AbstractID: 3599 Title: In vivo diode dosimetry for helical tomotherapy dose verification

Purpose:

We propose and assess the feasibility of *in vivo* diode dosimetry for helical tomotherapy treatments. We aim to evaluate the influence of treatment parameters (grid size, field width, pitch and modulation factor) on diode measurements.

Methods:

Isorad-p type diodes were calibrated and diode characteristics (angular dependence, etc) were studied. Treatment plans with different delivery parameters were performed on a s30 cm diameter solid water cylindrical phantom to deliver: 1) homogeneous dose to the whole phantom target; and 2) dose to a small target located at the center of the phantom. Diodes were placed in various positions at the surface of the phantom. The megavoltage CT (MVCT) was utilized for accurate phantom and diode localization. Diode measurements on patients have been performed and will also be analyzed.

Results:

Diode directional dependence in the transverse direction was less than ± 1% over full 360º rotation. On the whole phantom target, in general measured data were within ± 5% of the planned dose. Use of a fine dose grid (2mm) in planning generally showed better agreement with measurements. Field width has no effect on diode response. Higher pitch resulted in poor agreement. Diode measurements were within 10% of expected dose for a centrally located small target. Dose measurements for patients have been within 10% of expected dose.

Conclusion:

Isorad-p type diodes agree to ± 5% for some situations and better than ± 10% for in vivo diode dosimetry for helical tomotherapy treatments. A basic understanding of the effects of physical factors (field width, pitch and modulation factor, grid size) on variations in diode response is essential to select the accepted limit. In vivo dosimetry can be very useful as a secondary check for complicated helical tomotherapy radiation delivery.