Daily QA of the CyberKnife using the QA BeamChecker+

Jacob A. Gersh, PhD DABR
Speaker is the owner of Spectrum Medical Physics, LLC, a company which has contracts with:

- Standard Imaging, Inc
- Siemens Healthcare USA
Current Clinical Use

Varian TrueBeam

• Daily
  – Photon Output (Gantry Mount)
  – Photon Energy Constancy (Gantry Mount)
  – Photon Flatness and Symmetry (Gantry Mount)
  – MV Imaging (Gantry Mount)
  – kV Imaging (Gantry Mount)

• Weekly
  – Electron Output (Couch-Placed)
  – Electron Energy Constancy (Couch-Placed)
  – Electron (Couch-Placed)
  – EDW (Gantry Mount)
  – RapidArc (Gantry Mount)

• Monthly
  – Respiratory Gating (Gantry Mount)

• Patient-Specific
  – Electron Cut-out Measurements (Couch-Placed)
Lovable Aspects of the QABC+

- Robust
- Simple Hardware Interface
- Simple Software Interface
- Wireless
- Simple-to-traverse database
- Easily Scalable as clinic changes
- Stable readings
- Easy out-of-tolerance notifications
- Very few problems
- Excellent Support
LINAC Output Verification

- Machine Isocenter matches the Room Isocenter
- Room Lasers provide demarcation of machine isocenter
- Alignment crosshair
- Optical SSD
- Can be delivered as an automated clinical beam
Output Verification (Current Methods)

- Requires manual manipulation of the robot
- Beam delivered in a non-clinical mode
- Requires manual correction for temperature and pressure
- Requires manual numeric entry for baseline comparison
- Setup uncertainty associated with setup following Iris QA
Output Verification (Current Methods)

- Machine Isocenter matches the Room Isocenter
- Room Lasers provide demarcation of machine isocenter
- Alignment crosshair (Sort of)
- Optical SSD
- Can be delivered as an automated clinical beam

Alignment ???
The Cutting Board

- Milled Inlays to ensure precise fit
- Crosshair used for “rough alignment”
- Four fiducial markers for alignment and offset calculation using TLS
Plan Preparation

- Scan from Superior to the Cutting Board to the blue casing.
Plan Preparation

- Define the location of the fiducial markers in the TPS
Plan Preparation

- Place 5 SINGLE beams (4 peripheral and 1 center)
- 500 MU Each
Plan Preparation
Output Verification (Current Methods)
Output Verification (Current Methods)
Plan Preparation
Output Verification (Current Methods)
Thank You