Application of spherical diodes for megavoltage photon beams dosimetry
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Small and modulated field dosimetry is an active research area in modern radiotherapy. Current detectors perturb the measurements due to their finite volume and lack of water equivalence. The selection of an appropriate detector can result in a difficult task, and usually several detectors are used to achieve a correct dose characterization. The development of new dosimetry approaches and detectors is now a key point. High sensitivity and good spatial resolution are required in any detector for this purpose. Spherical diodes of 1.8 mm in diameter have been studied to assess their ability to perform dosimetric measurements in radiotherapy high energy photon beams. The diodes were designed for the visible light energy spectrum but they have shown a good response in brachytherapy energies (20–30 keV). In this work they have been used to measure total scatter factors for large and small fields (between 2 cm × 2 cm and 18 cm × 18 cm), comparing the results for the same setup measured with several ionization chambers and planar diodes commercially available. A study about the change in diode response with the previous irradiation, its angular response, and the possibility of correcting the overresponse to low energy scattered photons in large fields by a metallic shielding layer was also done. Results show the feasibility of the spherical diode for relative dose measurements, especially for small and modulated fields. Due to its high homogeneity in angular response compared to other detectors, they can be employed for arc irradiations. They are also good candidates for in vivo dosimetry.

http://dx.doi.org/10.1016/j.rpor.2013.03.600

Application of the technique in forward-planned multisegments pelvis tumors
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Introduction. A Forward-planned multi segments technique (FPMS) is an alternative for situations when IMRT cannot be applied, due to availability or to medical constrains. We believe this technique, applied by Lee for “head and neck” tumours, can be applied to other areas, i.e. pelvic area, when reducing to the maximum the dosage in the intestine is critical. We are presenting the results of a patient with endometrial carcinoma and previous history of peritoneal adhesion, where it was essential to reduce the dosage in the intestine.

Material and methodology. To perform this technique, the outline of the nodal volumes is done using Small and col guidelines.

Results. The dose in CTV is FPMS: V50 99.2% vs box: 98.1%. PTV: 47.50 99.2% vs 99.97%. On bowel for FPTS DM: 32.68 Gy y box: 39.39 Gy. The following cc were covered in each box. V Box FPTS DIFERENCIA V10 491,6 480,8 10,8 cc V20 458,5 419,2 39,3 cc V30 415,5 326,4 89,1 cc V40 302,5 197,5 105 cc V50 233,2 58,1 175,1 cc There is a bigger advantage for higher levels of dosage. The dose in CTV is FPMS: V50 99.2% vs box: 98.1%. PTV: 47.50 99.2% vs 99.97%. On bowel for FPTS DM: 32.68 Gy y box: 39.39 Gy. The following cc were covered in each box. V Box FPTS DIFERENCIA V10 491,6 480,8 10,8 cc V20 458,5 419,2 39,3 cc V30 415,5 326,4 89,1 cc V40 302,5 197,5 105 cc V50 233,2 58,1 175,1 cc There is a bigger advantage for higher levels of dosage. On bowel for FPTS DM: 32.68 Gy y box: 39.39 Gy. The following cc were covered in each box. V Box FPTS DIFERENCIA V10 491,6 480,8 10,8 cc V20 458,5 419,2 39,3 cc V30 415,5 326,4 89,1 cc V40 302,5 197,5 105 cc V50 233,2 58,1 175,1 cc There is a bigger advantage for higher levels of dosage.

http://dx.doi.org/10.1016/j.rpor.2013.03.601

CTV to PTV margin estimated with CBCT IGRT
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Introduction and objectives. Imaged guided radiotherapy (IGRT) allows us to measure and correct the setup patient’s errors. In this paper we estimate our margins for different locations based on the cone beam (CBCT) off line protocol patient corrections.

Methods. At our institution patient are treated in two Oncor Expression linacs (Siemens) with megavoltage CBCT based IGRT. We analyze 474 patients with a total of 4821 CBCT, and classified the CBCT by tumor location: thorax, rectum, prostate, head & neck, gynecological, abdomen. CTV to PTV margin is calculated from the random and systematic errors based on measurements in a population of patients for each location, and these are estimated from the CBCT corrections performed in each patient (Sp). The SD of the means per patient is an estimator for the random error, σ = raiz(Σi/(N−1)p). The root mean square of the SD’s of all patients patient is an estimator for the random error, σ = raiz(Σi/(N−1)p). The root mean square of the SD’s of all patients patient is an estimator for the random error, σ = raiz(Σi/(N−1)p). The root mean square of the SD’s of all patients patient is an estimator for the random error, σ = raiz(Σi/(N−1)p). The root mean square of the SD’s of all patients patient is an estimator for the random error, σ = raiz(Σi/(N−1)p). The root mean square of the SD’s of all patients patient is an estimator for the random error, σ = raiz(Σi/(N−1)p).

Results. and discussion CTV to PTV margin is calculated using Van Herk formula, Margin = 2.5(SD(Si)p). The margins obtained in mm for each location (lateral, longitudinal, vertical) are: thorax (8, 7, 6), rectum (5, 5, 7), prostate (5, 4, 5), head&neck (5, 4, 4),...
Dosimetric comparison in cervical cancer with different therapeutic modalities

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Introduction. Cervical cancer is usually treated with RC3D and in supine position, and generally the bowel is not contoured in exclusive pelvic irradiation cases.1 In our center we would like to verify what is the dose that bowel receives in these cases and whether the patient positioning or the irradiation technique influence the distribution of the dose-volume histogram.

Materials and method. We present a cervical cancer IIb in supine position planning with RC3D and VMAT® techniques and in prone position with RC3D. VMAT® plan in supine position was carried out by MONACO 3.10.02 version. This plan consisted in a single 360° arc with 6 MV. RC3D plans in supine and prone position were carried out by XiO® 4.6.4 version with three treatment fields with 15 MV: 0° field and two lateral opposed fields.2

Results. All treatment plans had to satisfy ICRU-62 conditions, such that 99% of the PTV volume receives at least 95% of the prescribed dose of 46 Gy to pelvic volume and 54 Gy to boost volume. Hot spots up to 107% of the prescribed dose were allowed and OaR’s were evaluated with tolerances recommended by QUANTEC.3 The PTV has a very similar dosimetric behavior in the three plans carried out.4 The average dose of the PTV with VMAT® planning was 54.87 Gy for the supine position and it was 55.68 Gy and 55.64 Gy respectively for prone position. The PTV volume that receives doses greater than 107% of the prescription dose was less than 1% in three plans. The dosimetric analysis in small bowel showed a decrease of the V10, V20 and V30, V40 in favor of the prone position. Being this difference of a 35.2% for the V10, 41.5% for the V20, 43.2 the V30 and a 43.2% for the V40. A small dose difference between supine position of VMAT and RC3D was calculated for V20, V30 and V40 and it was 2.9%, 8.7% and 13.5% respectively.

Conclusion. In view of the results RC3D planning in prone position gets a better dosimetric distribution in PTV’s and organs at risk than VMAT® treatment in supine position, so we will initiate a prospective study about in these patients.

REFERENCES


Evaluation of the integral dose peripheral dose in healthy tissue of radiotherapy treatments for prostate cancer

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Introduction and objectives. Treatment with external radiotherapy CP can be performed with three techniques: 3DCRT, IMRT and VMAT® planning VMAT recently. Objective is to compare these techniques to evaluate the healthy tissue dose, defined as the total volume minus that planning sets the volume (PTV).

Methods. We selected 32 patients, 19 with CP low risk, 13 surgical bed. The TC supine position, full bladder and rectum empty. Prostates prescription dose 76 Gy and 66 in the beds. Each patient underwent three different schedules in Pinnacle planner version 9.1. Elekta Synergy accelerator, 6 MV photons. Planning 3DCRT in 5 fields (0°, 90°, 135°, 225° and 270°) IMRT inverse 7 fields, (0°, 50°, 90°, 130°, 230°, 270° and 310°), VMAT full arc. Integral dose was evaluated as the product of the volume in cm3 of