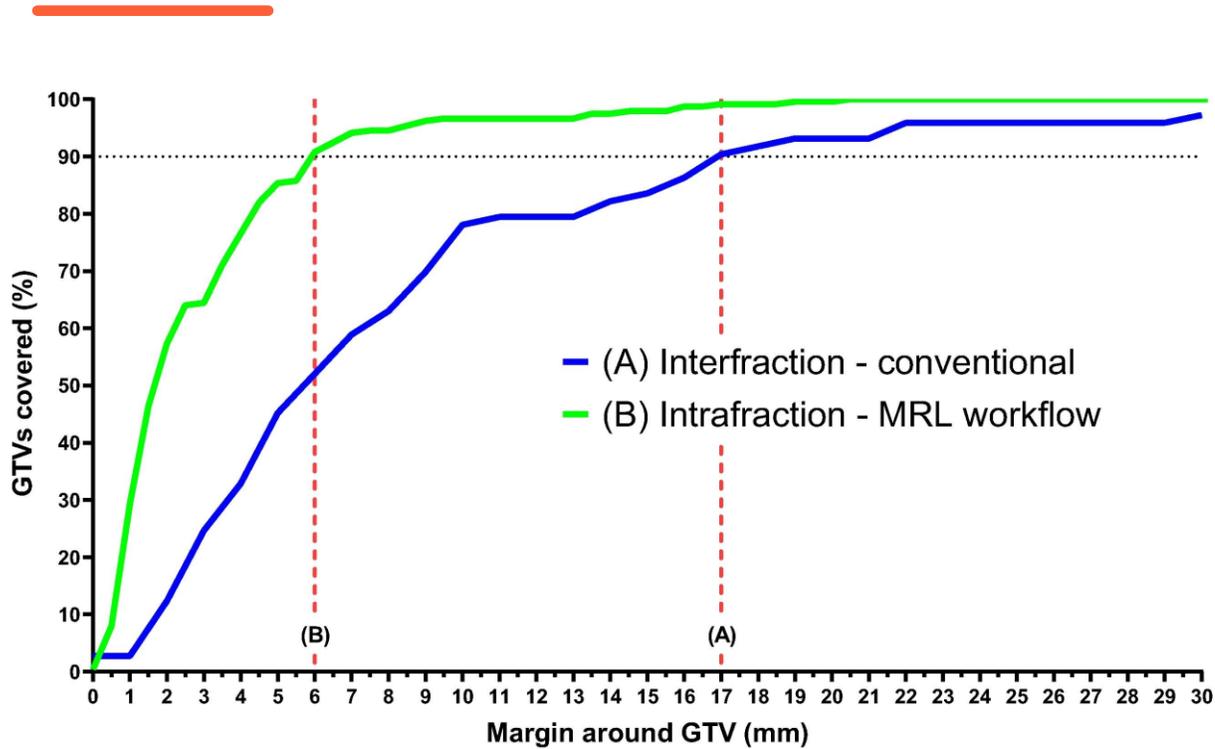


External Boost

MRgRT for dose escalation

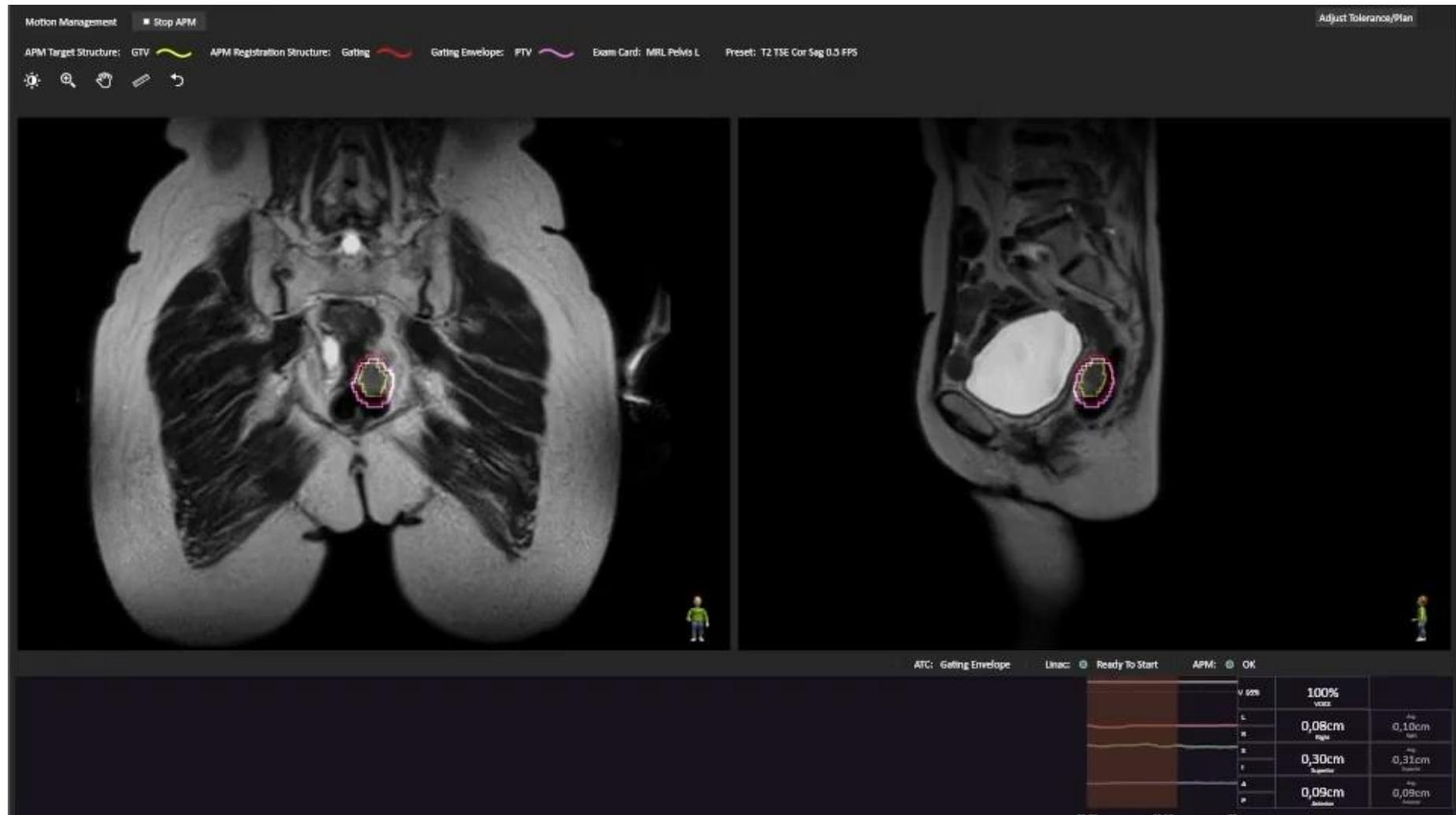


External boost (marge GTV)



more motion proximal tumours

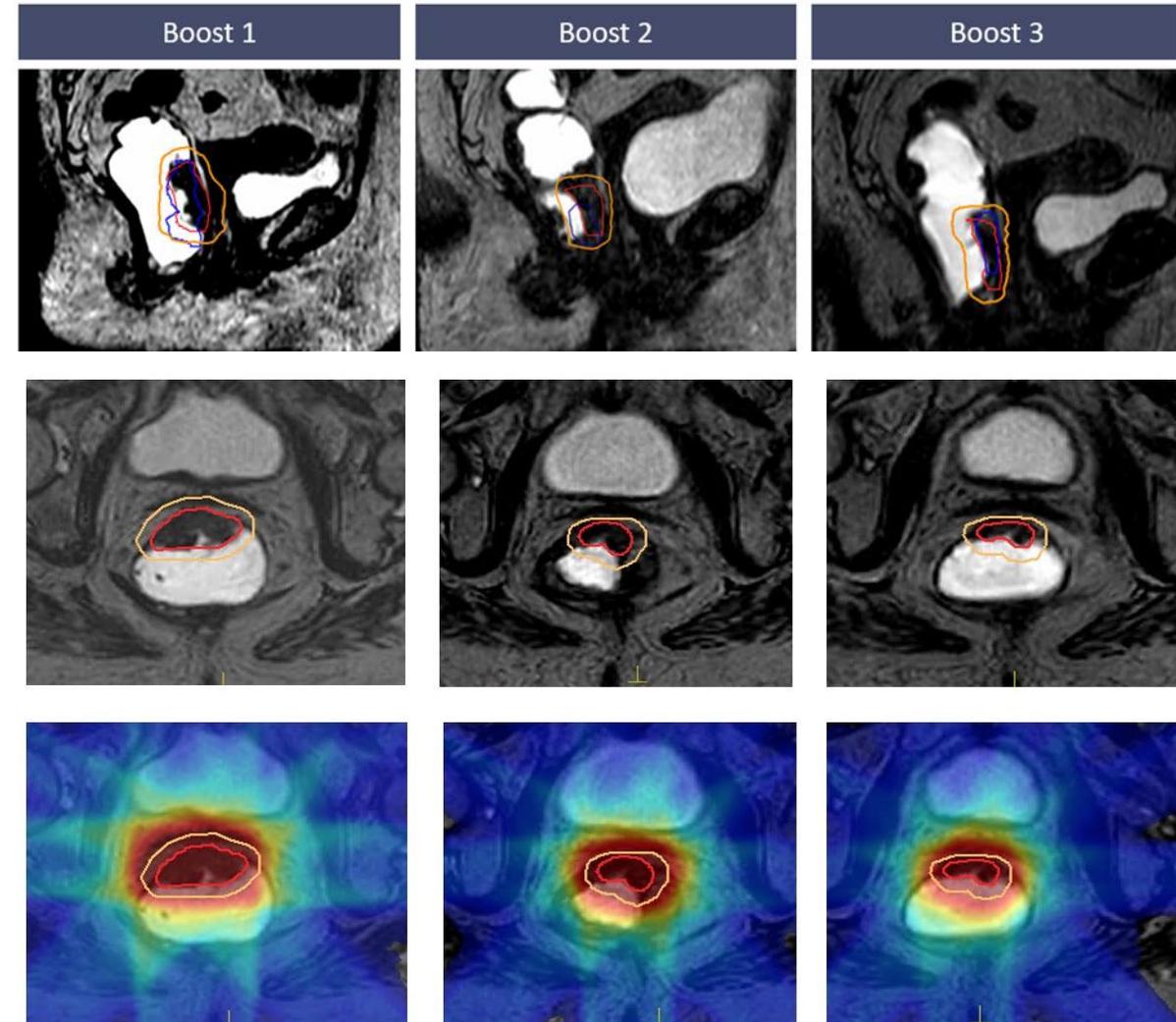
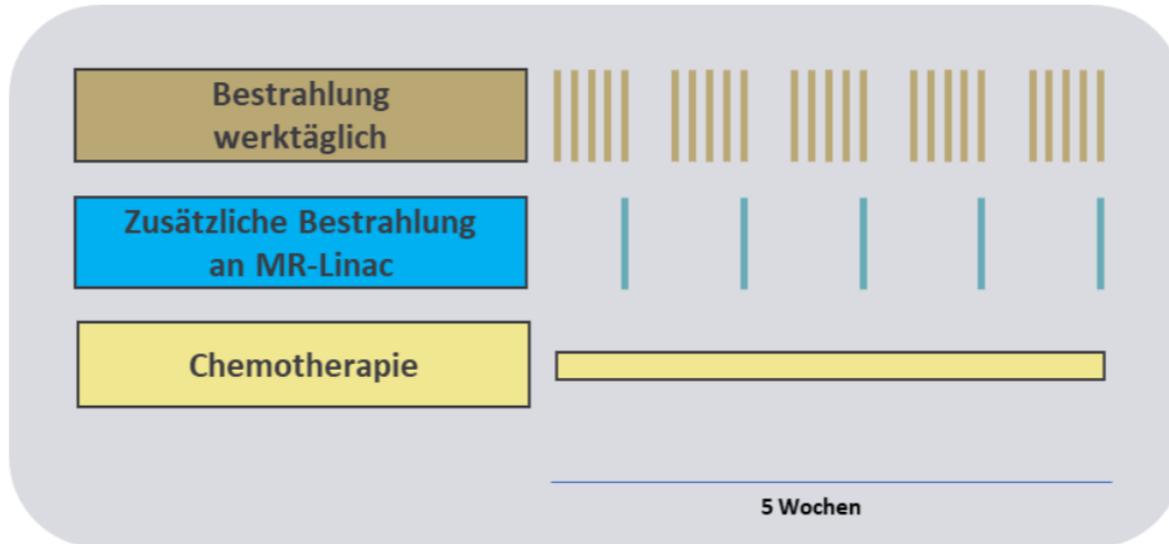
Need for online adaptation

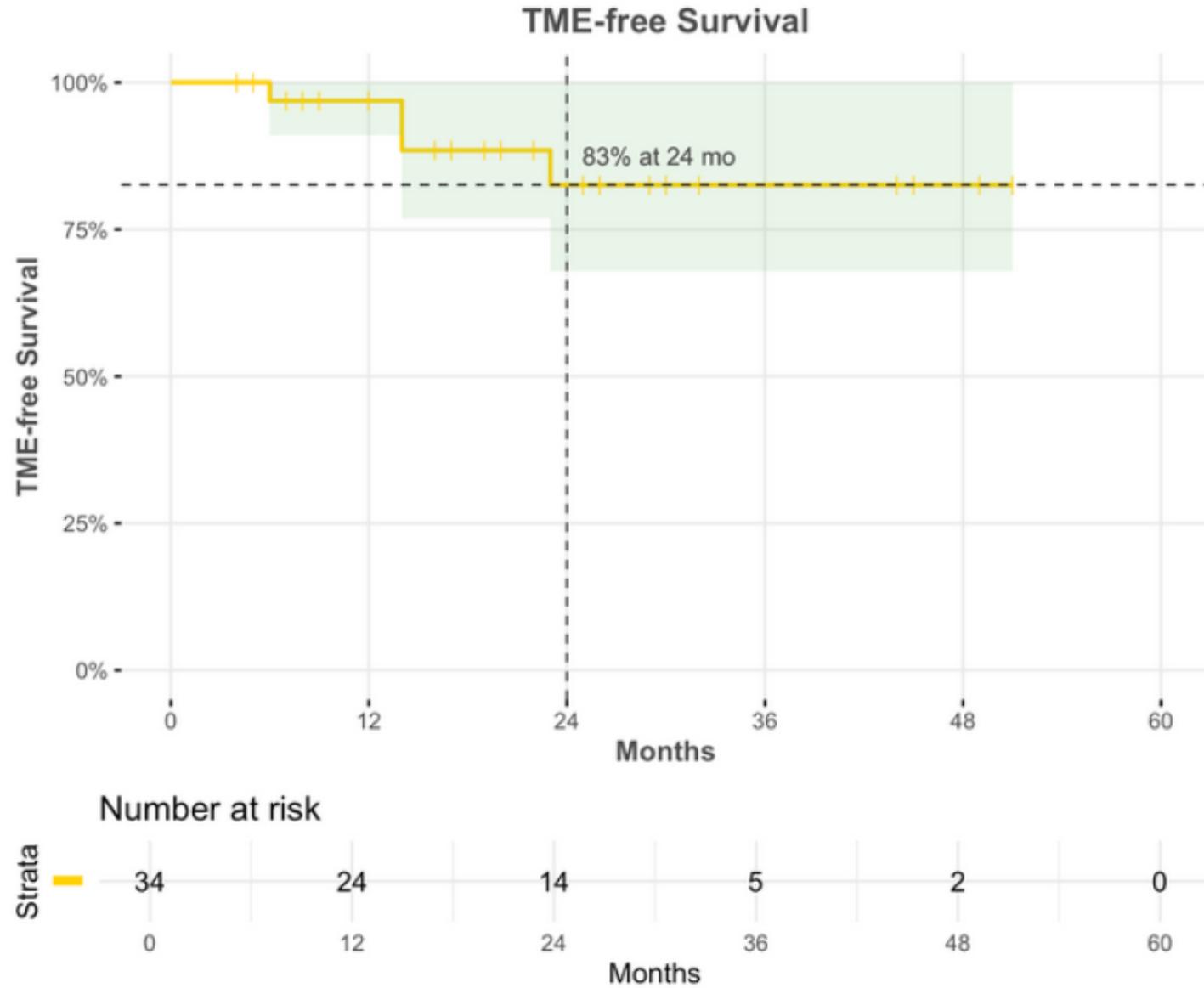


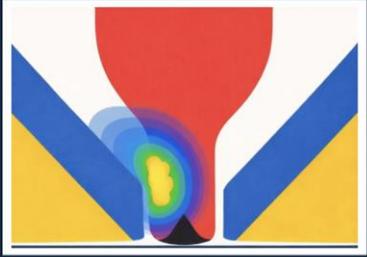
Tübingen– Online adaptive dose escalation using ultrasound gel

- 50 Gy in 25 fractions + Capecitabine on Standard Linac
- One fraction per week 3 Gy boost on GTV

— 95% Isodose
— MRI pre
— MRI post

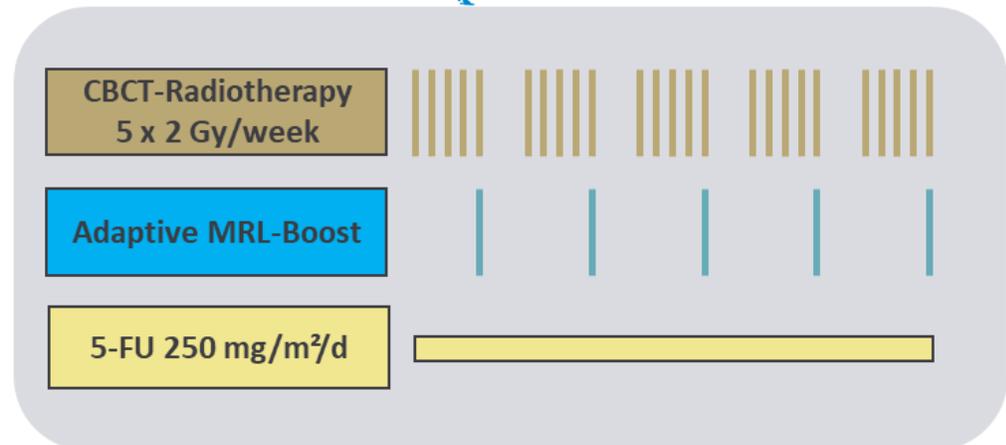
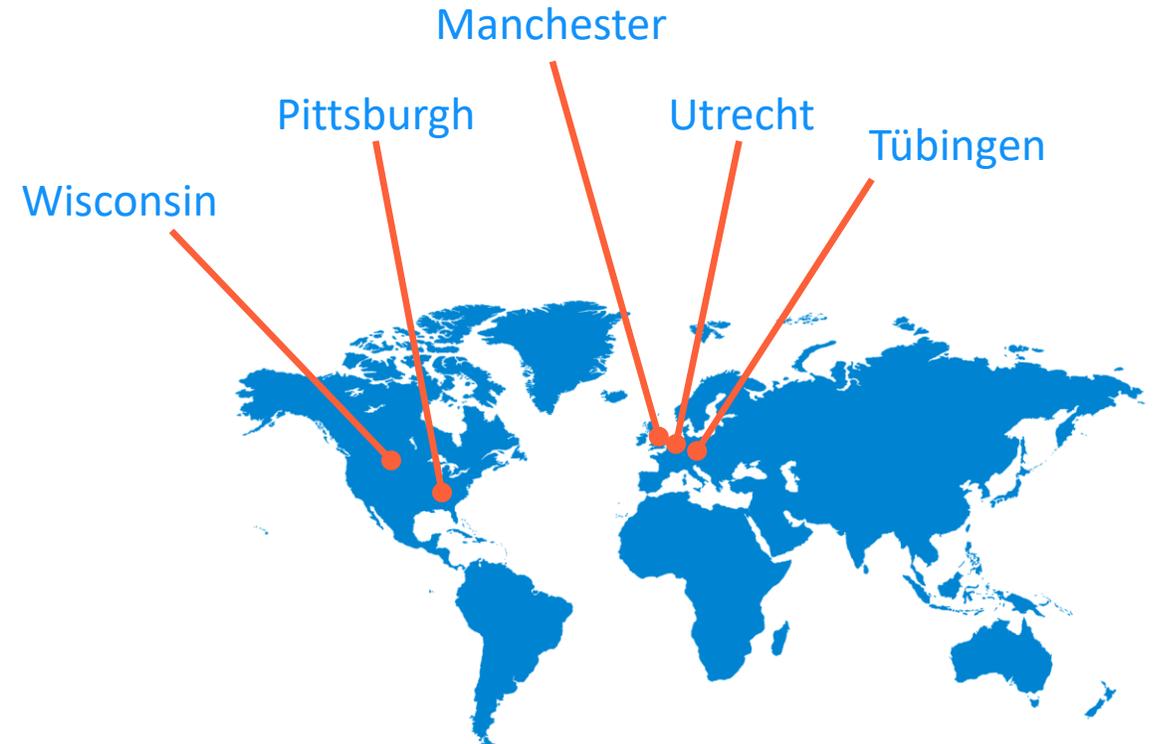
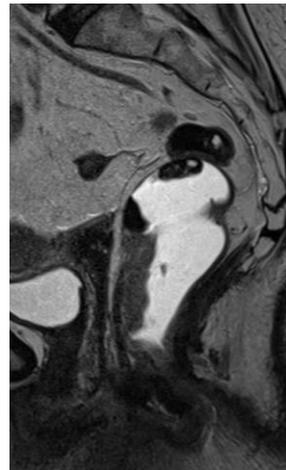




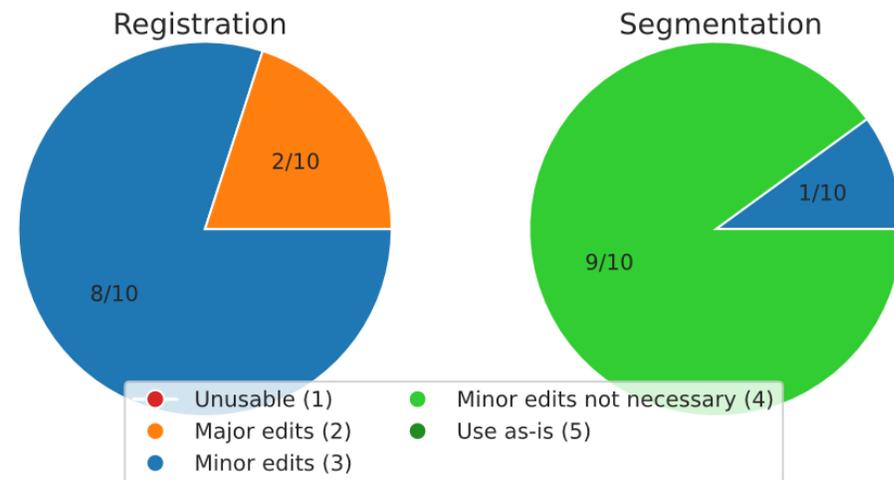
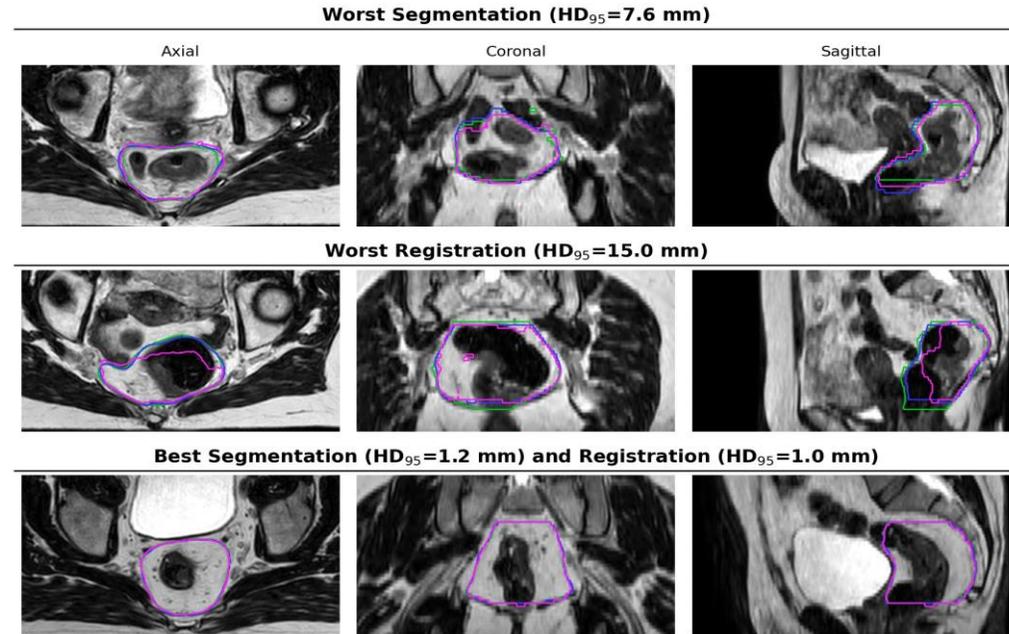
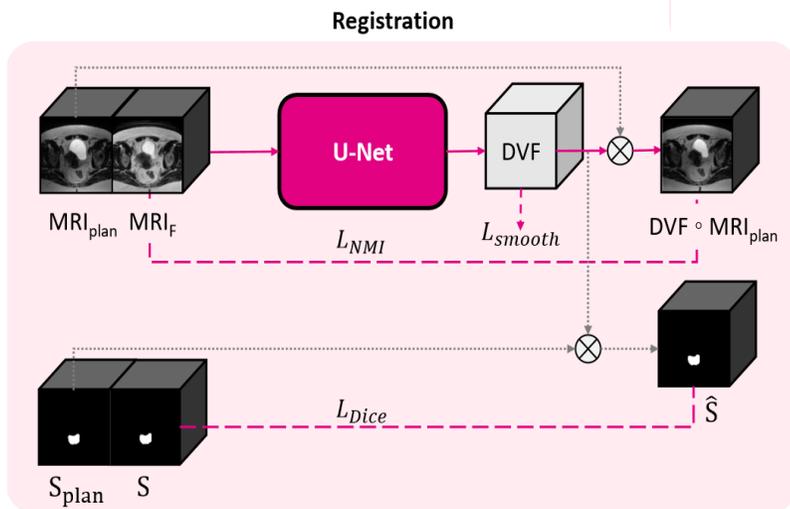
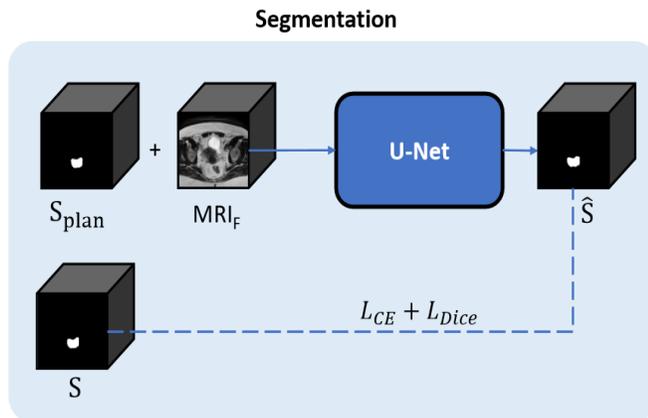


MARS

- Histologically confirmed **rectal cancer**
- distal and mid rectal tumors
- **cT1 (unsuitable for endoscopic resection or N1), cT2, cT3, cN0 or cN1, cM0**
- **Non-circumferential growth**
- **Longitudinal extension < 8 cm**



Recent technical developments



Acknowledgements

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