

AbstractID: 8571 Title: Dose calculation verification for stereotactic treatment plan

Purpose: Verification of SRS treatment plans was a challenge in the early beginning of stereotactic radio surgery. The large amount of dose deposited in a single fraction through a small collimator or MMLC was a cause of sleepless nights for many physicists. The traditional way was using a "hand calculation". In some cases a special measurement in phantom was performed (while the patient was in the SRS ring). This work suggests a quick and accurate way using a standard TPS.

Method and Materials: The original treatment plans were developed on the Ergo ++ treatment planning system ver. 1.6 for the 6X beam on a Beam Modulator (4mm leaves). All the plans were calculated with heterogeneity corrections turned on. For the purpose of "hand calculation" we used the built-in second calculation in the Ergo system (the system provides an automatic and independent MU calculation mechanism). For the comparison we used the XIO software version 4.3.3. The beam was carefully modeled and commissioned on both systems for small field sizes. A total number of 20 plans were compared. The transfer was done using DICOM RT protocol.

Results: The match between the calculation results on both 3D systems was excellent (in most cases less than 1% discrepancy). The 1D system showed larger errors (3-4% on head cases), which do not exist when we turned the heterogeneity corrections off. The DVH's and isodoses also showed very good agreement. The transfer and recalculation took about 15 minutes per plan.

Conclusion: Using a full second 3D calculation on a separate TPS is a fast and accurate way to check SRS plans. It is usually available in most departments and it justifies the effort (if needed) of some extra modeling for small field sizes. "Hand calculation" is much less accurate, especially when inhomogeneities are present.