One Year Clinical Experience with the Integral Quality Monitor

Marlies Pasler

Medical Physicist @ Lake Constance Radiation Oncology Center

Singen-Friedrichshafen, Germany

Integral Quality Monitor

Single ionization chamber

Online transmission detector

Real time plan verification

Integral Quality Monitor

Simple & robust verification

Safe patient treatment

Fully automated workflow

Integral Quality Monitor

Simple & robust verification Safe patient treatment Fully automated workflow

Error detection capability

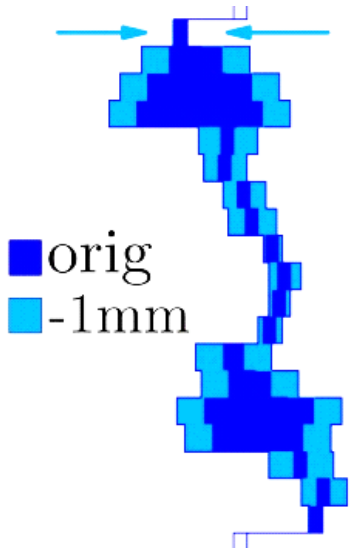
Detector robustness

Wrong plan/patient/MU

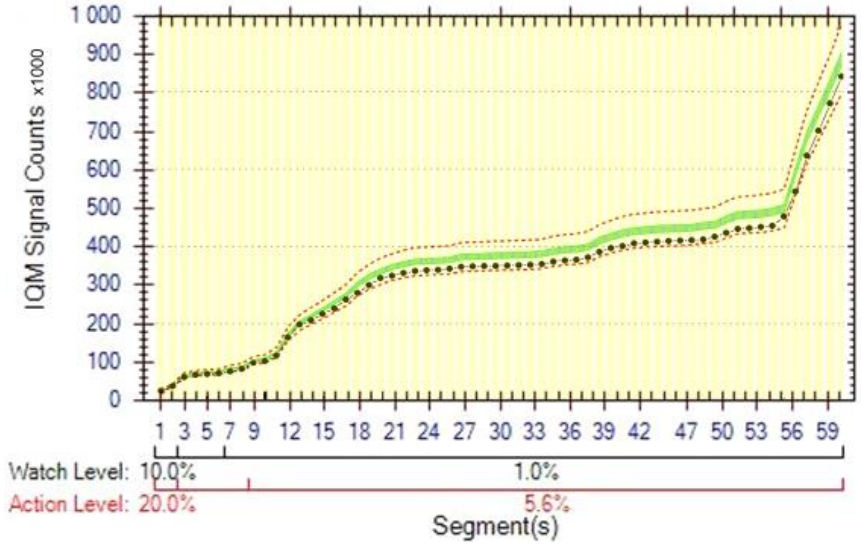
Integral Quality Monitor

Simple & robust verification Safe patient treatment Fully automated workflow

Systematic
MLC shift

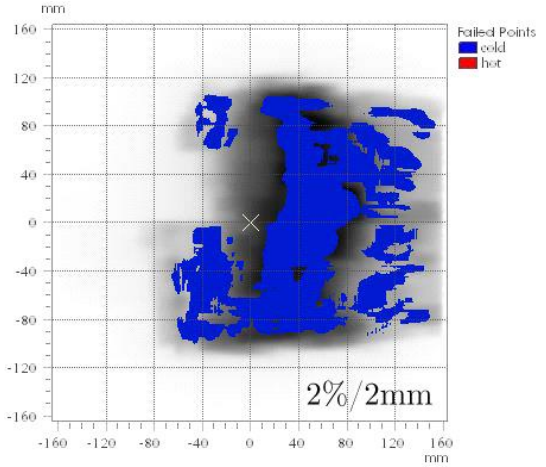


IQM



Δ_{Signal}= -5,27%

2D - array

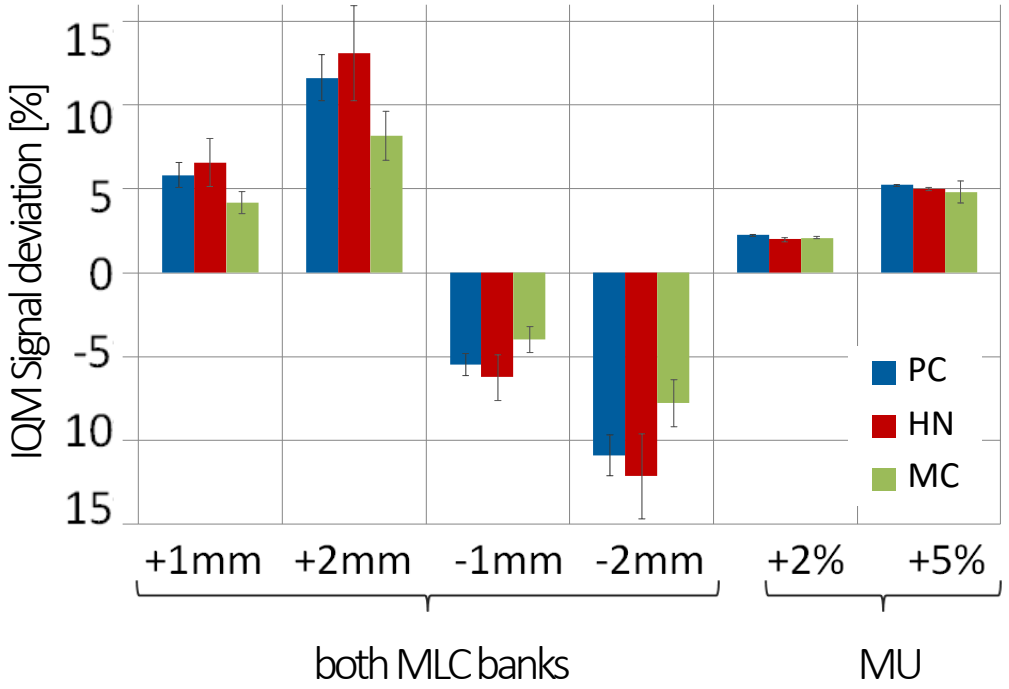


γ_{mean}= 0,78

$\gamma_{pass\ rate}$= 67,9%

Integral Quality Monitor

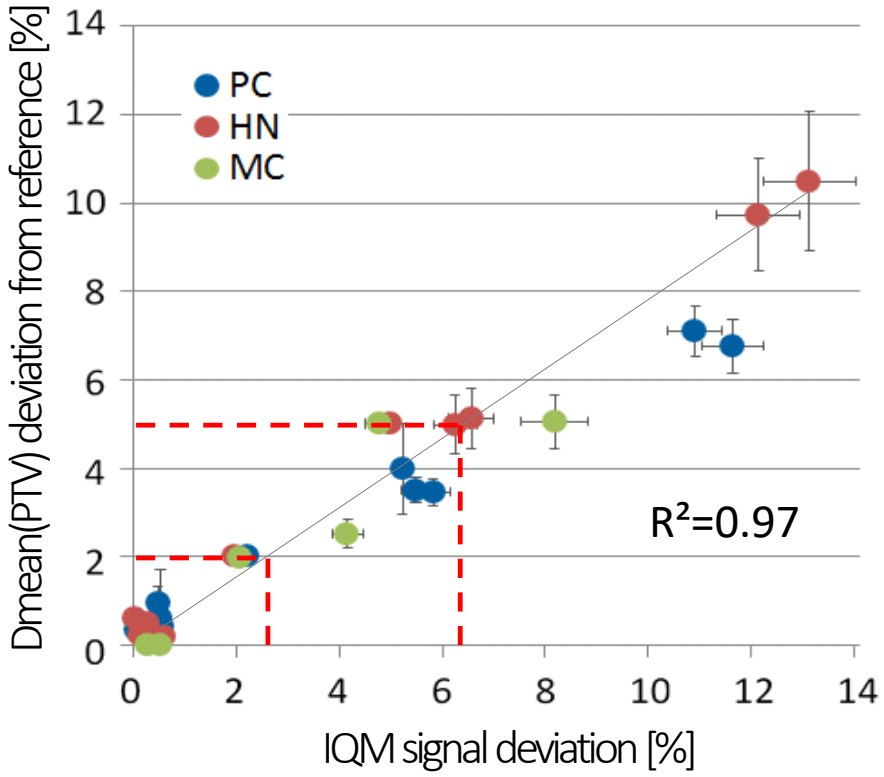
Simple & robust verification Safe patient treatment Fully automated workflow



Error detection capability of a novel transmission detector: a validation study for online VMAT monitoring; Phys Med Biol. 2017

Integral Quality Monitor

Simple & robust verification Safe patient treatment Fully automated workflow

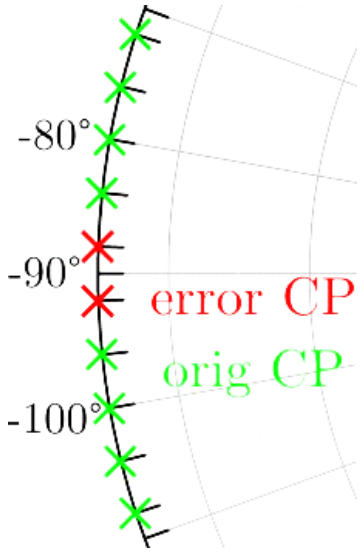


Error detection capability of a novel transmission detector: a validation study for online VMAT monitoring; Phys Med Biol. 2017

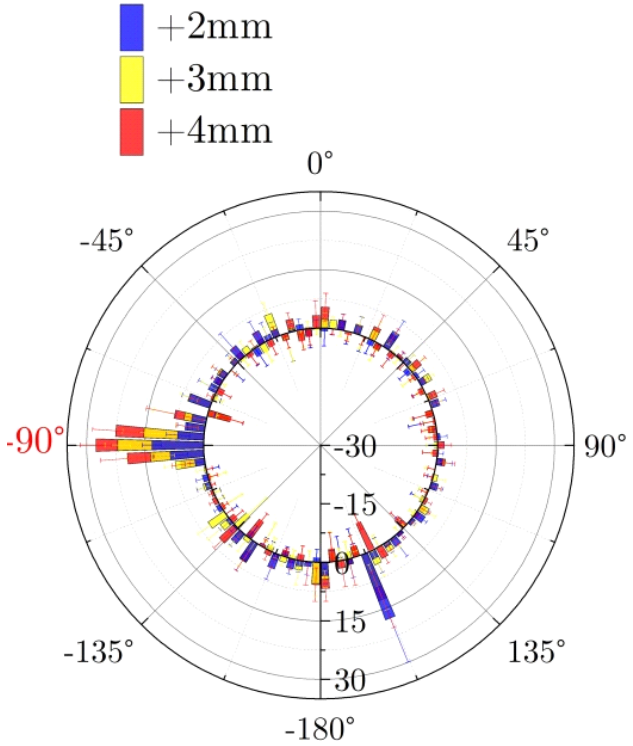
Integral Quality Monitor

Simple & robust verification Safe patient treatment Fully automated workflow

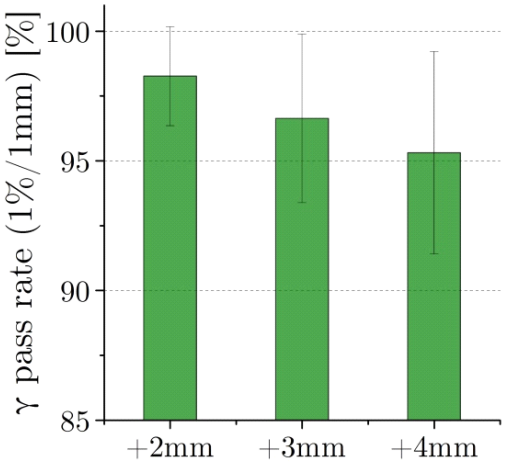
Random
MLC shift



IQM



2D - array

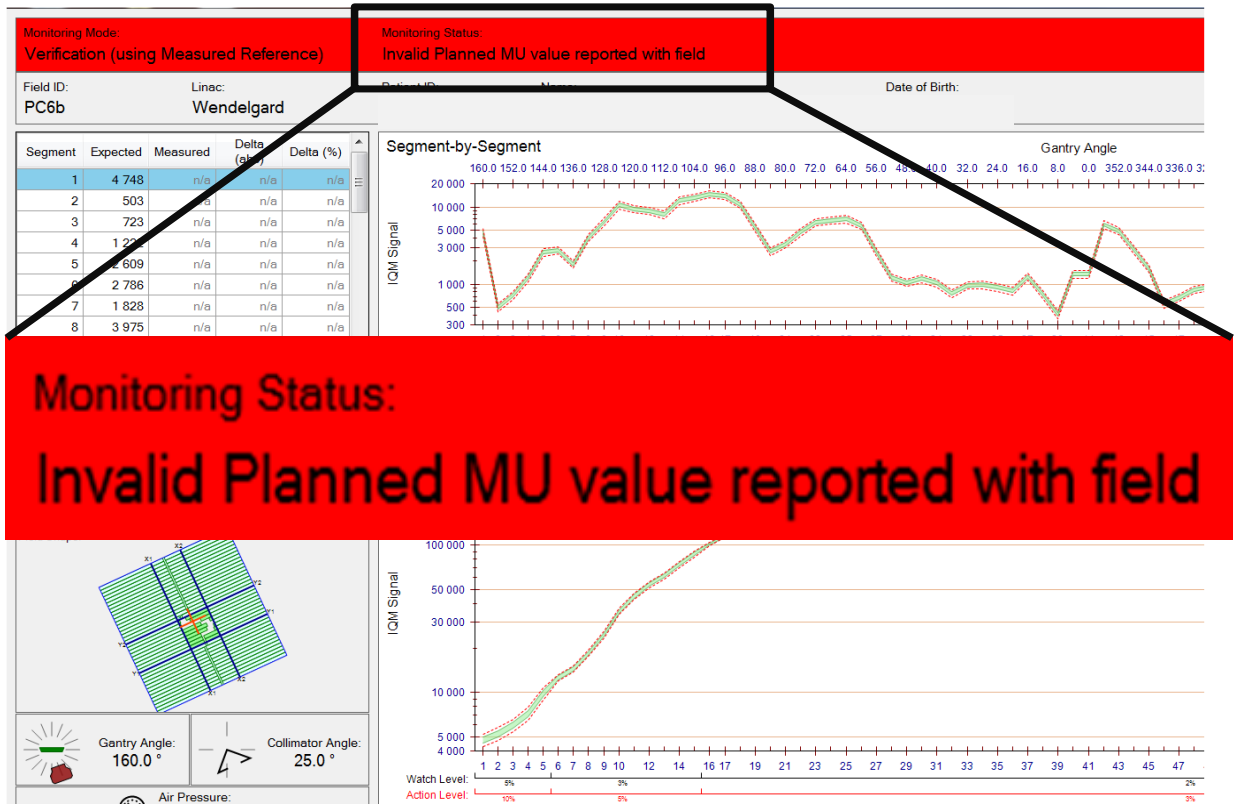


Integral Quality Monitor

Simple & robust verification Safe patient treatment Fully automated workflow

Incorrect plan data:

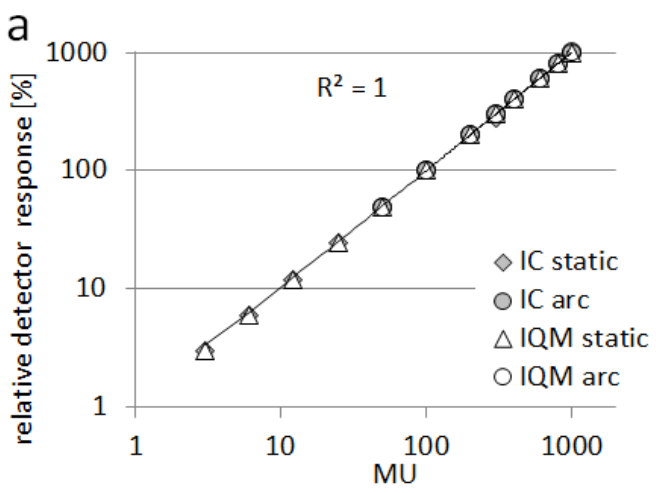
- Number of monitor units
- Photon beam energy
- Gantry angle
- Collimator angle



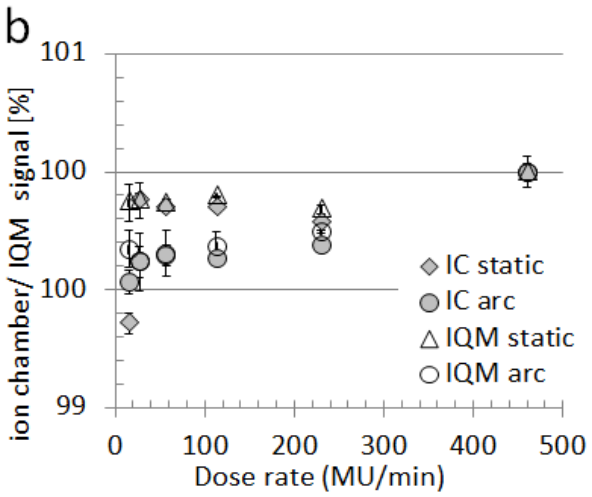
Integral Quality Monitor

Simple & robust verification Safe patient treatment Fully automated workflow

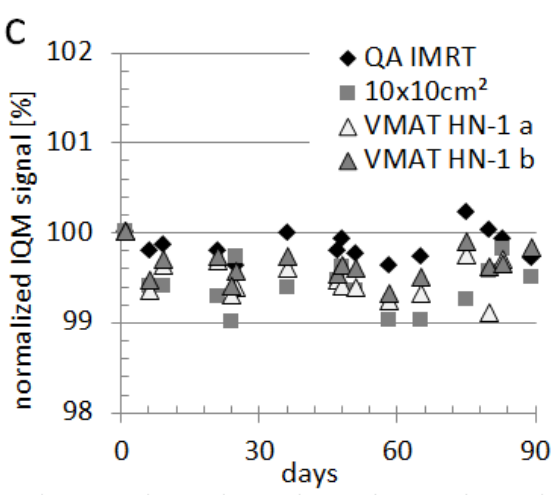
Linearity



Dose rate dependence



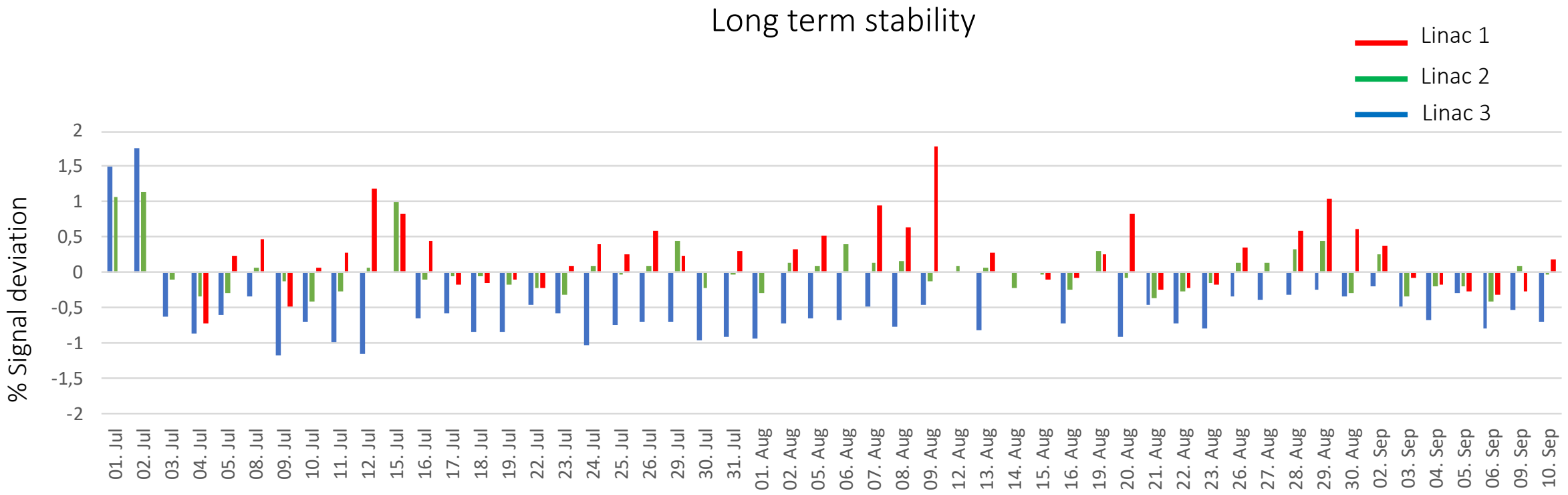
Stability



Error detection capability of a novel transmission detector: a validation study for online VMAT monitoring; Phys Med Biol. 2017

Integral Quality Monitor

Simple & robust verification Safe patient treatment Fully automated workflow



Integral Quality Monitor

Simple & robust verification Safe patient treatment Fully automated workflow

Hoffman D, et al; J Appl Clin Med Phys 2017

Characterization and evaluation of an integrated quality monitoring system for online quality assurance of external beam radiation therapy.

Casar B, et al; Z Med Phys 2017

Influence of the Integral Quality Monitor transmission detector on high energy photon beams: a multi centre study.

Pasler M, et al; Phys Med Biol 2017

Error detection capability of a novel transmission detector: a validation study for online VMAT monitoring.

Marrazzo L, et al; Strahlenther Onkol 2018

Real-time beam monitoring for error detection in IMRT plans and impact on dose-volume histograms.

"Online Dosimetry with the Integral Quality Monitor"
by Kilian Michel, Lake Constance Radiation Oncology Center, Friedrichshafen (Germany)

Click the following video link to watch the presentation by Kilian Michel, Lake Constance Radiation Oncology Center, Friedrichshafen during the ESTRO 36 in Vienna.

Kilian shared some of the exciting results they achieved with the IQM System over the last 18 months. Long-term constancy checks conducted over a period of 6 months while testing the error sensitivity of the IQM System was one of the main focal points of their IQM evaluation. In addition, the site has started using IQM for pre-treatment QA in combination with their conventional pre-treatment plan QA system.

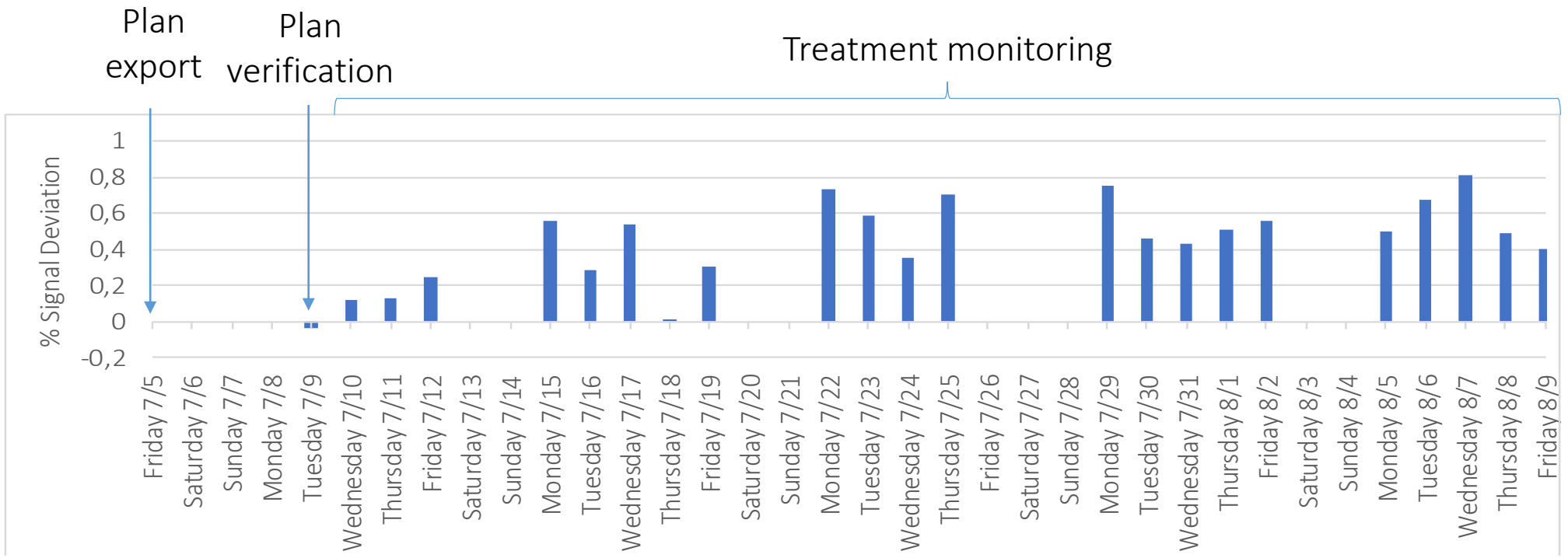
The full presentation can also be downloaded here.

https://www.youtube.com/embed/x_iKnFmtZ10

Integral Quality Monitor

Simple & robust verification **Safe patient treatment** Fully automated workflow

Treatment monitoring of a head & neck VMAT plan



Integral Quality Monitor

Simple & robust verification Safe patient treatment **Fully automated workflow**

Treatment plan verification

	IQM	2D Array
QA plan preparation	1 click	4:30 min
QA report evaluation	30 s / * no interaction	3:30 min
		3 min
		3 +3 min
		4:30 min
		21:30 min

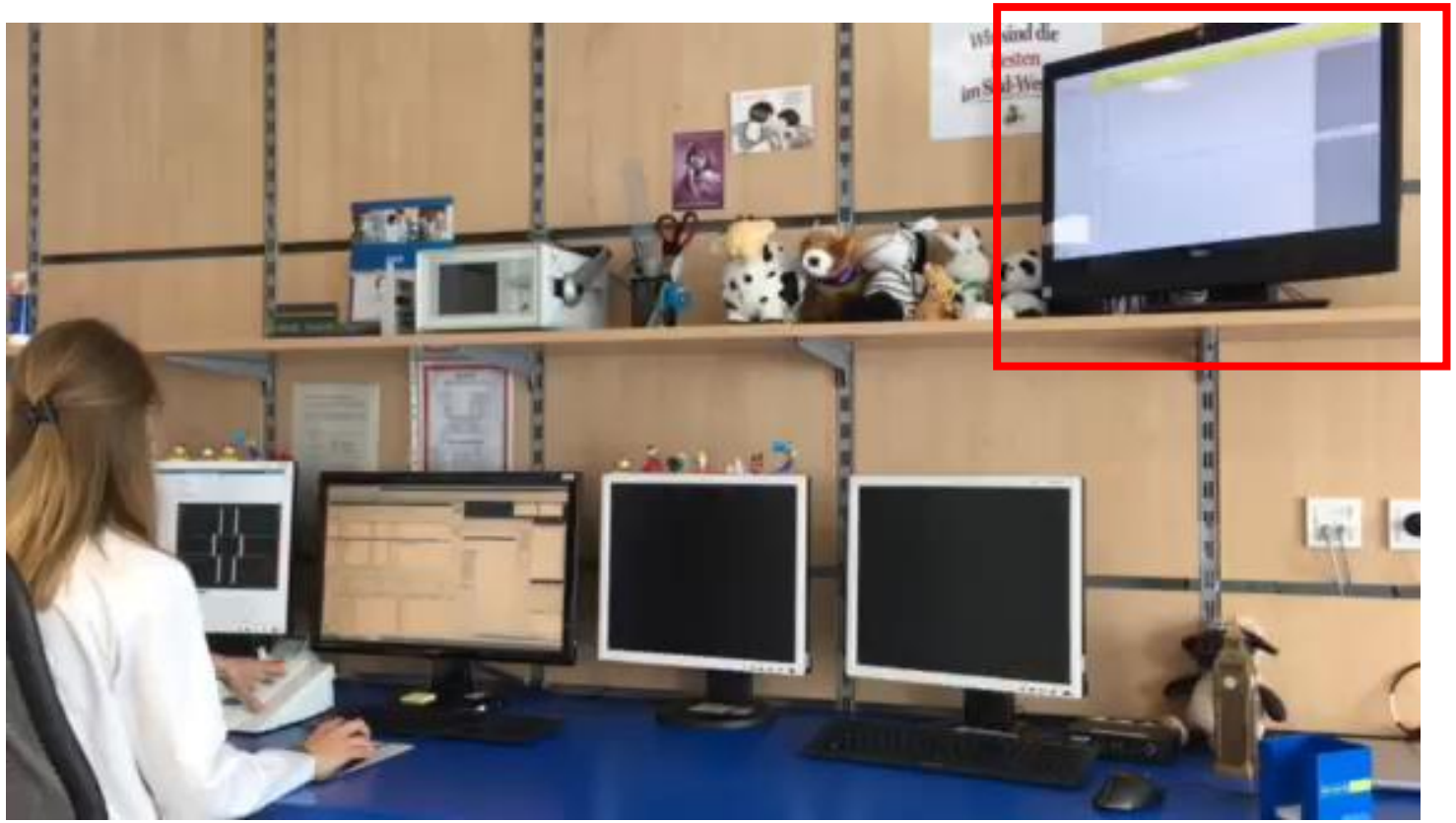
per day

per patient

Integral Quality Monitor

Simple & robust verification Safe patient treatment **Fully automated workflow**

Measurement of our daily QA beam



IQM Workstation

Integral Quality Monitor

Simple & robust verification Safe patient treatment **Fully automated workflow**

Treatment plan verification

	IQM	2D Array
QA Plan preparation	1 click	4:30 min
QA Plan Evaluation	30 s / * No interaction	3:30 min
Detector preparation	1:30 min	3 min
Detector setup/removing	10 s	3 +3 min
Measurement	* Fully automated	4:30 min
TOTAL	**2:30 min**	**21:30 min**

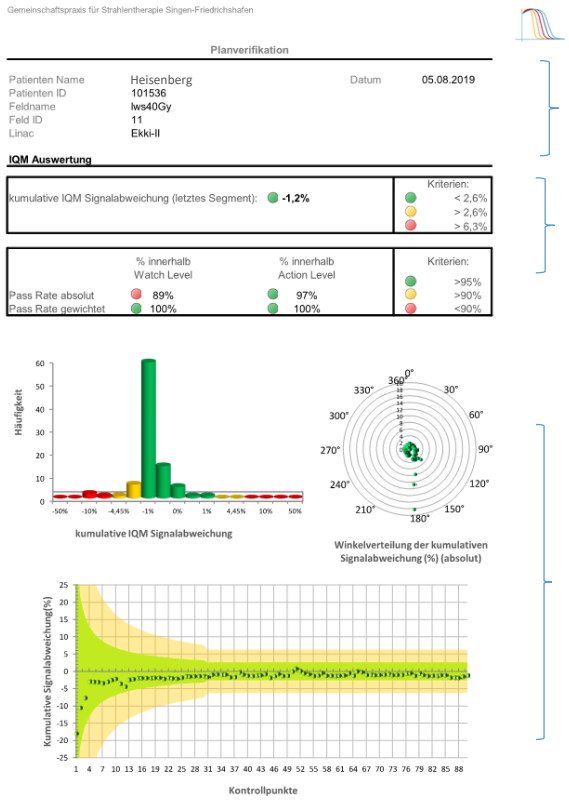
per day

per patient

Integral Quality Monitor

Simple & robust verification Safe patient treatment **Fully automated workflow**

QA evaluation


Gemeinschaftspraxis für Strahlentherapie Singen-Friedrichshafen

Planverifikation

Patienten Name	Heisenberg	Datum	05.08.2019
Patienten ID	101536		
Feldname	lws40Gy		
Feld ID	11		
Linac	Ekki-II		

IQM Auswertung

		Kriterien:
kumulative IQM Signalabweichung (letztes Segment):	-1,2%	< 2,6% > 2,6% > 6,3%

	% innerhalb Watch Level	% innerhalb Action Level	Kriterien:
Pass Rate absolut	89%	97%	>95%
Pass Rate gewichtet	100%	100%	>90% <90%

Häufigkeit

kumulative IQM Signalabweichung

Winkelverteilung der kumulativen Signalabweichung (%) (absolut)

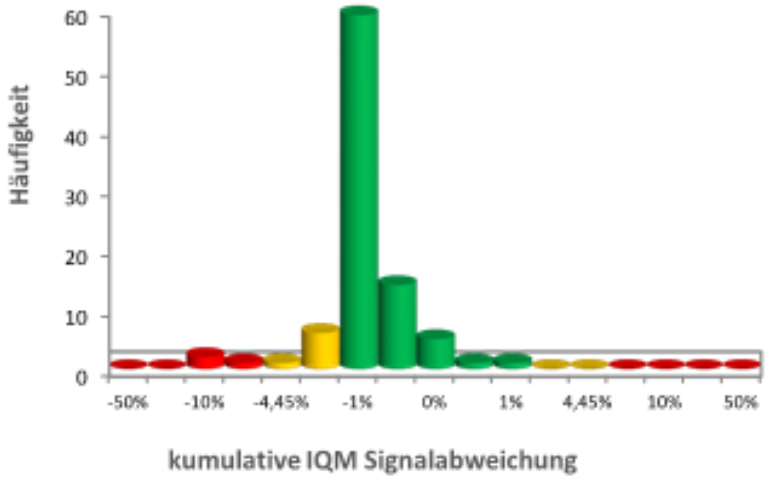
Kumulative Signalabweichung(%)

Kontrollpunkte

Patient information

Statistics

Graphs



1 YEAR IQM ANNIVERSARY

Simple & robust verification

Safe patient treatment

Fully automated workflow

1 YEAR IQM ANNIVERSARY

Thank you iRT!

Marlies Pasler

pasler@strahlentherapie-fn.de

1 YEAR IQM ANNIVERSARY

Thank you iRT!

Marlies Pasler

pasler@strahlentherapie-fn.de