

# Evaluation of the localization accuracy and precision of the RayPilot® system compared to Cone-Beam CT

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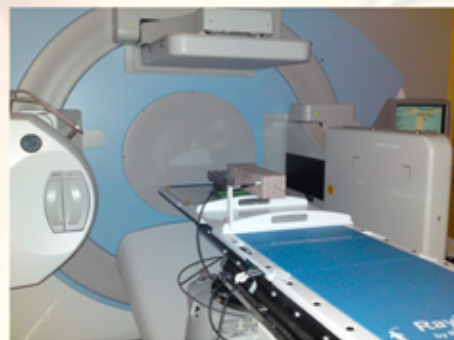
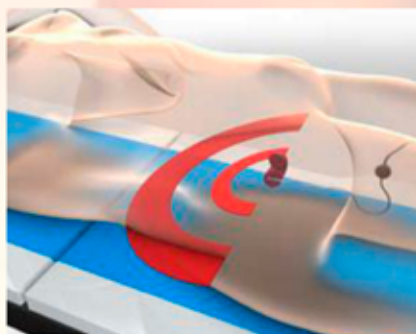
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## Purpose

The Micropos Medical AB has developed the four-dimensional localization system RayPilot®. The system is designed to provide real-time prostate tumour localization before treatment and tracking during radiotherapy, without use of ionizing radiation. The aim of this investigation is to evaluate the localization accuracy of the Ray Pilot® system compared with Cone-Beam CT, Elekta's Synergy XVI.

## Methods and materials

To investigate the accuracy of the RayPilot® and Cone-Beam CT a prostate phantom was made of tissue equivalent material with three gold markers placed similarly to the clinical practice. The RayPilot® transmitter was inserted between the gold markers. The phantom was mounted on a jig which could be moved in the x, y and z direction with the precision of 0,1 mm. This equipment was placed on the RayPilot® receiving sensor plate on the treatment table. Numerous controlled movements were executed on the phantom and the readout of the RayPilot® system and Cone Beam CT was detected simultaneously.

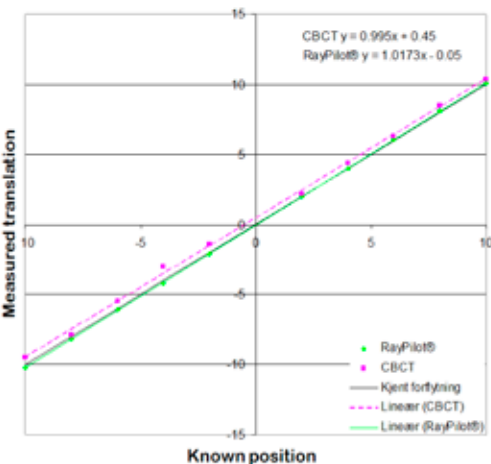


## Results

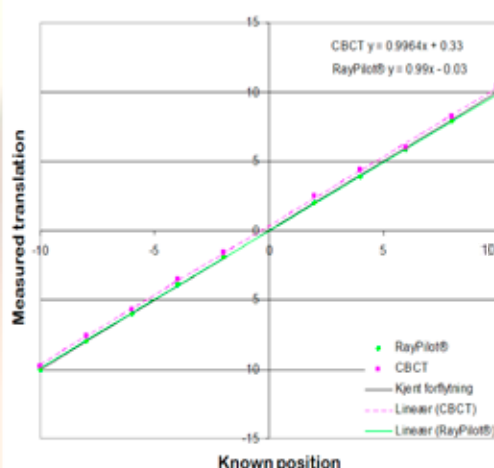
Both systems show sub millimetres accuracy but the Cone-Beam CT seems to overestimate the translation in the positive direction and underestimate it in the negative direction. The RayPilot® system had a higher precision than the Cone Beam CT with the lowest SD in all directions, 0.2 and 0.34 respectively.

Translation	Movement	CBCT	RayPilot®
Vertical	10.0mm	10.1mm	9.6mm
Vertical	10.0mm	9.8mm	10.0mm
Vertical	10.0mm	10.4mm	10.1mm
Vertical	10.0mm	10.6mm	9.8mm
Vertical	10.0mm	9.9mm	10.0mm
<b>Mean</b>		10.16mm	9.9mm
<b>SD</b>		0.34	0.2
<b>Median</b>		10.1mm	10.0mm

Longitudinal translation



Lateral translation



## Conclusion

The results indicate that the RayPilot® system is an accurate and precise tool to detect the prostate position during the course of radiotherapy and can be a beneficial tool to detect the prostate position during external beam delivering in real time.