AbstractID: 6747 Title: The study of dose distribution of HDR brachytherapy for prostate cancer with glass dosimeter

Purpose:
Many international investigations showed that external beam radiotherapy combined with high-dose-rate (HDR) brachytherapy will achieve therapeutic effect for prostate cancer. Hence, it is important to determine the treatment precision of in-vivo dosimetry. However, a number of factors could potentially lead to the discrepancy between the predicted dose and the actually absorbed dose. In this study, in-phantom measurements simulating the ^{192}Ir HDR brachytherapy for the treatment of prostate cancer had been performed.

Method and Materials:
To validate our in-vivo dosimetry system, a prostate phantom is designed. The innovative glass dosimeter (GD) and rod thermoluminescence dosimeter (TLD) were used in this study. The calibration of the dosimeter results showed the GD is a suitable dosimeter for radiation therapy dosimetry.

Results:
In this study, the compatibility factor (measured dose/calculated dose by TPS) was analyzed according to the locations in the phantom. For GDs and TLDs, the mean compatibility factor was 1.00±0.03 (range, 0.97 to 1.04) and 1.01±0.03 (range, 0.95 to 1.04) respectively with single source dwell position. In multiple source dwell positions, the mean compatibility factor was 0.98±0.03 (range, 0.93 to 1.02) for GDs.

Conclusion:
The results showed that the differences in dose between the measurement and calculation were within ±3% with single source dwell position. The measurements simulating the real clinical situations agree with the calculated values within 5%. In this study, results showed that GD displayed ideal properties for phantom-dosimetry. Phantom-dosimetry results show that dose delivery after CT-based planning can be of clinically acceptable accuracy.