

AbstractID: 7180 Title: Determination of output factors for stereotactic radiosurgery beams by Monte Carlo and measurements

## **Determination of output factors for stereotactic radiosurgery beams by Monte Carlo and measurements**

### **Purpose**

The Varian Trilogy accelerator provides high dose rate (1000MU/min) photon beams for stereotactic radiosurgery (SRS). Different output factors have been reported and their use may impair observations of dose response and optimization of prescribed dose. In this work, we investigated the output factors for the Trilogy 6 MV SRS beam using Monte Carlo simulations and measurements.

### **Method and Materials**

The Trilogy SRS cone collimators are 5 mm to 30 mm in diameter. Chamber measurement of output factors is difficult for small cone sizes. In this work, the measurement was carried out using a 0.015cc pinpoint chamber and Gafchromic EBT film. The Monte Carlo simulation was performed using the MCBEAM/MCSIM codes for linac head simulation and phantom dose calculation. The Monte Carlo calculations were validated using the measurement results and compared with the Varian recommended beam data.

### **Results and Conclusions**

The agreement in percent depth doses and dose profiles between the simulation results, the measurement results and the Varian data was within 2%/1mm for the 10x10 cm<sup>2</sup> reference field and all the cones at a 100 cm source to surface distance. The output factors obtained from the Monte Carlo simulations were in excellent agreement with the values from the film measurements. Similar agreement was found between the Monte Carlo results and the pinpoint chamber values except for cones with diameter less than 20 mm where the 2 mm chamber diameter has become comparable to the field size. However, the Varian recommended output factors are consistently higher than the Monte Carlo results, especially for the 5 mm cone, where the difference reaches 10.9%. Therefore, great caution must be taken with the use of the Varian recommended beam data.