

# RayPilot – electromagnetic real-time positioning in radiotherapy of prostate cancer – initial clinical results



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## Purpose

This is a report on the first thirteen consecutive patients treated with RayPilot electromagnetic positioning device for real time positioning during four dimensional radiotherapy (4DRT) of prostate cancer.

## Material & Methods

The RayPilot system consists of three parts; a transmitter for implantation into the prostate (once before start of the external beam treatment series), a receiving sensor plate system (integrated in the treatment carbon fibre table top) and a computer system, see Figure 1. The implantation of the transmitter was performed transcutaneously via perineum using a modified Seldinger technique. This was done directly after the high-dose rate brachytherapy which preceded the external beam radiotherapy part of the combination treatment, see Figure 2 and 3. The system was then used for high precision real-time positioning during the entire adjuvant external beam radiation therapy period. The implant was removed after the last external beam radiotherapy fraction.

## Results

The results from treatment of the thirteen first consecutive, single-center, patients are included in this report. The procedures and implants were well tolerated. No bleeding, infections or other notable

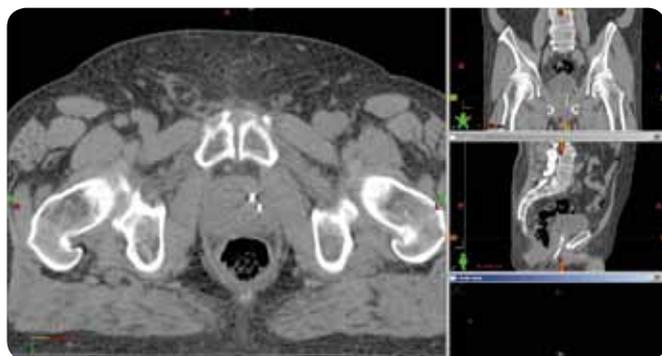


Figure 2. The RayPilot® transmitter and two goldmarkers implanted in the prostate in 3D.

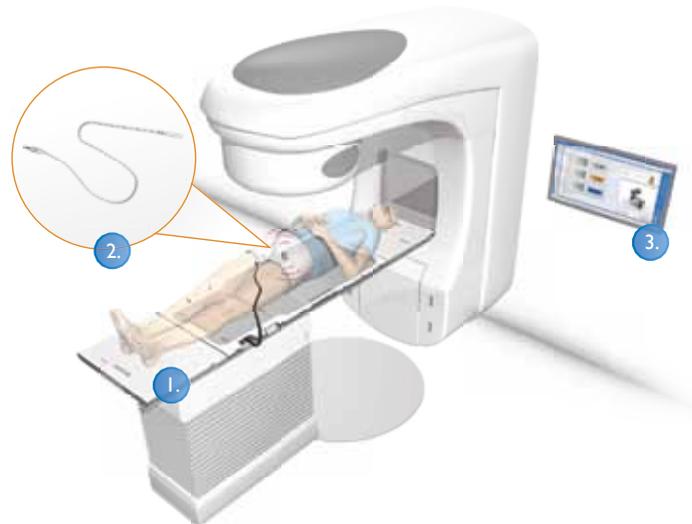


Figure 1. The RayPilot® System.

1. RayPilot® System 2. RayPilot® Transmitter 3. RayPilot® Software

complications occurred. Pain, tenderness and discomfort were specifically asked for. However, only sporadic minor sensations from the skin penetrating catheter were reported (less than 10 per cent of patients) although the implant was kept up to 5 weeks. The implant could be easily explanted. It automatically positions the implant/prostate 30 times per second with a high resolution (0.37 mm 3D error; SD 0,19 mm) and should thus be suitable for routine use of 4D external beam radiotherapy (4DRT) and for hypofractionation. One further advantage with system is that MRI can be used for subsequent follow-up since no metal elements are left after end of treatment.



Figure 3. The RayPilot® transmitter and two gold-markers implanted in the prostate in a 2D image.

## Conclusions

*The system is in clinical use and, although emerging, our initial oncologic and functional outcomes have been promising and the system seems to be well adapted for automatic and real time high precision positioning.*