

AbstractID: 11072 Title: Study of VMAT plan QA using film, diode based, and ion chamber based QA systems

Purpose: With the commercial introduction of delivery control systems for Volumetric Modulated Arc Therapy (VMAT), the need has arisen for reliable and efficient techniques for performing patient specific VMAT quality assurance (QA). In this work, we have studied three patient specific QA techniques for VMAT: ion chamber with film, 2D diode array, and a 2D ion chamber array.

Materials and Methods: The three QA techniques we have utilized are: (1) a stack of solid water slabs with an inserted ion chamber and film sandwiched between two slabs; (2) a 2D diode array (MapCHECK™ device inserted into a MapPHAN™ phantom); and (3) a 2D ion chamber array (MatriXX™ inserted into a MULTICube™ Phantom). Ten VMAT plans were delivered to all three QA systems on an Elekta Synergy linac.

Results: With the highest spatial resolution among all three systems, film measurements can provide very good QA results when analyzed in relative mode. Absolute dose comparisons were performed for both the MapCHECK™ and MatriXX™ systems. The average passing rate in gamma analysis were 95.0% and 98.5% using 3%/3mm criteria for the above two systems, respectively. The slightly lower passing rate for MapCHECK™ QA may be attributed to the angular and dose rate dependence of the diode response. It is also observed that the MapCHECK™ QA is more sensitive to the tongue-&-groove effect when diodes fall between two leaves. The MatriXX™ system provides slightly higher QA passing rates. However it may be less sensitive to large dose variation within small regions due to its 7.62mm detector grid size.

Conclusions: All three systems can be used for VMAT plan QA provided users are attentive about the strengths and limitations of the QA device.

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