AbstractID: 3454 Title: First clinical experience with pre-treatment and in vivo IMRT verification using EPID dosimetry

Purpose: The aim of this study was to verify the first IMRT prostate plans made in our clinic with a newly commissioned treatment planning system (TPS, Pinnacle 7.4f) using an amorphous silicon electronic portal imaging device (a-Si EPID, Elekta iViewGT), both pre-treatment and *in vivo*.

Method and Materials: For pre-treatment verification, the plans of 8 patients were re-calculated on a polystyrene slab phantom. An in-house developed back-projection algorithm was used to estimate the dose distribution at the phantom/patient isocentric mid-plane (perpendicular to the beam-axis) with the EPID. Each plan was also validated at the isocentre with ionization chamber measurements. Separate fields were measured with film and EPID, with gantry angle =0°. The *in vivo* mid-plane dose was estimated with the EPID for the first 3 fractions and weekly thereafter. γ–evaluation was used to assess 2D dose distributions with criteria of 3% dose difference (of maximum dose) and 3mm distance-to-agreement. The evaluated area included all points within the 20% isodose line of each EPID field. Anatomy changes for *in vivo* measurements were assessed using cone-beam CT acquired prior to each verified fraction.

Results: For pre-treatment verification, the dose distributions of EPID vs. plan and EPID vs. film agreed within 3% or 3mm for 99.2% and 100% of points, respectively. The average ratio of the measured and planned isocentre dose was 0.987 ±0.003(SD) for ionization chamber and 0.997 ±0.009(SD) for EPID. For the *in vivo* fields, 96.7% of dose points were in agreement. Examples of discrepancies were due to variation in gas pockets during treatment and problems calculating the dose distribution in a small area of overlapping segments (1cm2).

Conclusion: These results show that an a-Si EPID can be used to accurately verify IMRT prostate treatments in the mid-plane of the phantom or patient, both pre-treatment and *in vivo*.