End to End Motion QA in Radiation Therapy Treatment Planning

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End to End Motion QA in Radiation Therapy Treatment Planning

Why is there a need for 4D IGRT?
- Reduction of treatment volumes
- Methods of mitigating patient motion

End to End QA using Modus QA Phantoms
- CT-based systems
- MR-based systems
Why Is There a Need for 4D IGRT?

During treatment planning, margins are contoured around target volumes.

However most tumors are not stationary and exhibit deformation. Volumes closer to the diaphragm can exhibit significant intra-fraction motion.

Without motion guidance, treatment volumes need to increase significantly, causing unnecessary irradiation of healthy tissues, limiting the total therapeutic dose that can be delivered.

4D IGRT offers the ability to increase the therapeutic dose and spare healthy tissues, significantly improving patient outcomes.
Mitigating Patient Motion

Traditional Methods
Beam Gating

Traditional techniques focus on restricting tumor motion or coordinating treatment delivery with a surface tracking device or SGRT.

Advancing Methods
Live Beam Gating and Adaptive Beam Tracking

Advanced techniques focus on live gating or beam tracking delivery using advanced delivery systems such as MR-LINACs.
System QA Versatility

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MODUS QA
MODUS QA Solutions

pRESP Motion Platform

MRI^4
CT-Based QA
CT planned SBRT-type treatment with CBCT verification.
MODUS QA
MRI 4D

end to end

MR CT PET

QUASAR
MRI\textsuperscript{4D} System Latency QA

Evaluate total system latency without the need of an external oscilloscope using the MRI\textsuperscript{4D} gating signal input and outputs.
All 3 featured devices are compatible with SGRT tracking systems. The chest wall platform can be modified to capture the breathing motion profile in relation to the internal tumor motion.
A new generation of adaptive radiotherapy systems is set to transform workflows in the radiation oncology clinic.

The ability to **visualize the tumour target during treatment and adapting radiation dose in real-time**, improves patient outcomes.

Adapting for motion requires advanced QA tools including the 4D motion management solutions by Modus QA.
Thank-you for your time during the AAPM/COMP Virtual Meeting

For more information on End to End Motion QA in Radiation Therapy Treatment Planning or any other Quality Assurance needs, please visit:

www.modusqa.com