

AbstractID: 10316 Title: Clinical Implementation of the first RapidArc treatment within MOSAIQ environment: Dosimetric validation and QA considerations

**Purpose:**

QA and dosimetry validation safeguard the accurate delivery of RapidArc™ treatments within MOSAIQ R&V system.

**Method and Materials:**

Catphan 504 phantom; Varian isocenter cube with 2mm ball assembly were used in CBCT position accuracy calibration. For RapidArc™ dosimetric validation, an in-house designed dosimetric validation and QA system was constructed with solid water blocks, ion chamber and MapCheck. Total 11 clinical plans generated in Eclipse were measured by using this system. Both half-arc (90°-270°) and full arc were delivered. Both point dose measurements and 2D dose distributions were compared with calculated value.

**Results:**

CBCT position alignment QA was done by comparing manual and automatic shift matching under different settings in imaging acquisition. All shifts were reviewed and found to be matched in MOSAIQ. Clinical optimal CBCT setting using small cube was determined to be 10x10cm fields and 1mm slice thickness. Position matching accuracy was obtained within 1mm in all directions.

For our first 11 RapidArc plans, ion chamber measurements for full arc treatment delivery agree with the treatment plan by 0.47% (SD=1.71%) while 1.20% (SD=1.14%) for partial arc delivery. 2D dose distributions were measured using MapCheck sandwiched by solid water blocks. Due to the angular dependences of diode's response, which results under-dose for full arc's measurement from MapCheck, only profiles from half-arc were analyzed. For gamma function analysis (3% absolute dose/3mm DTA), average agreement is 97.24% with standard deviation of 2.46%.

**Conclusions:**

RapidArc™ is an advanced technique to create a more efficient, faster treatment. Accuracy of the treatment can only be achieved with CBCT or other imaging guidance tools. Our approach to the QA process was based on the belief that not only each component has to be checked but also complete system QA is essential. Both the point dose and dose distribution must agree with the treatment planning.