

AbstractID: 3526 Title: Dose variation on the simultaneous irradiation of head and neck (H&N) cancer and supraclavicular nodal fields with step-and-shoot IMRT

**Purpose:**

IMRT QA is just a single event in the entire treatment. The objective of an IMRT QA may be expanded to include temporal variations such as dose linearity, MLC leaf positioning, etc..

**Method and Materials:**

IMRT QA is carried out for an H&N case covering simultaneously the nodal regions in the supraclavicle. In addition, dose linearity is studied with ion chamber measurements in the MU range 1-100, and field size range from 1x1-5x5 cm<sup>2</sup>, including elongated fields. A 2D diode array device is used to study the consistency of dose delivery by repeating the irradiation of selected fields ten times. The dose delivered and the distributions in all repeated irradiations are compared. The dynamic positioning of leaves during dose delivery is recorded.

**Results:**

The routine IMRT QA yielded acceptable agreement (4% in dose and over 2%, 3mm distance-to-agreement is >90%) between calculation and measurement. Dose linearity is within 2% for all fields except 5% for 1 MU. The linearity holds even for small MU segments, down to 1x1 cm<sup>2</sup>. The maximum shift in the 90% isodose line in 10 irradiations > 5mm, and up to 1 cm for the 50% line. For fields with average MU/segment in the range 0.9-2, the dose variation is <1.5% in 10 repeated irradiations. While 90-95% of the dynamic leaf positioning are within 0.5 mm, about 3-6% are >10 mm.

**Conclusion:**

The standard QA acceptance criteria may not be adequate to gauge the accuracy of dose delivery, especially for sliding window techniques. The effect of the isodose shift may compromise the dose constraint to adjacent critical structures. A composite QA process incorporating leaf positioning may be warranted for comprehensive QA. Any deviations from calculation should be evaluated in the context of composite TCP and NTCP.