Machine QA with IQM

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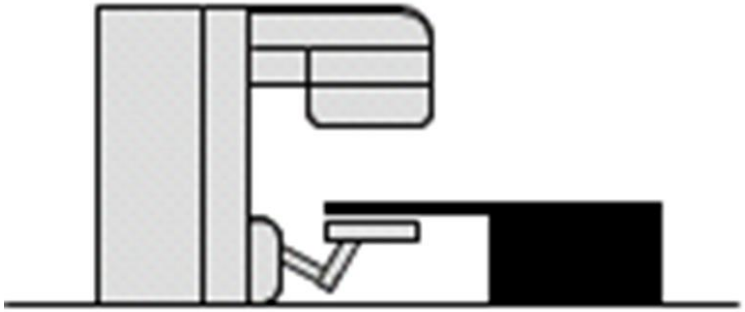
Disclosure

- I have no actual or potential conflict of interest in relation to this presentation

Why using the IQM for Machine QA?



or

CHECK

The Team

MAYO CLINIC

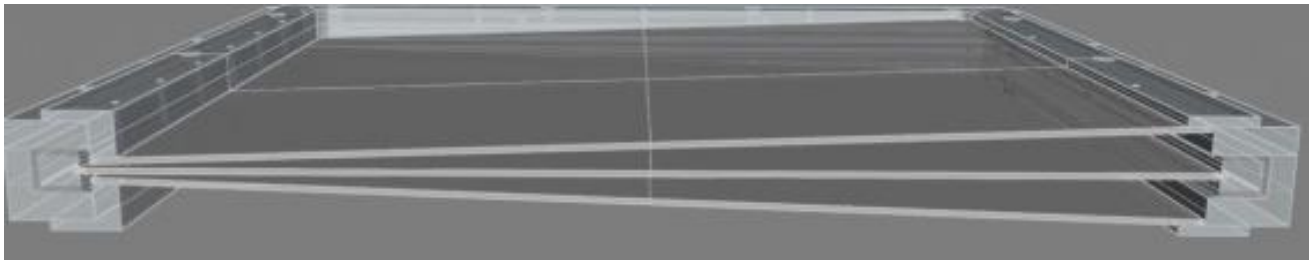
CEDARS-SINAI

UHN Princess Margaret Cancer Centre

What can we check? TG-142

- Output,
- Field Size,
- Energy,
- Symmetry and Flatness,
- Jaw position,
- MLC position,
- IMRT/VMAT - Delivery

How??



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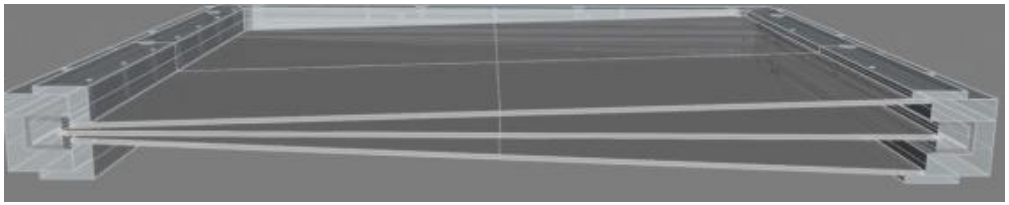

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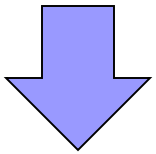
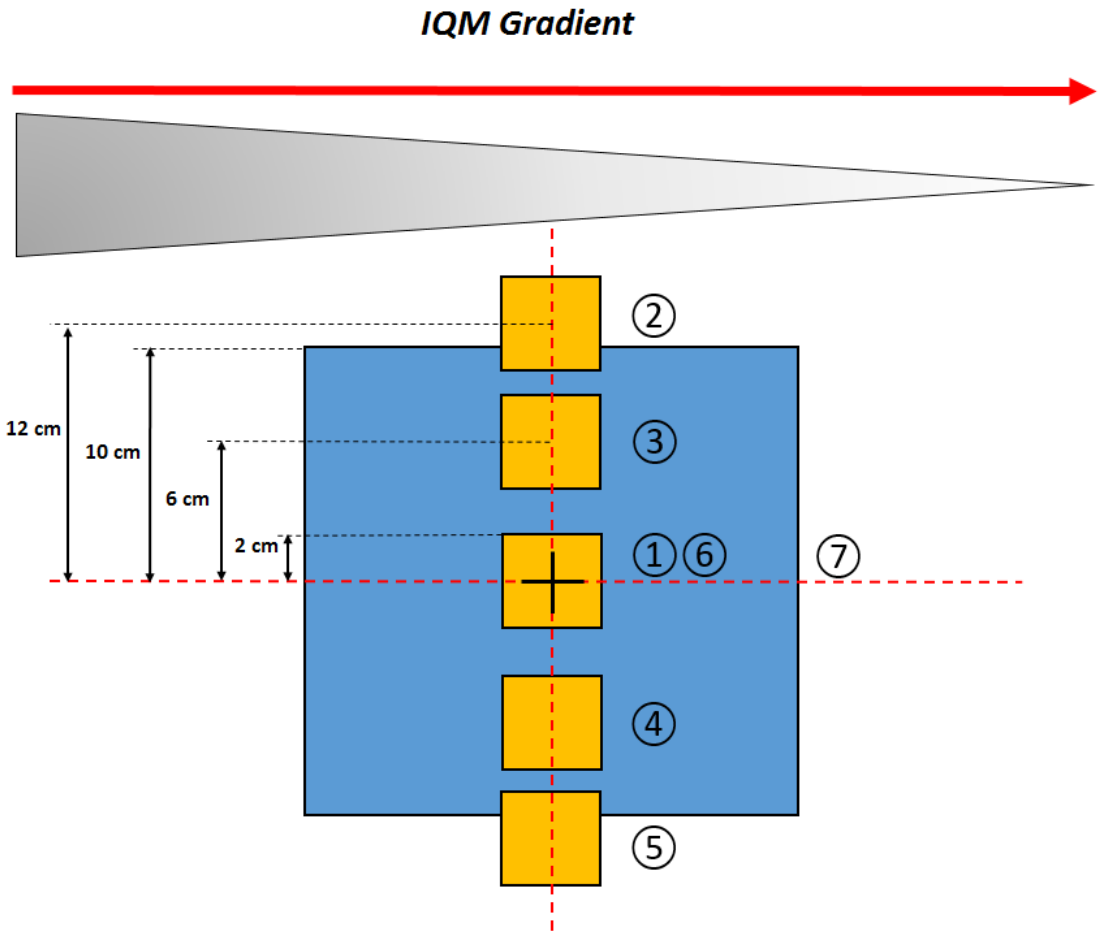
Progressive Approach



Gantry /Collimator Position

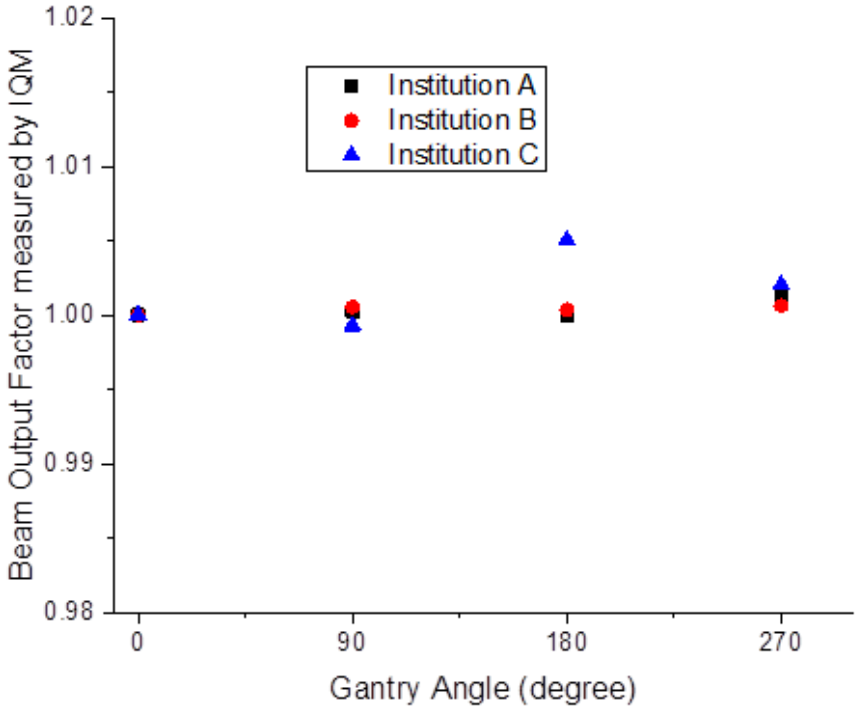
Initial QA Protocol

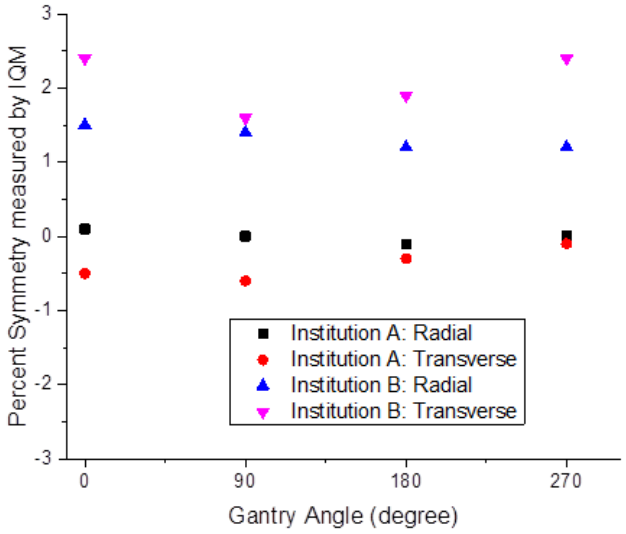


Initial Results

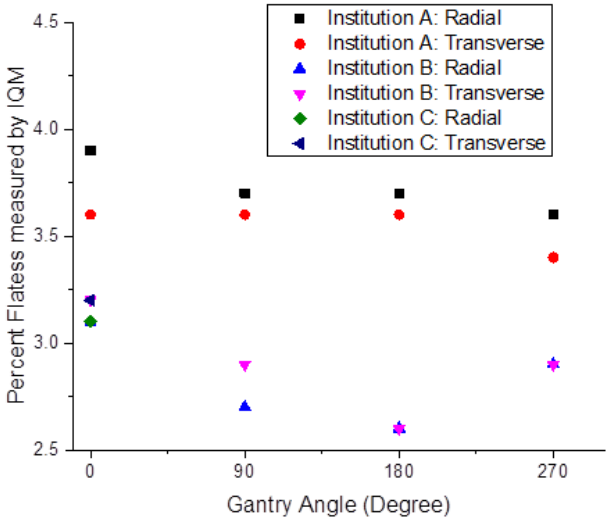
- The IQM signal reproducibility in terms of relative standard deviation of the measured signal per segment was **<0.5% per institution** and **< 3% across all institutions** based on multiple measurements and different measurement days.

The **beam output constancy** at the four cardinal gantry angles across all the institutions were found to be highly consistent; well within 0.5%.

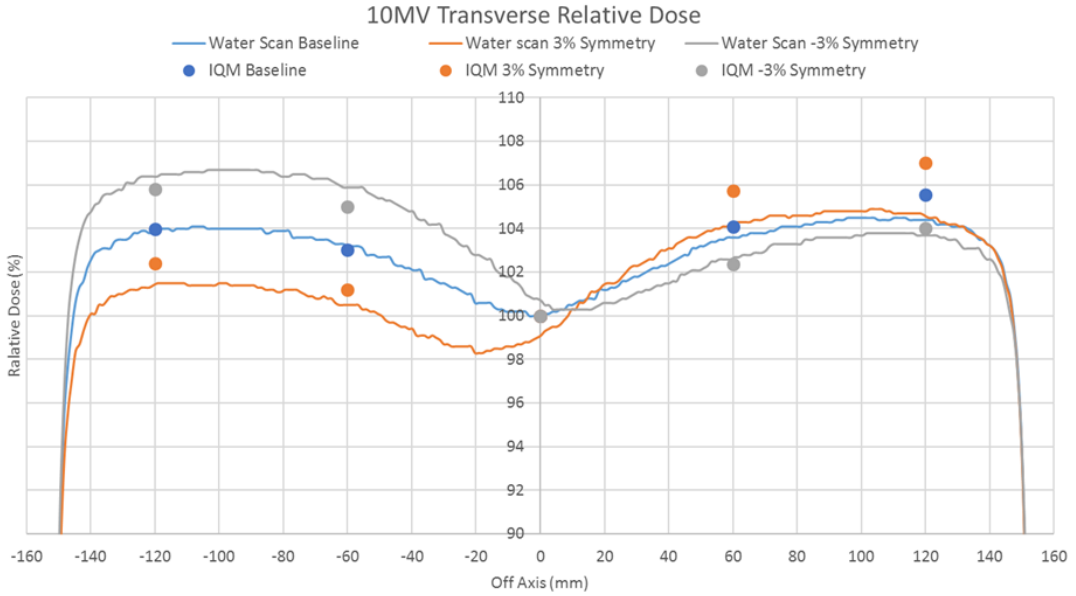


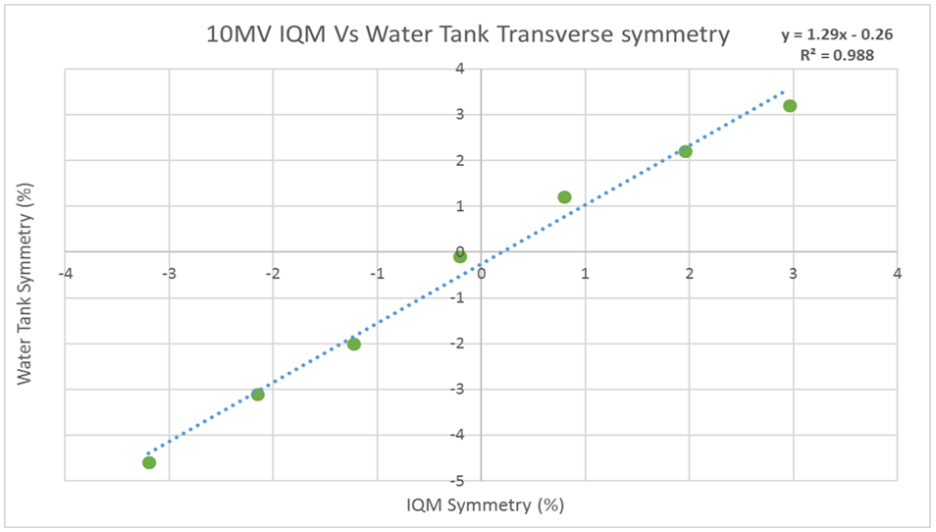


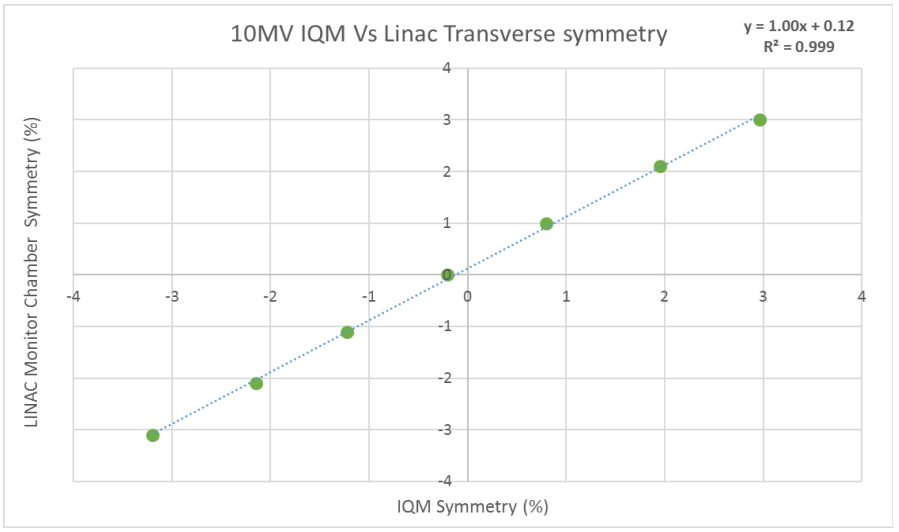
The **beam symmetry constancy**, for both the radial and transverse directions, for all cardinal gantry angles, are found to be **within 0.5%** for institution A. while for institution B the consistency was **within 1%**.



The **beam flatness constancy**, for both the radial and transverse directions, for all cardinal gantry angles, are found to be **within 0.5%** for institution A. while for institution B and C the consistency was **within 1%**.


10MV Transverse Relative Dose
Water Scan Baseline
Water scan 3% Symmetry
Water Scan -3% Symmetry
IQM Baseline
IQM 3% Symmetry
IQM -3% Symmetry
Ralative Dose (%)
Off Axis (mm)


10MV IQM Vs Water Tank Transverse symmetry
y = 1.29x - 0.26
R² = 0.988
Water Tank Symmetry (%)
IQM Symmetry (%)


10MV IQM Vs Linac Transverse symmetry
y = 1.00x + 0.12
R² = 0.999
LINAC Monitor Chamber Symmetry (%)
IQM Symmetry (%)

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Progressive Approach

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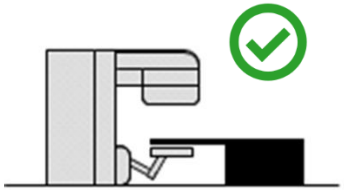
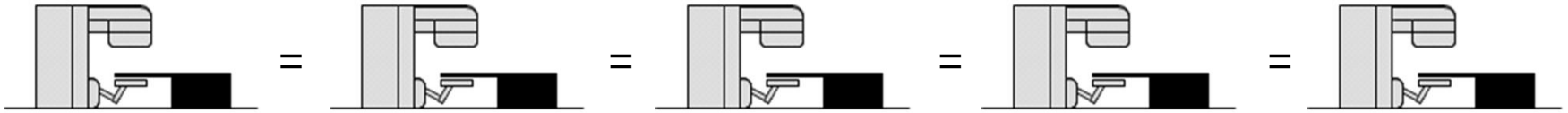
Added Value!



Efficiently and **Effectively** assess machine performance across multiple systems



Summary

- IQM is a great tool for routine machine QA and machine performance check.
- QA protocol is important
  - *Willing to break current paradigm for machine QA*
- Efficiently and Effectively assess machine performance across multiple systems
  - Independent of their location
  - Are all my systems performing at the same level

Acknowledgements

- John DeMarco at Cedars Sinai
- Andrew Veres at Mayo Clinic
- Princess Margaret team:
  - Mohammad Islam,
  - Makan Farrokhkish,
  - Robert Heaton,
- Will Roestel from iRT

Questions?