**Objective**

**Why?**
- verification of dose distribution during treatment
- no time needed for pre-treatment measurements

**How?**
- EPID based with iViewDose (Elekta, Crawley, UK)

**Problem**
- large tissue inhomogeneity due to air-filled endorectal balloon used to spare part of the rectal wall

**Solution**
- in aqua vivo approach – developed for lung cancer treatments

**Materials and methods**

**Patients**
- 10 hypo-fractionated prostate cancer patients:
  - 5 x 7 Gy to the prostate with/without seminal vesicles
  - 5 x 10 Gy to the dominant intraprostatic lesion (DIL)

**Treatment planning**
- Pinnacle 9.10/16.0 (Philips, Fitchburg, WI, USA)
- Auto Planning, 2 VMAT arcs of 10 MV photons
- pre-treatment verification on Delta4 phantom (Scandidos, Uppsala, Sweden) - all plans fulfilled clinical criteria

**Treatment**
- Elekta Agility linear accelerator
- position verification with cone-beam CT, correction for translational errors
- in vivo EPID dose measurements during actual treatment (3 to 5 fractions per patient)

**Comparison**
- γ evaluation (within 50% isodose surface):
  - percentage of points within 3%/3 mm (Pγ), mean γ
  - conventional analysis vs. the clinical plan
  - in aqua vivo analysis vs. the in aqua plan, i.e. with a density override equal to 1 on the whole CT dataset

**Results**

TPS dose, EPID-reconstructed dose and γ analysis are shown for both the conventional in vivo method and for the in aqua vivo method (example patient).

- **conventional analysis** (left panel) → disagreement in indicated region (white dotted circle) due to large density inhomogeneity caused by endorectal balloon
- **in aqua vivo analysis** (right panel) → considerable improvement

<table>
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<th>Pt. no.</th>
<th>conventional</th>
<th>in aqua vivo</th>
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<tr>
<td></td>
<td>Pγ ≤1 (%)</td>
<td>mean γ</td>
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<tr>
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<tr>
<td><strong>total</strong></td>
<td><strong>90.9</strong></td>
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</table>

**Conclusion**

EPID dosimetry with iViewDose can be used for in vivo dose verification of prostate cancer treatments with an endorectal balloon using the in aqua vivo method.

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**In vivo EPID dosimetry for prostate cancer treatments with an endorectal balloon**

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