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Rectal in-vivo dosimetry in fractionated brachytherapy of cervix cancer with HDR-Fletcher-Applicator (HDR-FA)

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Purpose: In brachytherapy (BT) of cervix carcinoma with HDR-FA, a fractionated dose schedule was derived from the LDR-based Fletcher System by division of LDR-doses into 3 fractions on 3 consecutive days. Since the dose to the rectum is a limiting factor in total dose prescription, in-vivo dosimetry was performed for each session. We tested the accuracy and reliability of rectal in-vivo measurements in fractionated HDR-brachytherapy.

Methods: In 47 patients, rectal doses were measured during 3 insertions/patient by a semiconductor detector with five diodes (Type: AM6, PTW-Freiburg) up to a total of 141 applications. All applications were documented on radiographs. We tried to place the detector in the anterior rectum, with at least one of the diodes' positions close to the applicator. The maximum measured dose/fraction was considered to be the representative rectal dose. We analysed the reproducibility of the measured doses to the rectum by comparing the 3 values for each patient.

Results: Within three consecutive fractions, the measured rectal doses showed deviations up to 61%, with less than 10% in only 45% of the applications.

Deviation [%]	−50	−40	−30	−20	−10	0	+10	+20	+30	+40	+50	>50
Frequency [%]	<1	4.2	7.1	9.2	13.2	23	8.5	8.0	11.0	5.7	4.9	3.5

Conclusion: In fractionated HDR brachytherapy of cervix cancer, the calculation of cumulative rectal doses by a single in-vivo measurement bears the risk of clinically relevant underestimations. In-vivo dosimetry is recommended for each insertion.

319 POSTER DISCUSSION

The use of an immobilisation system in the treatment of prostate cancer with conformal radiotherapy – A prospective randomised trial

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Purpose: To evaluate the impact of a customised immobilisation system on accuracy, treatment times, radiographer convenience, and patient acceptability.

Patients and Methods: 30 men recieving radical radiotherapy for prostate cancer were randomised using a cross over trial design to have radiotherapy planning and treatment given either in a conventional treatment position (CTP) or using an immobilisation system (IMS). The randomisation was to have the CTP or the IMS for the initial 3 weeks of treatment after which patients were replanned and changed to the alternative treatment setup. Treatment accuracy was measured using an electronic portal imaging device. Radiographers and patients completed weekly questionaires.

Results: Median isocenter displacement for anterior fields was 1.70 mm from the simulated isocenter for the CTP compared to 2.06 mm for IMS ($p = 0.07$). For lateral fields values were 1.80 mm and 1.77 mm ($p = 0.98$).

Median treatment time was 9 minutes for CTP, and 10 minutes for IMS ($p < 0.001$).

Ten of the 14 patients who expressed a preference reported IMS to be more comfortable than CTP. Radiographers reported greater difficulty in positioning 23 of the men using the IMS and in 18 there was increased difficulty aligning skin tattoos.

Conclusions: Although the IMS was preferred by patients because of its comfort, the system failed to improve treatment accuracy, took longer and patient set-up was more difficult.

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Treatment of malignant pericardial effusion with 32P-colloid

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Purpose: Malignant pericardial effusion is usually treated only when signs of cardiac tamponade develop. Several methods of treatment have been reported with an overall response rate of approximately 75%. Since our initial study (Firusian 1980) using intrapericardial 32P-colloid instillation as a treatment modality for pericardial effusion demonstrated a significant higher response rate, this study was conducted to further evaluate the efficacy of intrapericardial 32P-colloid in terms of response rates and duration of remissions.

Methods: The patients treated comprised: breast cancer (23), lung cancer (8), other cancers (5). All patients had multimodal treatment including chemotherapy and external radiotherapy. Prior to 32P-colloid application the pericardial effusion was removed completely. A single dose of 32P-colloid (5 mCi) was administered in 21 patients via an intrapericardial catheter. In 14 patients, two injections of 32P-colloid within two weeks were necessary due to rapid fluid formation.

Results: Intrapericardial instillation of 5–10 mCi 32P-colloid in 36 patients with malignant pericardial effusion resulted in a complete remission rate of 94.5% (34 patients) whereas 2 patients did not respond to treatment due to a foudroyant formation of pericardial fluid. The mean duration time of response was 8 months. No side effects were observed.

Conclusions: These results suggest that intrapericardial instillation of 32P-colloid is a simple, reliable and safe treatment strategy for patients with malignant pericardial effusions. Therefore, since further evidence is provided that 32P-colloid is significantly more effective than external radiation or non-radioactive sclerosing agents, this treatment modality should be considered for the management of pericardial effusion.

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Stereotactic irradiation of uveal melanoma at a 6 MV-linear accelerator – Technical considerations concerning movement verification by video recording

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Purpose: To investigate a reproducible stereotactic method using non invasive eye fixation techniques of irradiation at a 6 MV-LINAC to treat uveal melanoma.

Method: Modification of the standard fixation mask system (BrainLAB) and direct mounting of a light source at the mask system in front of the healthy eye, allow immobilization of the globe without invasive intervention. Globe movement is controlled during irradiation with a mini-video-camera installed in front of the treated eye. Immobilization of the bulbus is verified by observation and video recording. Video tapes are analyzed by performing image fusion and evaluation of movement range. CT scans are repeated during therapy and compared digitally.

Results: Analysis of video tapes of 20 patients showed a median vertical deviation of the pupil of 0.3 mm (range 0 to 1.2 mm) and median horizontal deviation of 0.2 mm (range 0 to 1.2 mm). The analysis of 20 control CTs showed a median rostral-occipital deviation of 0.78 mm (range 0 to 1.56 mm). The median horizontal deviation was 0.4 mm (range 0 to 2.1 mm).

Conclusion: Stereotactic irradiation of uveal melanoma with a modified stereo-tactic mask system at a LINAC is feasible. Glass fiber light source allows high precise fixation. Standard hard- and software offer movement documentation during treatment and allow interruption if necessary.

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Comparison of radiation therapy planning for proton- and photon treatment of pediatric Wilms' tumors

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Purpose: We compared Proton Radiation Therapy (PRT) with a standard photon plan in two patients, treated either for microscopic disease or positive resection margins requiring different volume coverage and radiation doses.

Methods: Two patients underwent postnephrectomy PRT for Stage III (favorable histology, age 2 years) and Stage IV (anaplastic histology, age 3 years) Wilms' tumor. Both patients received a dose of 10.8 Cobalt Gray Equivalent (CGE) at 1.8 CGE per fraction to a clinical target volume, followed by a boost dose of 10.8 CGE in the second patient. Posterior and posterior oblique proton fields were utilized and compared with standard anterior-posterior photon approaches using the same 3D planning system. Dose volume histograms were obtained for all target and non-target structures.

Results: The target volumes were encompassed by the 95%-isodose volume with both radiation techniques. Average volumes of all isodoses