

Development of a QA procedure for IMRT plans using EBT radiochromic film



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Purpose

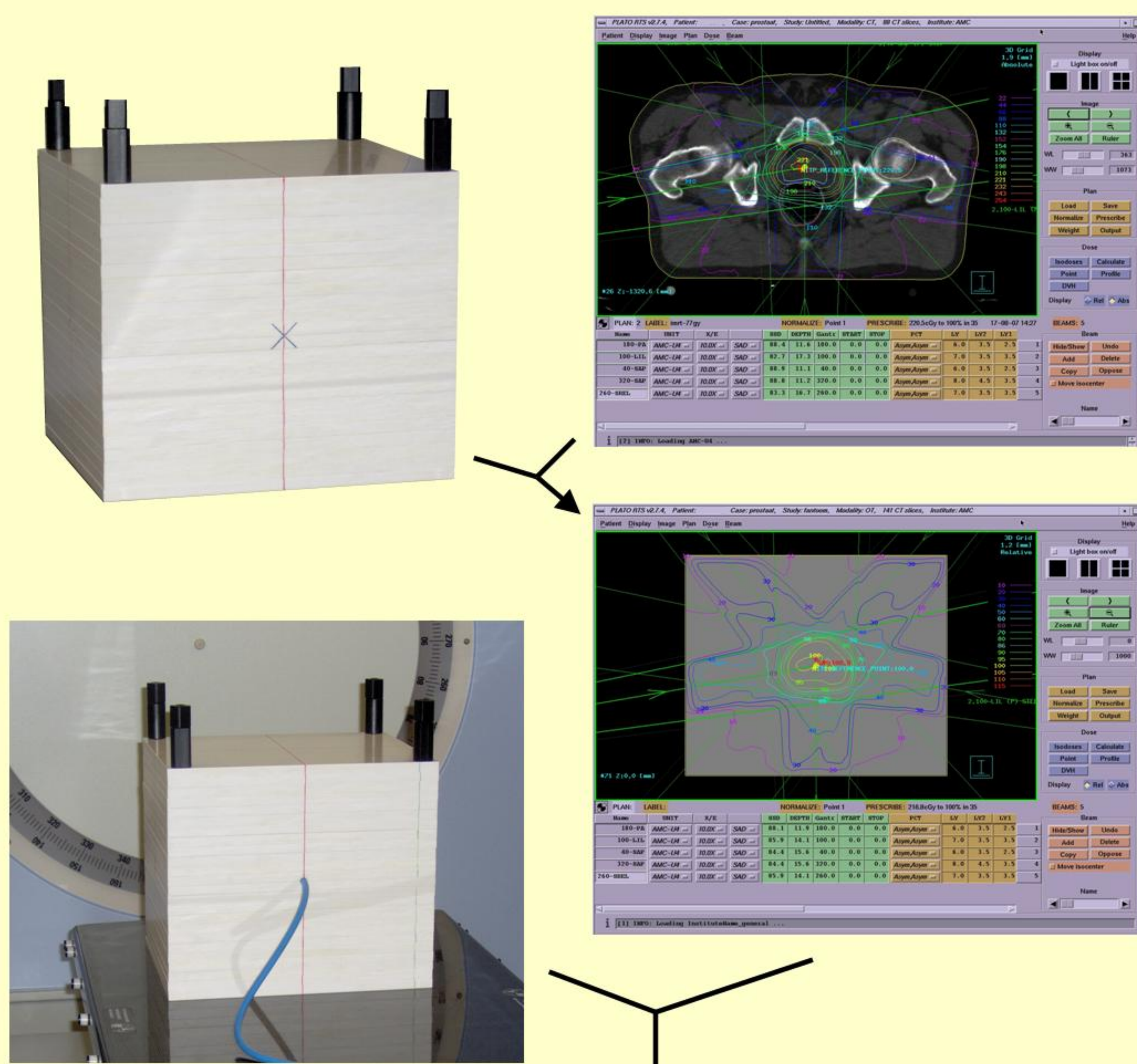
To develop and test a procedure for verification of IMRT plans using radiochromic film, also called GAF film.

Method

For pre-treatment IMRT plan verification a clinical IMRT plan is recalculated (Plato RTS 2.7.4. Nucletron, The Netherlands) on a phantom geometry and compared to measured dose (always composite plan). Absolute dose is verified for a single point using a pinpoint (PP) ionisation chamber (TN31014, PTW Freiburg) positioned at the isocentre. Verification of the dose distribution is performed using GAF film (EBT GAFchromic film, ISP corp., USA) positioned in the coronal plane through the isocentre. A procedure is developed (represented schematically) and tested for 20 cases with prostate cancer receiving a 5-field step and shoot IMRT treatment.

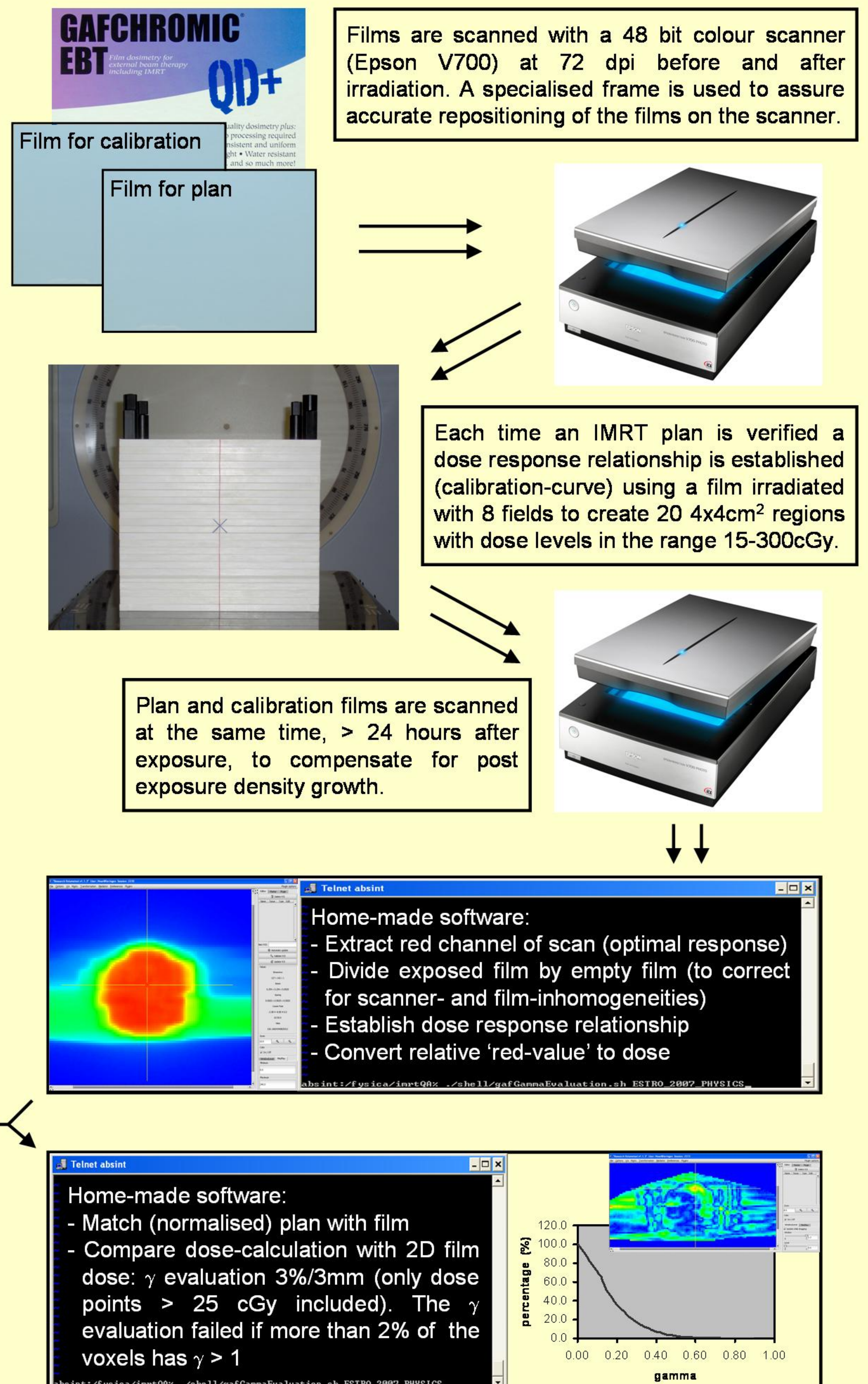
Absolute dose verification: single point

A polystyrene slab phantom, 28x24x24 cm³ wxdxh, was developed with special slabs with inserts for GAF film and PP to ensure a reproducible position within the phantom. The GAF film, 20.3x25.4 cm², is completely encompassed by the phantom as no envelope is needed.



Compare absolute dose: single point

Relative dose verification: 2D



Results

The average of the absolute dose difference is 1.1% and the averaged percentage of voxels with a $\gamma > 1$ is 0.6%. 30% of the patients had a $\gamma < 1$ in all voxels. For 2 patients only the fail criterion of 2% was exceeded (though always below 5%) and the results were further examined. For these plans and some other plans that just met the imposed criterion we saw larger areas with high γ values. It was found that this was not due to the plan, but due to uncertainties in the calibration-curve.

Conclusion

The procedure described in this study is standard in our department for introduction of new IMRT treatments. As the calibration procedure is prone to small errors, it needs to be further optimised.