

Multinational IMRT credentialing by phantom irradiation:

A joint RPC and EORTC ROG Experience

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Objective. For credentialing of a multinational EORTC IMRT head and neck cancer trial, the anthropomorphic head phantom from the Radiological Physics Center (RPC) was used. The phantom's insert contains eight TLDs marking primary and secondary PTVs and one organ at risk (OAR)(Figure 1). GAFchromic dosimetry film is placed through the primary PTV in the axial and sagittal planes. Besides this phantom, institutions were, retrospectively, also requested to irradiate their own in-house phantom using the same plan. Both measurement and calculations for the in-house phantom were sent to the EORTC for analysis. We here present the results as reported by the RPC and of the in-house phantoms as analyzed by the EORTC.

Methods. The standard RPC analysis is based on a $\pm 7\%/4\text{mm}$ criterion. The 4 mm is evaluated on the anterior-posterior axis through the line coinciding the axial and sagittal films in the penumbra region. The 7% criterion is applied to the TLD measurement points in the primary and secondary PTVs. Extra 2D gamma maps were generated for both the RPC and the in-house phantoms using 3%/3mm, 5%/5mm and 7%/4mm criteria. The RPC used in-house software with a rectangular area of interest while EORTC used the RIT113 software from RIT disregarding the dose below 30% of the prescribed dose.

Results. 24 Institutions performed the RPC measurements. 22 of the 24 (92%) passed on their first attempt. Two institutions positioned the phantom incorrectly by 1 cm. One of these institutions repeated the test and then passed. The RPC gamma analysis showed that the same pass/fail results could have been realized if a 7%/4mm 2D gamma criterion was used with a 70% pixel pass rate for the sagittal plane and 90% for the axial plane. With a 85% sagittal pass rate, 3 more sites would not have passed.

The in-house phantom test was performed at 18 institutions. However, only 7 sites uploaded a complete dataset suitable for evaluation. Datasets from the tomotherapy TPS or from the Delta4 phantom could not be evaluated with the RIT software. The pass rates of the RPC

gamma maps and the generated in-house phantom gamma maps differed, on average, by 2%, 1% and 2% for the 3%/3mm, 5%/5mm and 7%/4mm pass rate criteria, respectively.

Conclusions. 22 out of 24 EORTC institutions passed the IMRT phantom test of the RPC on the first attempt. The in-house phantom results were similar to the RPC results. Since the number of sites for which the in-house phantom data could be analyzed was limited, this procedure needs to be investigated further.

Keywords: EORTC IMRT credentialing, clinical trials, RPC phantom, virtual phantom,

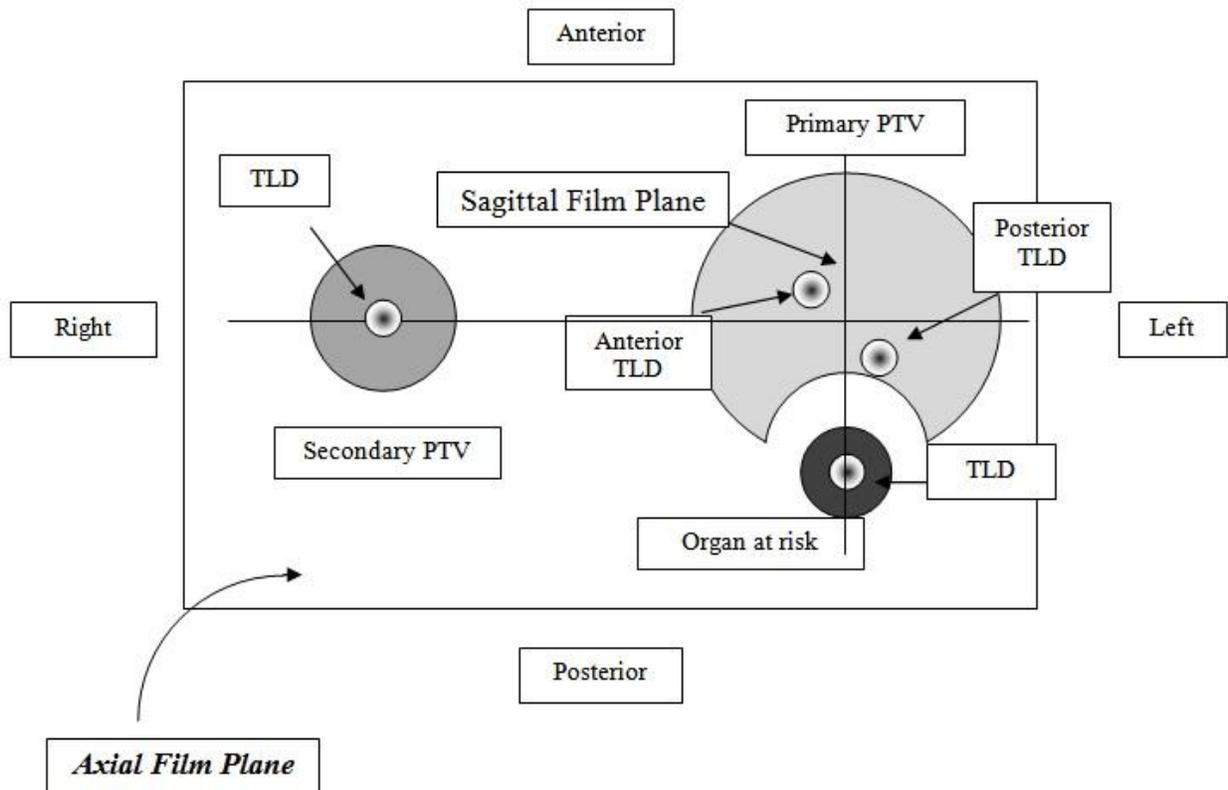
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Figure 1. Cross-sectional view of the insert in the axial film plane.



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1 figure, table or illustration is allowed

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