perspex phantom either at the centre of the field or in a region of least dose gradient.
All portal dosimetry fields have been within ±3% of their prediction in CU which has been confirmed by ion chamber measurements also within ±3 % of expected values.
Gamma analysis of the portal dosimetry fluences using constraints of 3% and 3mm has shown good agreement. Results of the 2D array fluences also show good agreement except for some individual points at the edges of the fields or in regions of high dose gradient. These are due to limitations of the resolution of the array.
The time taken for portal dosimetry QA on the linac is of the order of 10 minutes for a typical 5-field IMRT plan. Analysis of the images can be done remotely in approx 1 hr. This compares very favourably with 3-4 hours traditionally quoted for conventional ion chamber and film based verification.
Portal dosimetry has been investigated as a verification tool for IMRT patient QA. Comparison with IMRT fluences measured independently together with ion chamber measurements has confirmed the acceptability of portal dosimetry. Using portal dosimetry results in a significant reduction in patient QA machine time.

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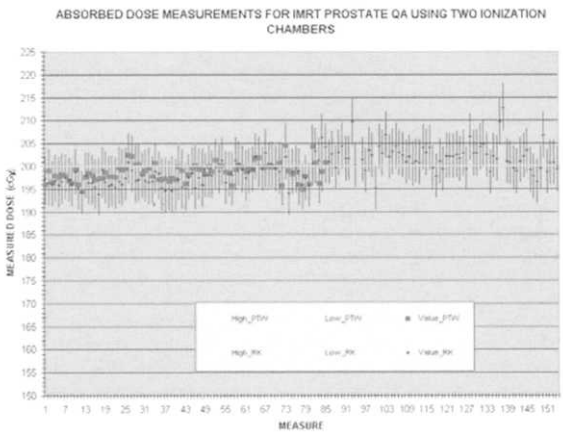
Comparison of two ionization chamber used absolute dose for intensity modulated radiotherapy of prostate quality assurance

P.J. Cecilio[1], J. Da Cruz[1], L. Rodrigues[2], A. Santos[1], L. Martins[1], L. Caprioglio[1]
[1]Albert Einstein Hospital, Radiation Therapy, Sao Paulo, Brazil 2Instituto de Pesquisas Energéticas e Nucleares, Dosimetry, Sao Paulo, Brazil

Introduction: The use of intensity modulated radiotherapy (IMRT) for patients with prostate cancer treated at Albert Einstein Hospital-SP, started in August 2001. As a treatment planning quality assurance (QA) all plans were validated by ionization chamber (IC) and film dosimetry in a phantom before the course of the radiotherapy.
Objective: The present work will analyze the results of measured and calculated absolute doses for 100 prostate IMRT plans using two different ICs models and volumes.
Description - The patients plan parameters are exported to a CT scanned phantom with the IC centralized in the field central axis at 10.0cm depth in the phantom. The normalized dose was in the median dose inside the IC volume. During 3 years 249 prostate plans were checked in terms of absolute dose at central axis, for 100 cases were used two ICs, PTW23333 (0.6cc) and Skanditronix-RK083 (0.12cc). The absolute dose was measured according to the IAEA-TRS-398 protocol. The expected deviation was calculated in terms of minimum square law. The prescription dose and dose per fraction for each field were compared to the dose calculated from treatment planning system (TPS). As a maximum reference deviation between any individual field or total absorbed measured dose and calculated dose we addoted 5%. If this value was reached, a new set of measurement or a new optimization plan was performed.
Results: The average and the maximum deviation of the measurements were 198.82cGy ± 2.28% for PTW23333 and 199.74cGy ± 2.45% for RK083 (both with prescription dose of 200cGy. When the measured and TPS dose were compared the maximum deviation resulted in 3.23% and average 0.93% for PTW23333. For RK083 was 3.15% and 1.36.



Conclusion: The absolute absorbed dose measurement for IMRT is necessary for plan approval of the treatment to verify the individual fluencies generated from inverse planning optimization. The use of regular clinical ICs and solid-water phantom is satisfactory for prostate IMRT dosimetry. The prostate IMRT fields have sufficient geometry and low gradient to use the ICs of 0.6cc or 0.12cc volumes. For measurements in small fields or high gradient dose regions, ICs with smaller volumes are recommended.

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The value of radiochromic film for IMRT verification in a head-and-neck phantom

C. De Wagter, L. Paelinck, S. Gillis
Ghent University, Dept. of Radiotherapy, Gent, Belgium

Experimental assessment of the total dose distribution delivered to an anthropomorphic phantom is the ultimate QA test for the planning and delivery chain of IMRT. Verification can be achieved by comparing the delivered (measured in the phantom) dose distribution to the aimed (computed for the phantom) distribution. 3D gel dosimetry is complicated and not readily available. A series of films sandwiched in a slab phantom is a practical alternative.
Radiographic film has two major disadvantages:
1. The transverse placement of the films in the phantom means - in case of a coplanar beam setup – that the films are oriented parallel to the central beam axis. This implies a depth-dependent and field-size-dependent dose response. The effect of film orientation has been investigated by many researchers but there is a significant variation in results and interpretation. Since IMRT contains multidirectional fields of various sizes, the film-measured data cannot be compensated for depth and field-size dependences.
2. Differential attenuation effects by protruding film parts as the film ready-pack size is fixed.

Radiochromic film offers following advantages:
1. Radiochromic film is basically much more soft-tissue equivalent, and has a flat dose energy response, eliminating the disadvantages 1 of radiographic film. In addition, the use of radiochromic film has been shown to enable dose measurements near interfaces. Finally, radiochromic films themselves do not perturb dose distributions absorbed in soft-tissue equivalent media and can be sandwiched closely together within a slab phantom.
2. Radiochromic film is not particularly light sensitive and can be trimmed in shape to the local contour of the phantom, hence removing above mentioned disadvantage 2.
3. The films are self-developing and do not need a chemical developing process, which, under pressure of environmental regulations, might be banned from most