excluded. All patients received definitive RT of >60 Gy, predominantly with 6 fractions per week concomitantly with the radiosensitizer nimorazole, but without chemotherapy. Weight loss was expressed by the relative weight change per week as fitted by linear regression from observations during week 0−7 of RT. For the statistical analysis, critical weight loss was defined as weight loss of >1.0% per week. Multivariate linear regression analysis was applied.

Results: The average weight loss during RT for the whole group was 5.65 kg corresponding to an average absolute weight loss of 7.3% over $7\frac{1}{2}$ weeks. 245 patients (50%) experienced a critical weight loss of more than 1% per week which on multivariate analysis was significantly associated with accelerated RT (OR=2.6; CI 1.1−5.7), BMI (OR=2.5; CI 1.2−4.8), non-glottic tumour sites (OR=3.6; CI 2.2−5.7), and disease stage (OR=1.9; CI 1.2−2.9). Tube feeding was prescribed for 24% (119/490) which was significantly related to non-glottic tumour sites (OR=2.6; CI 1.2−5.5) and disease stage (OR=3.6; CI 2.0−6.7), as well as to lower age (OR=0.6; CI 0.5−0.8) and poor performance status (OR=1.8; CI 1.1−3.0), but not to BMI.

Conclusion: Accelerated RT, BMI, disease stage, and non-glottic tumour sites predicted critical weight loss during RT. Of these factors, only disease stage and non-glottic tumour sites were linked to the prescription of tube feeding besides age and performance status; the latter indicating clinicians' preferences.

8517 POSTER DISCUSSION

Comparison of Clinical Outcome Between Proton and Carbon-ion Radiotherapy in the Same Treatment Protocols

M. Murakami[1], Y. Demizu[1], Y. Niwa[1], K. Terashima[1], O. Fujii[1], M. Mima[1], N. Hashimoto[1], Y. Hishikawa[1], M. Abe[1]. *[1]Hyogo Ion Beam Medical Center, Radiology, Tatsuno, Japan*

Purpose: To compare retrospectively our treatment results after proton radiotherapy (PRT) or carbon-ion radiotherapy (CiRT) in patients with malignant tumours originated in the H&N, the lung and the liver.

Methods: From June 2005 to December 2010, 699 patients, aged from 26 to 98 (median 71), with H&N (n = 122), lung (208) and liver cancer (369) were treated by PRT (330) or CiRT (369) with radical intent. All patients except for liver cancer were fresh cases. The RBE values for protons and carbon-ions were determined as 1.1 and 2.0−3.7, respectively, by in vivo and in vitro studies. Three protocols consisting of 70.2 GyE/26Fr (BED_{10}=89.2), 66 GyE/10Fr (109.6) and 52.8 GyE/4Fr (122.5) were employed for either proton or carbon-ion therapy (Table). The selection of protons or carbons was made for all patients based on the DVH analysis (D95 of CTV and PTV, V20−60 of OAR). Overall survival (OS) and local control (LC) rates were calculated by Kaplan–Meier and Log-rank test.

Results: The median follow-up periods were 22.2 months. As for LC and OS rates, there were no significant differences between PRT and CiRT in the same treatment protocols (the same total dose and the same fractionation) in patients with H&N, lung and liver cancer (Table).

Discussions: Our clinical experiences suggested that GyE calculated by the above described RBE values was equivalent for tumours with different histological types.

Conclusions: There were no significant differences of LC and OS rates between PRT and CiRT in the same treatment protocols.

		H&N			Lung			Liver		
		n	2 year OS (%)	p value	n	[1] 2 year OS (%)	p value	n	2[3] year OS (%)	p value
52.8 GyE/4Fr	proton	0	–	–	18	94.4	0.669	26	83.9[74.6]	0.61
	carbon	0	–		55	86.1		82	80.3[65.5]	
66.0 GyE/10Fr	proton	0	–	–	57	74	0.34	154	63.0[60.3]	0.194
	carbon	0	–		54	78.5		107	80.2	
70.2 GyE/26Fr	proton	66	61	0.389	9	72.9	0.399	0	–	–
	carbon	56	83.1		15	[92.3]		0	–	
			2 year LC (%)	p value		[1]2 year LC (%)	p value		2[3] year LC (%)	p value
52.8 GyE/4Fr	proton	0	–	–	18	87.4	0.908	26	95.0[95.0]	0.819
	carbon	0	–		55	89.6		82	93.0[89.2]	
66.0 GyE/10Fr	proton	0	–	–	57	76.9	0.186	154	94.3[94.3]	0.253
	carbon	0	–		54	100		107	83.5	
70.2 GyE/26Fr	proton	66	66.9	0.425	9	[65.6]	0.225	0	–	–
	carbon	56	81.9		15	100		0	–	

8518 POSTER DISCUSSION

Genetic Factors and Late Adverse Effects of Tissue After Radiotherapy in Breast Cancer Patients − Results From the German MARIE(RAD) Study

P. Seibold[1], I. Helmbold[1], P. Schmezer[2], R. Claus[2], J. Debus[3], M.L. Sautter-Bihl[4], F. Wenz[5], O. Popanda[2], J. Chang-Claude[1]. *[1]German Cancer Research Center, Cancer Epidemiology, Heidelberg, Germany; [2]German Cancer Research Center, Epigenomics and Cancer Risk Factors, Heidelberg, Germany; [3]Heidelberg University Hospital, Radiation Oncology, Heidelberg, Germany; [4]Karlsruhe Municipal Hospital GmbH, Clinic for Radiation Oncology and Radiotherapy, Karlsruhe, Germany; [5]University Clinic Mannheim, Radiation Oncology, Mannheim, Germany*

Background: After breast conserving surgery (BCS), breast cancer patients are routinely treated with radiotherapy (RT) to reduce the rate of local recurrences. However, late adverse effects such as telangiectasia and fibrosis can occur as a consequence of RT. The risk of these events can be modified by individual genetic susceptibility. As RT leads to increased levels of oxidative stress, we assessed the association of polymorphisms in genes related to oxidative stress and RT-induced late adverse effects.

Methods: For this analysis, breast cancer patients from the study region Rhein-Neckar-Karlsruhe of the German MARIE study were eligible if they received RT after BCS (2002–2005) and had no chemotherapy, no metastases at diagnosis or any previous cancer(s). 414 patients participated (participation rate: 84%). Late adverse effects were evaluated by physical examination and classified according to standardized EORTC/RTOG scoring (0=none to 4=severe adverse effects) by an experienced study physician. 109 common single nucleotide polymorphisms (SNPs) were genotyped using Illumina Golden Gate and 22 SNPs for replication using iPlex application. Associations of genotype with skin alterations (e.g. telangiectasia) and with fibrosis, respectively, were assessed in up to 363 patients, excluding individuals who received intraoperative or interstitial boost to achieve a homogeneously exposed population. Multivariate logistic regression was used to adjust for potential confounding factors. A dominant model was assumed, comparing carriers of the variant allele to non-carriers. An independent study of 390 breast cancer patients (RT after BCS in 1998–2001, same study region) was used for replication.

Results: After a median follow-up time of 67 months, 46 of 414 patients (11%) developed skin alterations of grade 2 or 3. A total of 43 patients developed fibrosis, of whom 23 also experienced telangiectasia. None of the patients presented with grade 4 toxicities. Two SNPs in *NQO1* in high linkage disequilibrium were associated with a significant risk reduction for skin alterations (OR 0.3, 95% CI 0.1−0.9) that was replicated in the independent study (OR 0.4, 95% CI 0.2−0.8). For fibrosis, SNPs in *TXN, TNF* and *NQO1* showed significant associations in one study.

Conclusion: Polymorphisms in oxidative stress-related genes might influence the occurrence of RT-induced late adverse effects. Our findings need further replication by larger studies and support from functional studies.

8519 POSTER DISCUSSION

Setup Margins in a Thermoplastic Shell Can Be Reduced to Those of a Stereotactic Frame Using Daily Online Correction − a Prospective Comparison Between Shell and Frame

N. Rosenfelder[1], L. Corsini[1], C. Lamb[1], M. Brada[1]. *[1]Royal Marsden Hospital, Radiotherapy, London, United Kingdom*

Background: Patients undergoing fractionated stereotactic cranial radiotherapy (SCRT) who cannot tolerate a relocatable frame may be immobilised in a thermoplastic shell but larger CTV-PTV margins are applied to account for the reduced relocation accuracy. This prospective study compares the setup accuracy and intrafraction motion achieved using daily online correction with the ExacTrac (ET) system for frame and shell based treatment. The primary endpoint is to evaluate whether margin reduction to 3 mm (as used in a frame) is safe in shell patients.

Methods: Approval was granted by the Committee for Clinical Research, Royal Marsden Hospital. Margin reduction will be considered safe in the shell if $\geqslant$168 of 179 fractions are accurate (defined as maximum error <2 mm on post correction *and* post treatment imaging).

All patients undergoing SCRT for benign brain tumours were included. For each fraction, stereoscopic kV image pairs were acquired using the ET system:

- pre-correction (at initial setup)
- post-correction pre-treatment
- post-treatment
- additional image pair acquired after floor twist to 90° for the first 5 fractions

Population systematic & random errors were calculated for each image sets.