

AbstractID: 11105 Title: In Vivo Dosimetry for HDR Brachytherapy Using a Scintillating Fiber Dosimeter

Purpose: The goal was to develop a scintillating fiber dosimeter and verify its suitability in assessing the dose deposited during brachytherapy HDR treatments. As a first step toward in vivo dosimetry, it has been decided to conduct a full process, from planning to treatment, using a prostate phantom. **Method and Materials:** The scintillating fiber dosimetry system is composed of a RGB photodiode (MCS3AT) detecting light emitted from a scintillator (BCF-60) coupled to a plastic optical fiber. Fiber is aligned on the photodiode, and its output is then amplified and acquired through a National Instruments acquisition card. Signal processing, including Cerenkov and fluorescence light subtraction, is done and dose deposited during treatment is obtained through integration. A prostate phantom (CIRS #053) has been used to conduct the study. An ultrasound-guided catheter insertion procedure was performed by a radiation oncologist at our institution. A total of 13 catheters were inserted, one of those being used for the dosimeter. Following a CT scan, the prostate and urethra were contoured and treatment planning was performed according to our prostate clinical protocol on a PLATO workstation (Nucletron BV, Netherlands). The plan was delivered using a microSelectron V2 192Ir afterloader. **Results:** We measured dose rate as function of time. It varies with distance between the dosimeter and the dwell-positions. Dose rate integration, once the contamination component is subtracted, determines the total dose deposited during treatment. Measurements were within 2% of the dose predicted by the planning system. **Conclusion:** Scintillating fiber dosimeter provides an accurate method to assess dose deposited to targets and organs at risk during HDR brachytherapy. Dose rates measured allow QA of treatment delivery for each catheter and total delivered dose. Measurements have been done in a prostate phantom, but there is a potential for a variety of clinical sites.