AbstractID: 9060 Title: Practical Suggestions for Annual Quality Assurance in CyberKnife

Purpose :To make practical suggestions for effective Annual QA in Cyberknife

Methods and Materials :The Cyberknife system is capable of delivering radiosurgery in the body with submillimeter accuracy.For small fields,dosimetry is very critical since minor dosimetric change can cause deleterious effects.The present Annual QA program as described by Accuray primaly focuses on film-based QA tests as with traditional stereotactic delivery systems.AAPM TG135 for robotic SRS QA is eagerly awaited.Hence it is essential to incorporate additional tests for the Annual QA.In this study we outline practical QA tests based on scanning with appropriate diodes in water.The diodes used were PTW60008,PTW600012 and SNC edge-detector.The water scanning system used was MULTIDATA-3D 9840 Phantom.In this study we performed direct TPR measurements for the small(5mm),medium(30mm) and large(60 mm) collimators,profiles for all collimators and output-factors at 800mm SAD.The ouput-factors were compared for three diodes as well as theoretical Monte Carlo calculations.These scans were compared with the commissioning data and analyzed.Also detailed TG51 calibration was performed with water proof farmer chamber with the 60mm cone and cross calibration of the farmer chamber used for daily quality assurance is performed.

Results :All the results are outlined and compared to the commissioning data. Multidata RTD software was used for analysis.The direct TPR measurements and plotted profiles match closely to commissioning TPR measurements.The output-factor with 60008 was found slightly higher than 60012 diode,whereas the output factor measured by the edge-detector was found between 60008 and 60012 diodes.All output-factors with different diode detectors are within $\pm$2% of commissioning values.Calibration factors for daily QA are presented.

Conclusions :With newer features being added to Cyberknife and Monte Carlo algorithm being added to Cyberknife treatment planning system,additional tests should be incorporated as part of Annual QA. We also suggest that monthly TG51 should be performed and compared to the Annual values as reference.