AbstractID: 5490 Title: An implantable dosimeter study of patients with prostate cancer

Purpose: A study of 30 prostate cancer patients who received implanted radiation dosimeters in conjunction with external beam radiation therapy has been completed. The purpose of the study was to compare daily measured dose to the value predicted by the treatment planning system.

Method and Materials: In most patients two dosimeters were placed adjacent to the capsule of the prostate. The devices were introduced perineally using a trocar/cannula system. Polyester mesh was placed behind the sensors after insertion to prevent them from moving back down the insertion track before healing occurred. Serial CT scans were taken to gauge any migration of the devices away from the point of surgical placement. Some patients were localized on a daily basis using a kilovoltage x-ray positioning system. The clinical protocol did *not* permit alteration of the therapy parameters based on sensor readings.

Results: An evaluation of the dose discrepancy between measured and planned values was completed for each sensor. Additionally, the relative standard deviation of each sensor's readings was calculated (as a measure of randomness of the readings). In many patients, the relative standard deviation value exceeded 3%, which is beyond the nominal value for the sensor itself when tested in a phantom. In some patients the cumulative dose for a given treatment period disagreed with the planned dose by 5% or more. The discrepancy tended to be more pronounced for boost phases when the isodose contours were reduced in volume.

Conclusions: This initial data suggests that implanted dosimeters may play a useful role in tracking dose discrepancies, both systematic and random, in patients being treated with external beam therapy for prostate cancer. Future studies will focus on the effects of daily kilovoltage x-ray localization, using the dosimeters as fiducial markers, on the magnitude and randomness of dose discrepancies.