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Evaluation of dosimetric controls for patients treated with IMRT for a prostate cancer

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Purpose : The aim of this study was to analyse our pre-treatment verification of intensity modulated radiation therapy (IMRT) treatment plans for prostate cancer in order to establish a clinical action level.

Materials and methods : Pre-treatment verification was performed for 100 fields from 20 patients treated for localised prostate cancer and 196 fields from 20 patients treated for high risk prostate cancer : Absolute measurements were performed at high dose/low gradient zone for individual beams and for all beams using flat and cylindrical phantom, respectively. Indeed, planar dose distributions were measured using electronic portal imaging devices (EPID) and ionisation chamber array. Agreement of planar (measured and calculated) dose distributions were evaluated using gamma index set at 3% and 3mm. Two gamma scaling parameters, percentage of points with a gamma value lower than 1.0 ($\gamma_{%<1}$) and average gamma (γ_{avg}) were calculated for each fields.

Results : Correlation between absolute dose measurement performed for individual beams and for all beams with maximum difference of 2% and 3.6% respectively. The mean values of ($\gamma_{%<1}$) and γ_{avg} calculated using (EPID) and ionisation chamber array were depicted in table 1.

Conclusion : Using our findings, we set an acceptance criteria of ($\gamma_{avg}<0.5$) and ($\gamma_{%<1}$) better than 95% for planar dose comparison using EPID, as well as, absolute field by field dose comparison using flat phantom must be lower than 2%. This approach is fast and reliable comparatively to the use of ionisation chamber array or absolute composite measurements for pre-treatment verification.

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