

# Interpretation of pre-treatment verification results with respect to patient anatomy

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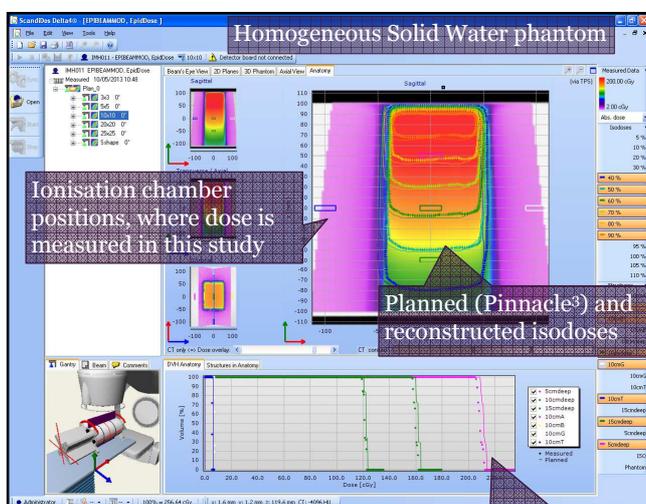
## Introduction

- Occasionally, pre-treatment verification shows a discrepancy between planned dose and measured dose. In these cases it is helpful to interpret the differences with respect to the patient anatomy, to provide an estimation of what dose the patient is likely to receive.
- The Delta<sup>4</sup> anatomy module (ScandiDos, Uppsala, Sweden) determines beam fluence from pre-treatment verification measurements in the Delta<sup>4</sup> phantom and then calculates the corresponding dose in the patient anatomy by means of a pencil-beam algorithm.
- This study evaluates the basic characteristics of the anatomy module using phantom measurements.

## Method

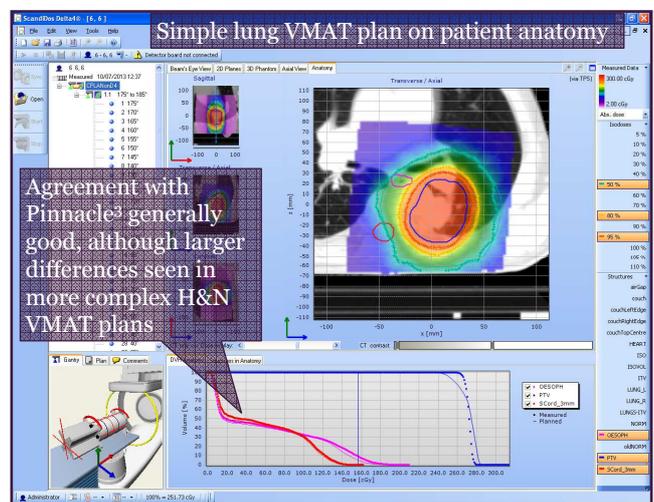
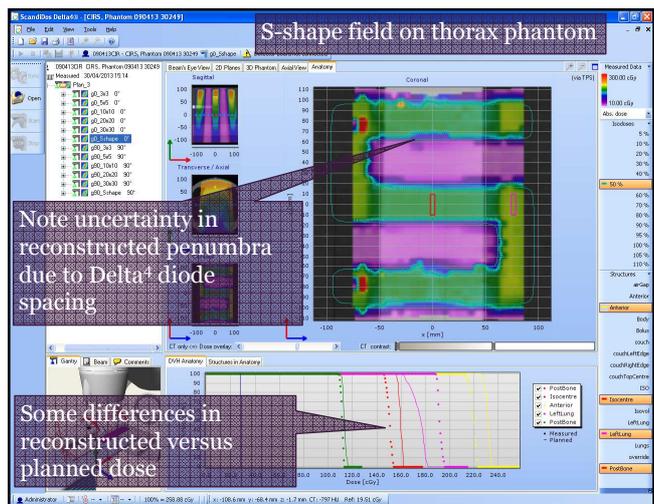
- Simple and irregularly-shaped beams were delivered to a homogeneous Solid Water phantom and a thoracic phantom and the dose was measured using a 0.6 cm<sup>3</sup> ionisation chamber.
- The beams were then delivered to the Delta<sup>4</sup> phantom and the anatomy module was used to reconstruct the dose in the Solid Water and thoracic phantoms. Measured and reconstructed doses were then compared.

## Results



DVHs for planned and reconstructed dose. In this study, reconstructed dose is compared with dose measured at specific points with an ionisation chamber

## Results (continued)



- The anatomy module was clear and intuitive to use.
- Mean differences between measured and reconstructed doses were  $2.1\% \pm 2.6\%$  (1 SD) in the homogeneous Solid Water phantom and  $0.6\% \pm 7.5\%$  in the thoracic phantom, with the largest errors being for small fields in low-density material.
- Spatial differences between isodoses calculated by the treatment planning system and reconstructed by the anatomy module of up to 10 mm were also observed under some conditions due to the finite resolution of the Delta<sup>4</sup> measurements.

## Conclusions

- Interpreting the delivered dose with respect to the patient anatomy may introduce uncertainties which are at least as large as those present in the original dose calculated by the treatment planning system. However, provided the uncertainties are understood, the anatomy module within Delta<sup>4</sup> is capable of providing useful information regarding patient dose.

## Further information

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