

AbstractID: 5797 Title: Clinical Use of Linear Array MOSFET for Urethral Dose Verification in Prostate High Dose rate Brachytherapy

Purpose

To investigate the use of linear array MOSFET as *in vivo* dosimetry detector to determine the urethral dose for a single and multiple fraction during the prostate HDR treatment.

Method and Materials

Commercially available Linear Array MOSFETs with 5 individual MOSFET was inserted into the 18 gage Foley catheter right after the HDR prostate implant. Measurements were performed in 25 patients receiving total of 2400cGy HDR boost in 4 fractions with 600cGy per fraction. The urethra dose was measured right after first fraction for all the patients and also subsequent fraction in 5 patients in terms of reproducibility of urethra dose. The exact location of the MOSFET was determined using radio-opaque marker and the point dose for each MOSFET was determined using CT-base treatment planning.

Results

A Linear Array MOSFETs was placed in such a way that the first MOSFET being slightly above the bladder neck with the average reading of $75\% \pm 18\%$ of the prescribed dose since it is beyond the base of the prostate. The dose was increased to maximum of 128% of the total dose within the prostate gland and decreased to 40% or less of the total dose beyond the apex of the gland. There was an excellent correlation of 2.8% between the MOSFET reading and treatment planning dose calculations. The MOSFET reading comparison between first and second fraction also correlated within 2.3%.

Conclusion

MOSFETs are suitable for *in vivo* dosimetry during prostate high dose rate brachytherapy not only to verify the dose across the urethra but also to verify that the needles are maintained in its exact same position as the first fraction. Any unexpected variation in urethra dose compared to initial treatment plan can be corrected in the subsequent fraction as a result of this dose verification procedure.