

AbstractID: 3034 Title: Analytical derivation of 6 MV radiosurgery cone factors

Purpose: To derive cone factors analytically for 6 MV radiosurgery beams

Method and Materials: Lack of lateral electronic equilibrium and finite detector size make experimental measurements of stereotactic radiosurgery cone factors a difficult task. In this work, cone factors for 6 MV radiosurgery beams of various cross sections are determined using an analytical model for absorbed dose in narrow photon beams and validated by means of experimental measurements in water. The model allows one to calculate absorbed dose under electronic disequilibrium conditions using measured broad-beam data. For each cone ranging from 4 mm to 20 mm in diameter, cone factor is derived analytically and compared to that measured in water experimentally using a high resolution diode and a computerized data acquisition system.

Results: The agreement between the analytical and measured cone factors is within 2.5 % of local value.

Conclusion: Based on the results of this study for 6 MV x-rays, the analytical method described here can be employed to determine radiosurgery cone factors. It provides a viable alternative to experimental methods where measurements in water are arduous. It can be used as an independent method or to validate experimental results