(37–58). Dose per fraction was 2 Gy in the majority of the patients (n = 70). Prior to RT, all patients were tested using a rapid (48 h) apoptosis assay where fresh blood samples were irradiated with 8 Gy X-rays. Lymphocytes were collected and prepared for flow cytometric analysis. Apoptosis was assessed by gradual degradation of DNA (sub-G1 peak on the DNA histogram). Acute (CTC v2.0) and late (RTOG/EORTC) toxicities were graded in all patients. Median follow-up period was 31 months (23–43).
Results: Following in vitro 8 Gy irradiation, median radiation-induced CD8 apoptosis was 20.88% (5.69–57.00%). Radiation-induced CD8 apoptosis significantly predicted grade 2 and 3 late effects. The area under the curve of the receiver-operated characteristic curve (sensitivity versus 1-specificity) of CD8 apoptosis was 0.83. Median time to locoregional relapse was 30 months (1–43 months). There were 13 locoregional relapses among the 37 patients showing CD8 apoptosis below the median compared to 5 of 38 who were above (p = 0.02). Two-year estimated locoregional relapse rate was 31% (95% CI: 17–45%) versus 14% (95% CI: 3–25%), respectively (p = 0.03).
Conclusions: In patients with head and neck cancer treated with definitive or postoperative RT, in vivo apoptotic response of CD8 lymphocytes depends on genetic radiosensitivity, and the tumor follows the same genetic radiosensitivity of normal tissues. However, these findings should be confirmed prospectively, and future dose escalation studies could be stratified using the apoptosis assay.

1392 POSTER

Tolerance and efficacy of high-dose 3D-Conformal Radiation Therapy (CRT) in cirrhotic patients with small hepatocellular carcinomas (HCC) not suitable for curative therapies

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Background: Patients (pts) presenting with small size hepatocellular carcinoma (HCC) benefit from curative therapies (liver transplantation, surgical resection or percutaneous destruction) when others are only candidates for palliative options. Although conventional external radiotherapy is regarded as little efficient and potentially toxic in cirrhotic pts, 3D-conformal RT (CRT) for single HCC nodules demonstrated promising results.
Methods: Prospective phase 2 trial was conducted in 26 pts with small HCC (1 nodule $\leqslant$5 cm, or 2 nodules $\leqslant$3 cm), Child-Pugh A (15), B (8), 19 males, 7 females, mean age 70 (range 57–88 years), TNM stage I-II, mean tumor size 3.2 cm. The endpoints were the rate of complete tumor response, assessed by contrast-enhanced spiral computed tomography showing disappearance of the arterial contrast enhancement observed on 2 successive examinations at 3 mo interval, and assessment of toxicity, using NCI then RTOG-EORTC scales.66 Gy (2 Gy/fx, 5 D/W) was delivered with CRT, respiratory gating was used for recently enrolled pts. Liver dose-volume histograms (DVH) and normal tissue complication probability (NTCP) values were used to evaluate tolerance of 66 Gy.
Results: Out of the 23 currently evaluable pts, 18 (78%) achieved a complete tumor response, maintained with time (local control), and 5/23 demonstrated no response, after 6 months. 2 pts relapsed on the irradiated tumor bed at 12 and 30 months respectively. No G4 toxicity was observed in 16 Child-Pugh A pts, G3 asymptomatic biochemical toxicity was observed in 2 pts. G4 biochemical toxicity was observed in 2/9 pts, Child-Pugh B (thrombocytopenia, hyperbilirubinemia). Biochemical toxicity G3 was observed in 4 pts. 1 a G3 clinical toxicity (portal hypertensive bleeding), 1 jaundice with edema and ascites at 1 mo.
Conclusion: This phase II trial demonstrate that high Dose 3D-Conformal RT can induce complete tumor response, maintained with time (local control) in 78% of pts, with a good tolerance in cirrhotic pts, especially in Child-Pugh A pts. Nine percent of local relapse have been observed with a 17 months follow-up. This non invasive technique is highly suitable for some central or superior tumor locations, unreachable by percutaneous destruction. The future study will compare percutaneous destruction to 3D-CRT using an accelerated fractionation, in pts presenting with small size HCC. Updated results will be presented at the meeting.

1393 POSTER

Comparison of setup accuracy of two commercially available immobilization systems for the treatment of head and neck tumors using simulation CT imaging

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Objective: To compare the setup accuracy, comfort level, and ease of use of two immobilization systems used in head and neck (H&N) radiotherapy.
Methods: 21 patients undergoing radiation therapy for H&N tumors were consecutively assigned to one of two immobilization devices: a standard thermoplastic head-and-shoulder mask fixed to a carbon fiber base (Type S) or a thermoplastic head mask fixed to the Accufix™ cantilever board equipped with the shoulder depression system. All patients underwent planning CT imaging followed by repeated control CT imaging under simulation conditions during the course of therapy. CT images were subsequently fused and Setup accuracy was examined by recording displacement in the 3 Cartesian planes at 6 anatomical landmarks and calculating 3-D vector errors. In addition, the time required for setup and the comfort of the two systems was surveyed.
Results: A total of 64 CT datasets were analyzed. There was no difference in the Cartesian total displacement errors between the two populations at any landmark considered. Total vector displacement in the Type S arm reached a SD of 1.77, 1.78, 2.25, 4.77, 6.87, and 3.38mm at the odontoid, right styloid, left styloid, C7 spinous process, right and left acromial extremities, respectively. The Accufix™ system respective displacements are 1.26, 1.16, 1.08, 7.54, 5.36, and 2.78mm. Nonetheless, there was a trend towards a smaller population mean systemic error for the upper landmarks as a single group favoring the Accufix™ system. There was no difference in the setup time required and comfort level between the two systems.

Mean Systematic 3D errors in 21 patients treated for head and neck tumors [a]

Immobilization Device	Systematic 3D error (mean ± 1SD, mm)							
	Odontoid	Styloid		C7 Spinous process	Clavicle		Landmarks	
		Right	Left		Right	Left	Upper[b]	Lower[c]
Type S	2.88 ±1.21	2.91 ±1.44	3.57 ±2.06	8.83±3.13	10.04 ±6.07	5.08 ±2.08	3.12 ±1.59	7.98 ±4.52
Accufix™ System	3.00 ±0.96	2.60 ±0.91	2.71 ±0.91	10.21±7.24	8.03 ±5.13	5.65 ±2.37	2.77 ±0.92	7.96 ±5.47

[a] Setup errors were assessed for each anatomical landmark according to the type of device (10 patients for Type S and 11 patients for the Accufix™ System).
[b] Odontoid, right and left styloid.
[c] C7 spinous process, right and left clavicles (acromial extremities).

Conclusions: No significant difference in 3D setup accuracy was identified between the standard thermoplastic head-and-should mask system and the thermoplastic head mask fixed to the Accufix™ system. The study reassures us that our technique provides accurate patient immobilization, allowing us to limit our PTV to <4 mm when treating H&N and base of skull tumors.

1394 POSTER

The impact of half-body irradiation on quality of life of patients with multiple bone metastases

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Background: Half-body irradiation (HBI) is palliative treatment of cancer patients with painful, skeletal dissemination. Using HBI, we obtain pain relief and decrease of analgesics intake. The aim of this study was an evaluation of HBI impact on quality of life (QL).
Material and methods: Material comprised of 80 patients (38 W, 42 M), aged from 31 to 83 (mean 61) treated by one fraction HBI because of multiple skeletal metastases. The most frequent diagnoses were breast (26) and prostate (24) cancers. The most numerous histopathological diagnosis was adenocarcinoma (53). 29 patients had upper (UHBI), 47 lower (LHBI) and 4 middle (MHBI) HBI. The dose of 6 Gy was delivered for UHBI and 8 Gy for L and MHBI. All patients were examined in HBI day, 2 weeks later, and next every month. The pain intensity in 11 degree scale (0–10), performance status (PS) and QL in 7 degree scale (1 - very bad, 7-excellent), and pain frequency in 4 degree scale (1 - never, 4- very often) were evaluated using EORTC QLQ-C30 form. Means of particular variables