

A Point/Counterpoint On Current and Future Directions for Patient Specific QA

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Outline

- ▶ Patient specific IMRT QA—available tools
 - Lily Tang (10 min)
- ▶ **Point:** Limitations with IMRT QA
 - Stephen Kry (20 min)
- ▶ **Counterpoint:** Patient specific QA measurements will remain an essential part of Medical Physics practice
 - Andrea McNiven (20 min)
- ▶ Q&A (10 min)

Personal IMRT QA history

- ▶ First 5 years of my career
 - ❖ Routine patient specific IMRT QA (MapCheck)
 - ❖ 40-60 min per patient
 - ❖ Not a single replan due to QA result
- ▶ Second 5 years
 - ❖ IMRT QA after commissioning & single fraction treatment
 - ❖ Routine log file based QA
- ▶ Now
 - ❖ Routine patient specific IMRT QA by residents (EPID, Delta4, film)

Goal of this session

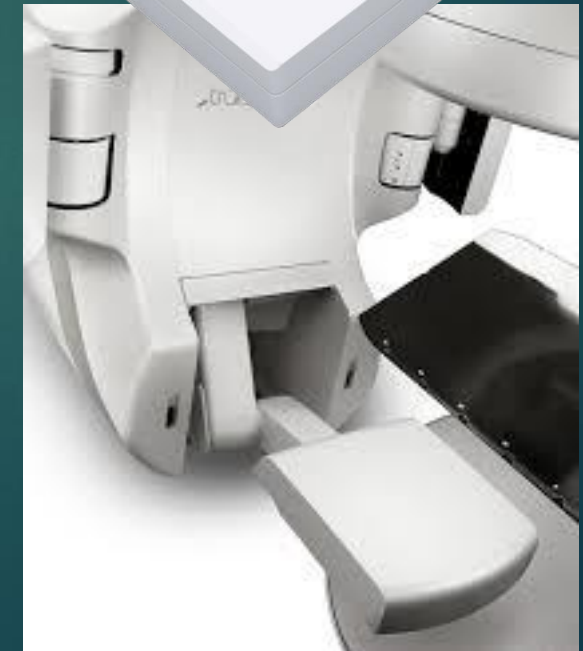
- ▶ Many discussions and talks about patient specific QA in recent years
- ▶ No official guideline
- ▶ Call for action: **time to form a new Task Group for patient specific QA**

In the early days

- ▶ 3 questions on patient specific IMRT QA in early 1990's
 1. Did TPS calculate the plan correctly?
 2. Can Linac deliver the planned dose accurately?
 3. Do we have the right tool for the measurement?

2D dosimetry

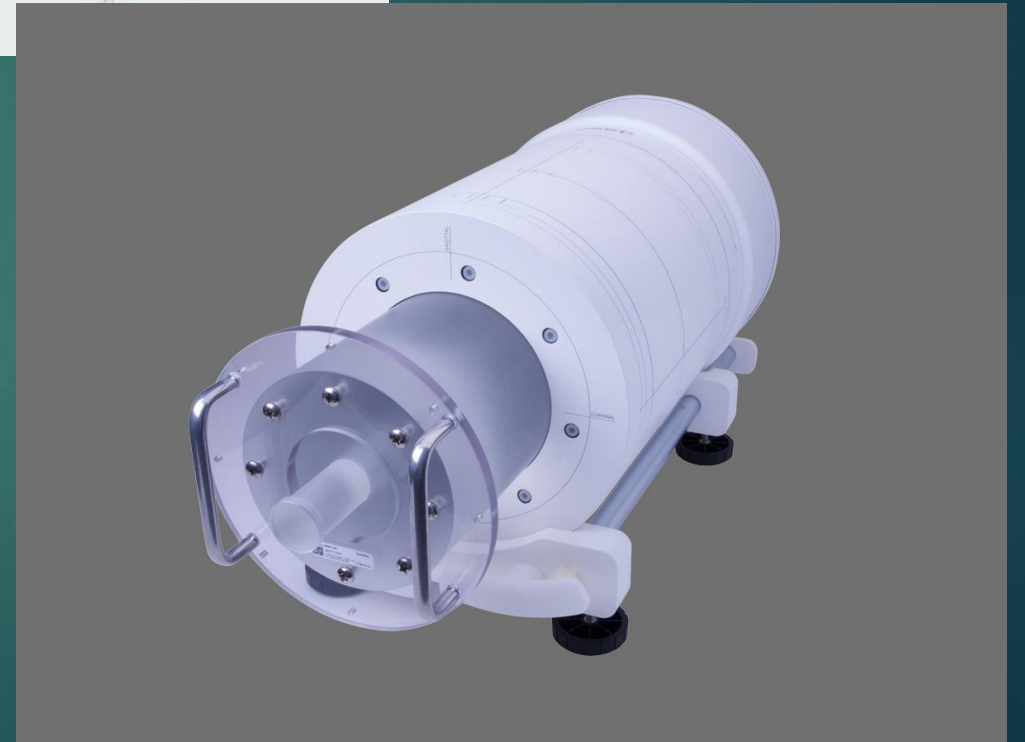
- ▶ Ion chamber
- ▶ Ion chamber array
 - ❖ MatriXX
 - ❖ Octavius
- ▶ Diode array
 - ❖ MapCheck
- ▶ Film
 - ❖ EBT2
 - ❖ EBT3
- ▶ EPID



3D dosimetry

▶ Delta4

▶ ArcCHECK



Log file analysis

- ▶ Workflow
- ▶ The log file includes: each MLC leaf position, Jaw positions, carriage positions, gantry angle, collimator angle, couch, MU, beam hold
- ▶ Dose reconstruction

Third party calculation based analysis

► Mobius3D

The screenshot displays the Mobius3D software interface. The top navigation bar includes 'Patients', 'DICOM Activity', and 'Tools'. The main area is divided into two sections: a table of patient data on the left and a detailed view of a specific treatment plan on the right.

Patient	Received ↓	Result	
Ethos Adaptive DVH Alert S003	12:28 PM 8/30/2019	Acknowledged	1 Plan: [Shield]
Ethos Adaptive Data Transfer BB-Test1	11:16 AM 8/30/2019	Pass	1 Plan: [Shield]
Ethos Adaptive Prostate VAL1104	6:11 PM 8/29/2019	Pass	1 Plan: [Shield]
Halcyon Whole Brain DFB HALCYON WHOLE BRAIN	7:01 PM 8/29/2019	Pass	1 Plan: [Shield]
Halcyon SBRT Liver LiverSBRT	6:02 PM 8/29/2019	Alert	1 Plan: [Shield] [Alert]
Ethos IGRT Prostate VAL1115	5:37 PM 8/29/2019	Pass	1 Plan: [Shield] [Alert]
Open field virtual water phantom QAMobiusOpenFields	2:50 PM 8/29/2019	Pass	5 Plans: [Shield]
Elekta Head CBCT-SRO SN26426-a81110e3	2:45 PM 8/29/2019	Acknowledged	1 Plan: [Shield]
Elekta With Couch SN00000-ec6352bd	2:38 PM 8/29/2019	Pass	1 Plan: [Shield] [Alert]
VMAT with RMS Diff M3D0001	3:08 AM 7/21/2016	Pass	1 Plan: [Shield] [Alert]
DVH Limit Example M3D0002	2:51 AM 7/21/2016	Alert	1 Plan: [Shield] [Alert]
DVH Limit Acknowledgement Example M3D0003	2:23 AM 7/21/2016	Acknowledged	1 Plan: [Shield] [Alert]
Stray Voxel Example M3D0004	2:07 AM 7/21/2016	Pass	1 Plan: [Shield] [Alert]

Plan: IMRT Prostate RT Intent Revision 0, IM108; 6 MV Dynamic 59.6 Gy (Max Dose)
Dr. Unknown; RDSMCH98, 20 Fractions (Central Hospital)

All DICOM files received (Plan: Thu, August 29, 2019, 04:09 PM) ▼

Plan Check finished (Thu, August 29, 2019, 04:12 PM) ▲

Target Coverage	DVH Limits	3D Gamma	Deliverable	Approvals
✓	✓	✓	✓	(No Approvals)

Checked with Mobius3D v3.0

[Trash] [Settings] [Print] [Approve] [View Plan Check]

QA Check finished (Thu, August 29, 2019, 04:42 PM) ▲

Target Coverage	DVH Limits	3D Gamma	Delivery	Approvals
✓	✓	✓	✓	(No Approvals)

Checked with MobiusFX v3.0

[Trash] [Print] [Approve] [View QA Check]

2 Fx Treatment Summary finished (Thu, August 29, 2019, 04:54 PM) ▲

Target Coverage	DVH Limits	3D Gamma	Delivery	Approvals
✓	✓	✓	✓	(No Approvals)

Checked with MobiusFX v3.0

[Print] [Approve] [View Summary]

[Delete Selected Plans] [Merge Selected Plans]

Now let's think again how we can answer these 3 questions

1. Did TPS calculate the plan correctly?
2. Can Linac deliver the planned dose accurately?
3. Do we have the right tool for the measurement?