INTRODUCTION

Advanced techniques such as gated radiotherapy and Single Arc IMAT present additional challenges for quality assurance. Delta4 (Scandidos AB) is particularly suited to dealing with these challenges. We have used it successfully to assess the accuracy of RapidArc™ treatment on a Varian Clinac® and have designed a moving platform to allow its use to monitor the effect of movement on treatment accuracy.

METHOD

The phantom allows the effect of delivering a step and shoot IMRT beam to a moving target to be assessed. A simple 3 field IMRT plan was created to a small peripheral lung tumour. The phantom was programmed to move in the same way as the tumour based on 4D CT scan data. Figure 2 shows the measured results. The gamma index (i.e. the percentage of diodes for which the dose was within 3% or 3mm of the expected dose) was not significantly worse when the movement amplitude was 7mm although there was an increase in the number of diodes differing by >5%. For 20mm movement the treatment would not have been acceptable.

RESULTS

Measurement of Movement

A RapidArc treatment plan for a head and neck patient was calculated using the Varian Eclipse planning system. This plan was for a complete 360° rotation and is shown in Figure 2.

DISCUSSION

The results presented here show the potential that a 3D diode array provides for the QA of complex radiotherapy treatments. It must be emphasised that this work is at an early stage of development. When agreement is good QA with Delta4 is a rapid process allowing several individual patient measurements to be made with minimal access to the treatment machine. However, the main benefit of the system may be when there are problems that need to be investigated. In these circumstances it becomes possible to investigate the cause of problems in very great detail. The potential to move the phantom also allows investigations to be carried out that are not normally possible with other systems.

CONCLUSIONS

Delta4 has been shown to be a versatile tool for the measurement of complex treatments.

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COMMERCIAL INTEREST

G Nilsson is President and CEO of Scandidos AB.