cycles). In order to estimate the entity of dose reduction, we compared for every patient INRT dose distribution profiles in different organs with dose profiles of classic involved fields, as if patients were treated outside the trial, and with mantle field as "historical" example of extended fields approach. All patients had mediastinal involvement in at least one nodal station at diagnosis, 4/5 patients had supraclavicular involvement and 3 middle-upper neck involvement. No axillary localizations were present. INRT fields were contoured following EORTC guidelines specifically designed for H10 trial (Girinsky et al, 2007–2008). A classic AP-PA parallel opposing fields technique with personalized shaped blocks was employed. Organs at risk were: breast (bilateral, as a whole organ), lung (bilateral, as a whole organ), thyroid gland, coronary arteries (origin). Breasts were considered at risk only in female patients (4/5). Mean dose and dose received by 50% of the volume (D50) were selected as parameters for comparison for every organ and calculated separately, then average values were taken into account for final comparison.
Results: Average dose reductions (expressed in percentage for mean dose and for D50) for breast, lung, thyroid gland and coronary arteries are shown in table I.

Table I

	Dose reduction	
	INRT vs. IFRT	INRT vs. MF
Breast:		
Mean dose	57.1%	57.3%
D50	44.1%	73.5%
Lung:		
Mean dose	38.8%	58.2%
D50	65.5%	88%
Thyroid gland:		
Mean dose	25.6%	41.5%
D50	9.1%	30%
Coronary artery:		
Mean dose	2.2%	22.2%
D50	1%	21%

Conclusions: As preliminary findings, our data suggest that for breast and lung a clear advantage in terms of global dose reduction is evident with INRT if compared with IFRT (and intuitively greater if compared with a traditional mantle field approach). The potential benefit for thyroid gland and coronary arteries sparing is not so evident, and has to be evaluated prospectively in a larger series. In order to spare these central structures, probably a different technical approach including IMRT and various IGRT options for thoracic radiotherapy is needed.

2026 POSTER

Response of melanocytes to low doses of fractionated radiotherapy

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Background: Low doses of ionizing radiation will inhibit cell division of the basal kreatinocytes of human epidermis, and reduce the ability to maintain the normal amount of cells in the germinal cell layer. Previously a hypersensitivity to doses below 0.3 Gy was determined by our group for DNA double-strand breaks, growth arrest and apoptosis throughout a treatment course of 7 weeks. The aim of this study is to determine the melanocyte response by molecular markers to daily low doses of radiation and to establish whether hyper-radiosensitivity also occurs for this cell type.
Material and Methods: Skin punch biopsies from 33 patients treated for prostate cancer with radiotherapy were used. Sampling of biopsies for each patient was performed before treatment and after 1 or 6.5 weeks into the radiotherapy course. The daily doses per fraction were about 0.1, 0.2, 0.45 and 1.1 Gy at the different areas of the exposed skin where biopsies were taken. The number of melanocytes per mm of the basal membrane was determined using immunohistochemical staining with eosin-PAS, ΔNP63-negative, MITF and Bcl-2. Three paraffined sections from each biopsy were assessed for every marker. The dose-response relationships were determined from the mean values of each staining versus fraction size.
Results: Both after 1 week and 6.5 weeks of radiotherapy an increase in the numbers of eosin-PAS, MITF and Bcl-2 stained melanocytes were observed. Small fraction doses of 0.04 Gy had a trigger effect, causing the melanocytes to reveal a more distinct morphology in eosin-PAS and express higher levels of MITF and Bcl-2. The number of ΔNP63-negative cells was constant, and independent of fraction size.
Conclusions: Melanocytes are radioresistant to low doses of radiotherapy over 7 weeks. Several molecular markers indicate an induced radioresistance. An effective DNA damage response of melanocytes preserves their cell number intact.

2027 POSTER

4D FDG-PET/CT combined with diffusion weighted MRI for planning of stereotactic radiation therapy of liver metastasis

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Background: Stereotactic radiotherapy is a highly effective method for treatment of liver metastasis in not operable patients. Although MRI and CT are standard imaging modalities for therapy planning, it is frequently difficult to define an exact target volume based on these methods. PET and diffusion weighted MRI (DWMRI) may help to improve the accuracy of target volumes. Aim of this study was to investigate feasibility and value of coregistration of respiratory gated PET-CT in treatment position and DWMRI.
Methods: 11 patients assigned to stereotactic body radiation therapy of liver metastases were examined by standard planning contrast enhanced CT and MRI scans, 4D FDG-PET/CT using respiratory gated PET and CT in treatment position and by diffusion weighted MR sequences. DWMRI data was acquired in breath hold (end-expiration). Immobilization for image acquisition (CT, PET-CT) and treatment was carried out in a vacuum couch with a low-pressure foil as used for regular SBRT. The different imaging studies were fused on a BrainLab workstation (iPlan net). The quality of the fusion was rated on a scale from 1 (very good) to 5 (bad). Gross tumor volumes were defined using conventional morphological imaging (CT, T1 and T2 weighted MRI) (Vcon), visual PET information (Vpet) and all modalities combined (Vcom). A composite volume from all different GTV was then created.
Results: 15 lesions were identified, in 2 patients the diagnosis of liver metastases was not confirmed in FDG-PET. Optimal fusion could only be achieved in 20% of the patients. The tumor volumes differed significantly when contoured in contrast-enhanced CT or MR compared to FDG-PET. The mean Vcon was 40 ccm while the mean Vpet and Vcomb were 59 and 89 ccm respectively. Difference of the volumes were up to a factor of 3.5 between Vpet and V con (mean 0.9) and up to a factor of 4.8 between Vcon and V comb (mean 1.8).
Conclusions: Coregistration of imaging modalities due to anatomic colocalisation was most feasible when planning CT and PET-CT in treatment position was used. MRI acquired in end-expiration was difficult to fuse with the other imaging modalities. Using visual information of FDG-PET for GTV-delineation the GTV was significantly enlarged. Prior to decide about target volume adaption (expansion) due to additional information provided by functional MRI or PET quantitative analysis should be performed.

2028 POSTER

Second Cancer after Total Body Irradiation: a retrospective analysis of 773 patients

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Background: To retrospectively evaluate second cancer in a group of children and adults treated with TBI. The database includes late toxicities; this analysis focused on second cancers.
Materials/Methods: Between October 1984 and June 2002, 773 patients received TBI in their conditioning regimens prior to autologous or allogeneic stem cell transplantation (SCT). TBI was performed at the Léon Bérard Cancer Center -France. The median follow-up from TBI was 4 years (range 0–27.4 yrs). The study registers 347 deaths (45%). Among 773 patients, 259 survived longer than 4 years with regular follow-up. Median age of patients at the time of the TBI was 32.4 years (range 0.3−95). Median TBI dose was 1090 cGy (8−12 Gy)/3 fraction (fx)/3 days with 6 MV linear accelerator.
Results: A total of 39 second cancers were recorded with a 2.9 years median time-to-TBI (range 0.5−17.2 yrs). Thirty-three second cancers occurred among the 259 more than 4 years survivors. Second cancer distribution listed 5 haematological malignancies, 3 cutaneous malignancies, 2 brain cancers, 6 gastro-intestinal cancers, 3 head-and-neck