ACEi/ARBs users vs. non-users (5.3% vs. 5.3%, p = 1.000). On univariate analysis, higher V20 (p = 0.00071), centrally located tumors (p = 0.00025), and higher baseline FEV_1 percentage (p = 0.03577) were associated with increased incidence of RP. On multivariate analysis, both higher V20 (p <0.0001) and centrally located tumors (p = 0.0094) were associated with increased incidence of RP. There was no identifiable relationship between age, gender, ethnicity, BMI, KPS, Charlson comorbidity score, smoking status or history, chemotherapy prior to or post SBRT, baseline DLCO, and total radiation dose or fractionation with the incidence of RP.
Conclusions: The use of ACEi/ARBs at the time of lung SBRT did not demonstrate a significant association with the incidence of symptomatic RP despite previously reported data suggesting the opposite. Higher V20's and centrally located tumors, however, were associated with increased incidence of RP. Given conflicting data of the protective effects an ACEi/ARBs may have against RP, a prospective evaluation is necessary.

PD-0429

Multireader study on 4DPET/CT target volume delineation in SBRT patients with central versus peripheral lung tumors

A. Chirindel[1], S. Adebahr[1], D.C. Schuster[1], T. Schimek-Jasch[1], J. Plappert[1], U. Nemer[2], M. Mix[2], P. Meyer[2], A.L. Grosu[1], U. Nestle[1]
[1]Uniklinik Freiburg, Radiation Oncology, Freiburg, Germany
[2]Uniklinik Freiburg, Nuclear Medicine, Freiburg, Germany

Purpose/Objective: To evaluate the role of coregistered 4DPET/CT for SBRT target delineation in patients with central and peripheral lung tumors.
Materials and Methods: Analysis of internal target volume (ITV) delineation of central and peripheral lung lesions (classified according to EORTC 2211-081133) in 21 patients treated with SBRT. Manual delineation was performed by 4 observers in 2 sequential contouring phases: first on respiratory gated 4DCT with a diagnostic 3DPET/CT available aside (CT-ITV) and secondly on coregistered 4DPET/CT (PET/CT-ITV). Comparative analysis of volumes and inter-reader agreement was carried out for both contouring sessions.
Results: Eleven cases of peripheral and 10 central lesions were evaluated. In peripheral lesions, CT-ITV was 6.2 cm3 and PET/CT-ITV 8.6 cm3, with a small but significant average volume increase (p<0.05) resembling a mean change in hypothetical radius of 2 mm. For both CT-ITVs and PET/CT-ITVs inter reader agreement was good and unchanged (0.733 and 0.716; p=0.58). All PET/CT-ITVs stayed within the PTVs derived from CT-ITVs.
In central lesions, average CT-ITVs were 42.1 cm3, PET/CT-ITVs 44.2 cm3 with statistically not significant volume and hypothetical radius changes. However, inter-reader agreement improved significantly (0.665 and 0.750; p<0.05). Furthermore, 2/10 PET/CT-ITVs exceeded the PTVs derived from CT-ITVs by several ml.

Peripheral lesions	Gender	Age	Location	UICC Stage	SUVmax	ITV (ml) 4DCT+3DPET/CT	ITV (ml) 4DPET/CT	CM amplitude (cm)	K-indices 4DCT	K-indices 4DPET/CT
1	M	65	Right lower lobe	IV	5.2	4.9	8.1	1.34	0.778	0.689
2	M	80	Right middle lobe	IA	7.3	10.3	13.8	0.97	0.786	0.828
3	M	68	Right upper lobe	IV	4.5	2.1	3.3	0.66	0.689	0.553
4	M	78	Right lower lobe	IA	3.8	18.4	19.5	2.63	0.721	0.691
5	M	72	Right upper lobe	IA	7.2	3.0	5.4	0.22	0.65	0.655
6	M	75	Left upper lobe	IA	5.7	2.7	4.3	0.42	0.727	0.748
7	M	69	Left lower lobe	IV	3	2.7	5.2	1.15	0.718	0.642
8	W	78	Left upper lobe	IV	7.4	6.2	6.5	0.17	0.804	0.739
9	W	59	Right lower lobe	IA	17	13.7	20.4	1.20	0.768	0.851
10	M	58	Right upper lobe	IA	1.5	1.3	2.2	0.29	0.746	0.724
11	M	71	Left upper lobe	IA	4.4	3.6	5.6	0.37	0.679	0.753

Central lesions	Gender	Age	Location	UICC Stage	SUVmax	ITV (ml) 4DCT+3DPET/CT	ITV (ml) 4DPET/CT	CM amplitude (cm)	K-indices 4DCT	K-indices 4DPET/CT
1	M	84	Left upper lobe	IB	31.8	76.7	71.9	0.60	0.513	0.674
2	M	73	Right upper lobe	IA	3.7	6.2	7.7	0.41	0.604	0.692
3	W	57	Right upper lobe	IA	10.7	10.9	16.7	0.57	0.562	0.796
4	M	84	Left lower lobe	IV	8.7	79.9	74.2	0.91	0.748	0.782
5	M	68	Right upper lobe	IIIA	14.4	101.3	116.6	1.32	0.768	0.85
6	M	68	Right upper lobe	IIB	10.8	27.6	26.1	0.43	0.643	0.752
7	M	84	Left upper lobe	IB	25.1	75.6	71.7	0.34	0.779	0.796
8	M	84	Right lower lobe	IA	8.1	4.7	6.1	0.82	0.673	0.633
9	M	82	Right lower lobe	IV	15.4	9.2	14.4	0.95	0.596	0.709
10	M	83	Left upper lobe	IIB	12.3	28.9	36.6	0.22	0.766	0.812

Conclusions: The addition of coregistered 4D-PET data to 4D-CT based target volume delineation for SBRT of centrally located lung tumors increases the inter-observer agreement and may help in avoiding geographic misses. Hence, it may improve treatment accuracy and normal tissue sparing. This chance should be further evaluated prospectively.

Poster Discussion: Young Scientists 3: Breast cancer

PD-0430

Results from the radiotherapy quality assurance programme for the FAST-Forward breast trial

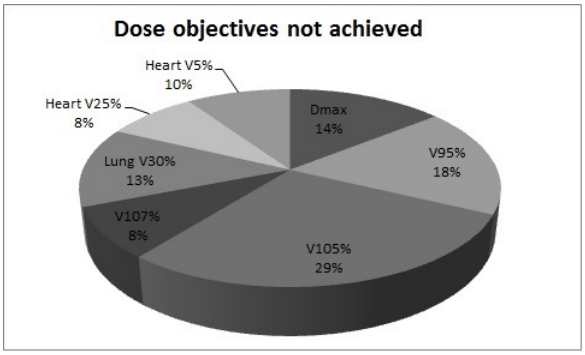
R. Zotova[1], J. Yarnold[2], D. Wheatley[3], C. Griffin[4], B. Murray[5]
[1]Mount Vernon Cancer Centre, Radiotherapy Physics, Northwood, United Kingdom
[2]Royal Marsden Hospital, Institute of Cancer Research, London, United Kingdom
[3]Royal Cornwall Hospital, Clinical Oncology, Truro, United Kingdom
[4]Institute of Cancer Research, Clinical Trials Statistical Unit, London, United Kingdom
[5]Royal Stoke University Hospital, Clinical Oncology, Stoke-on-Trent, United Kingdom

Purpose/Objective: The purpose of this study is to analyse the radiotherapy (RT) treatment plans collected in the FAST-Forward trial to ensure consistency of treatment across all centres and compliance with trial protocol.
FAST-Forward is a multicentre phase III trial comparing a 1-week course of curative whole breast RT against a standard 3-week schedule in terms of local control and late toxicity in patients with early breast cancer.
Materials and Methods: A comprehensive set of dose objectives for the breast PTV and organs at risk were defined for the trial and protocol compliance was assessed against these. The dose distribution should fulfil the following criteria:
- PTV V95%≥90%
- PTV V105%≤7%
- PTV V107%≤2%
- D_{max}≤110%
- Ipsilateral lung V30%≤17%
- Heart V25%≤5% and V5%≤30%

The analysis was based on a full 3D RT data review for a minimum of 10 randomly selected plans from each site, and the rest were based on evaluation of the plan assessment forms, completed by centres for each patient. Evaluation structure compliance was also checked for the reviewed 3D datasets.
Results: The main trial closed after recruiting 4110 patients. To date, 3200 plans (78% of recruited patients) from 47 centres have been collected. 2400 of these have been analysed, with full 3D RT data reviewed for 600 (25%) of

these. Retrospective reviews are still in progress, with all remaining data to be collected and analysed by the end of 2014.

A total of 84 objectives were not met in 63 plans (2.7% of all reviewed data), with 14 plans breaching more than one objective. The breakdown of all objectives not achieved as a percentage of the total number of cases with variations is presented below.



On further examination 37 of the variations were in challenging cases, where clinical compromises were deemed necessary by the site principal investigator. In 8 plans a higher absolute dose maximum was accepted to a non-clinically significant volume, as the V105% and V107% constraints were met. In 11 plans variations were due to misinterpretation of the DVH information at the investigator site and/or incorrect contouring of evaluation structures; in further 7 plans the reason was not clear. Therefore in 18 plans (0.8% of all reviewed data) it may have been possible to improve the distribution to comply with protocol.

The observed parameters varied across centres, which is attributed to different equipment, planning system and technique used. The differences in the median values for each dose objective across all centres is summarised below.

	PTV				Lung V30%	Heart V25%	Heart V5%
	Dmax, %	V95%	V105%	V107%			
MEDIAN	107.3	96.0	3.1	0.0	9.4	0.9	11.9
MIN	105.6	93.2	0.0	0.0	3.4	0.0	3.6
MAX	109.8	99.2	4.9	0.4	13.3	3.4	27.1

Conclusions: The review performed on 2400 plans in the FAST-Forward trial demonstrates that the majority of plans comply with the dose objectives specified in the protocol, with only 2.7% of all reviewed data not achieving one or more of the dose objectives.

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PD-0431

Prevalence, risk factors and consequences of breast edema during and following radiotherapy in breast cancer patients

D.A. Young-Afat[1], H.M. Verkooijen[2], M.L. Gregorowitsch[1], C.H. Van Gils[2], M. Van Vulpen[1], H.J. Van den Bongard[1]

[1]UMC Utrecht, Radiotherapy Department, Utrecht, The Netherlands

[2]UMC Utrecht, Epidemiology Department, Utrecht, The Netherlands

Purpose/Objective: The 'Utrecht cohort for Multiple BREast cancer intervention studies and Long-term evaLuAtion' (UMBRELLA) is a Dutch breast cancer cohort, aiming to gain insight into physical and emotional symptoms during and after breast cancer treatment and to evaluate (multiple) experimental interventions (e.g. novel radiotherapy treatments, physical activity interventions). In UMBRELLA the occurrence of breast edema is monitored, which can cause symptoms and decrease quality of life. The objective of this observational study is to evaluate prevalence, risk factors, edema-related toxicity and consequences of acute and chronic breast edema after surgery (i.e. lumpectomy, mastectomy, oncoplastic techniques, axillary lymph node dissection), irradiation (i.e. local, locoregional, regional) and (neo)adjuvant systemic therapy.

Materials and Methods: As of October 2013, all women with breast cancer who are referred to our department of Radiation Oncology are invited to participate in UMBRELLA. Participants consent to clinical data collection and provide 'patient reported outcomes' at regular time intervals during and after treatment. We estimated prevalence of breast edema according to CTCAE V4.0 scoring system as registered by radiation oncologists at weekly follow-up visits during irradiation, and at standard follow-up intervals after irradiation. We collected information on potential risk factors for edema, such as tumor size, patient characteristics (e.g. BMI) and treatment modalities. We performed univariate and multivariate logistic regression analysis to identify determinants that were (independently) associated with breast edema. Patient reported outcomes (i.e. quality of life, pain and cosmetic outcome) will be compared for patients with and without breast edema. The effect of different grades of edema on these patient reported outcomes will also be evaluated.

Results: Between October 2013 and November 2014, 437 breast cancer patients were enrolled in UMBRELLA. Preliminary results after analysis of the first 150 patients (median follow-up 49 days) showed that 23% of patients had acute breast edema within two months after the start of irradiation, of which 97% had 'mild edema (grade 1)'. The proportion of breast edema was higher among patients who also received neo-adjuvant chemotherapy (44%), compared to 21% in those who did not receive neo-adjuvant chemotherapy (p=0.024). No other determinants were significantly associated with breast edema.

Table 1. Patient characteristics of 150 breast cancer patients who received irradiation of the breast/chest wall.

	N=150
Age in years	
Median (range)	58.5 (26-83)
Follow-up (days)	
Median (range)	49.0 (23-139)
Type of surgery	
Lumpectomy	88% (132)
Mastectomy	12% (18)
Tumor size in mm	
Median (range)	15.0 (3-105)
Post- operative complications*	
Yes	51% (76)
- Seroma	73% (56)
- Hematoma	9% (7)
- Seroma + hematoma	7% (5)
- Edema	1% (1)
- Infection	3% (2)
- Other	7% (5)
No	49% (74)
Radiation therapy	
Local	78% (117)
Locoregional**	21% (31)
Regional**	1% (2)
42.56 Gy in 16 fractions	53% (79)
55.86 Gy in 21 fractions	40% (61)
61.18 Gy in 23 fractions	6% (9)
50.00 Gy in 25 fractions	1% (1)
Neo-adjuvant chemotherapy	
Yes	12% (18)
No	88% (132)

***includes radiation on axillary and/or peri-clavicular lymph nodes*