report the second phase of a study exploring two alternate schedules of accelerated E-CMF having previously reported the first phase [Rea ASCO 2007].
Methods: A non-randomised, multicenter trial to explore the feasibility and tolerability of accelerated E-CMF chemotherapy for women with EBC. The primary endpoint being delivered dose intensity (DDI). The accrual target was 40 patients (pts). Pts were treated with 4 cycles E (100 mg/m^2) q 14d, with Pegfilgrastim (PF) (6 mg sc) d2, followed by 6 cycles of cyclophosphamide, methotrexate, and 5-fluorouracil (800/50/600 mg/m^2) administered intravenously d1, with PF d2, q 14d. This schedule is designed to achieve similar DDI to the d1&8 accelerated q 21d CMF regimen previously reported.
Results: 41 pts were enrolled. Complete dose information from 36 pts and toxicity data from 360 cycles (41 pts) has been analysed. Median DDI was 98.8% of target. Delays of >2d were recorded for 5% of cycles. Dose reductions were recorded in 8% of cycles. Percentage grade 2 and 3/4 toxicity reported per cycle were respectively: all infections 4/2; bone pain 9/3; constipation 10/1; diarrhoea 1/2; dyspnoea 19/1; emesis 17/2; fatigue 32/6; febrile neutropenia not applicable (na)/1; mucositis 9/1; and phlebitis 7/na. Hospitalisation occurred in 6% of cycles.
Conclusions: Accelerated E-CMF with PF is feasible achieving high DDI in a majority of pts. Non-haematological toxicity was responsible for the majority of hospital admissions. We have established two alternative accelerated E-CMF schedules that achieve similar DDI. The marginal differences in toxicity profiles tend to favour the q 14d CMF reported here, rather than the d1&8 q 21d CMF schedule previously reported. Either schedules could be considered but to establish efficacy in comparison to conventional E-CMF requires phase III evaluation.

2036 POSTER

Prone position breast irradiation; an intensity modulated radiotherapy (IMRT) planning study

N. Bijker[1], M. van Heumen[2], F. Alberding[2], C. van Vliet-Vroegindeweij[2], D. Minkema[2], F.W. Wittkämper[2], N.S. Russell[2]. *[1]Academic Medical Center, Department of Radiotherapy, Amsterdam, The Netherlands; [2]The Netherlands Cancer Institute, Department of Radiotherapy, Amsterdam, The Netherlands*

Background: Supine position breast radiotherapy is most commonly used for radiotherapy of the whole breast in patients treated with breast-conserving therapy for early breast cancer. In women with larger and/or pendulous breasts, this technique can cause increased dose inhomogeneity and hot spots to skin fold areas, with, as a result, increased skin toxicity and impaired cosmetic outcome. In prone position, with the breast hanging free from the thoracic wall, skin folds could be eliminated and field separation could be reduced. We aimed to evaluate prone position breast radiotherapy by means of a CT planning study.
Materials and Methods: A pilot study was performed including 15 women with large or pendulous breasts. All women had a CT scan in supine and in prone position. The patients were treated conventionally, in supine position. Opposed tangential beam arrangements were set up in both positions. For each position, both a conventional 3D plan and an IMRT plan was developed. Breast coverage, dose homogeneity, and dose to the lung and heart were compared.
Results: The mean field separation in supine position was 24.7 cm (range 21.5−28.2 cm); this was reduced to 20.8 cm (range 16.2−24.6 cm) in prone position. In prone position, the breast tissue could be adequately covered. The maximum relative dose was 109%, 108%, 111% and 107% for supine conventional, supine IMRT, prone conventional and prone IMRT plans, respectively. In prone position, the conformal radiotherapy plan caused underdosage in the medial part of the breast, whereas with IMRT, a homogeneous dose could be obtained. In prone position, the dose to the ipsilateral lung was reduced compared with the supine position (average dose 6.02 Gy, 6.47 Gy, 1.20 Gy, 1.46 Gy for supine conventional, supine IMRT, prone conventional and prone IMRT plans, respectively). The dose given to the heart in prone was similar to that in supine position.
Conclusions: Prone position breast radiotherapy is a feasible technique, if IMRT is used. With this technique a homogeneous dose to a larger breast can be given, and skin folds are eliminated thus reducing the risk of skin epidermolysis. Also, the irradiated lung volume is reduced compared with supine breast irradiation.

2037 POSTER

The effect of hypofractionation and radiation dosimetry on the incidence of symptomatic rib fractures in women treated with radiotherapy for early breast cancer in the UK standardisation of breast radiotherapy (START) Trials

P.A. Lawton[1], E. Aird[2], J. Bliss[3], J. Haviland[3], B. Magee[4], M. Sydenham[3], K. Venables[2], J. Yarnold[5], Start Trial Management Group[3]. *[1]Nottingham City Hospital, Department of Clinical Oncology, Nottingham, United Kingdom; [2]Mount Vernon Hospital, Department of Clinical Physics, Northwood, United Kingdom; [3]Institute of Cancer Research, Section of Clinical Trials, Sutton, United Kingdom; [4]Christie Hospital NHS Trust, Department of Oncology, Manchester, United Kingdom; [5]Royal Marsden Hospital NHS Foundation Trust, Department of Academic Radiotherapy, Sutton, United Kingdom*

Background: Symptomatic rib fractures (SRFs) are an uncommon but painful late normal tissue reaction following radiotherapy (RT) for breast cancer. The effect of fraction size (Fr) and radiation dosimetry on the incidence of SRFs was examined in the Phase III randomised START Trials of breast radiotherapy.
Methods: The incidence of SRFs was recorded prospectively in the START Trials (ST-A and ST-B) which tested hypofractionated post-operative RT in women with completely excised invasive breast cancer (T1−3, N0−1, M0). ST-A compared 50 Gy in 25 Fr (5 wks) vs 41.6 Gy vs 39 Gy, both in 13 Fr (5 wks). ST-B compared 50 Gy in 25 Fr (5 wks) vs 40 Gy in 15 Fr (3 wks). An extensive quality assurance (QA) programme was conducted as part of these trials with treatment plans collected from 1 in 3 patients.
Results: 4451 patients were recruited from 35 UK centres during 1999–2002, with a median follow-up of 5.1 years for ST-A and 6.0 years for ST-B. SRFs were reported in a total of 61 of 4451 patients (1.4%) entered into the trials [27/2236 (1.2%) in ST-A and 34/2215 (1.5%) in ST-B]. The mean age of patients who developed SRFs was 65.7 years (range 51.9−84.1) in ST-A and 62.9 years (range 43.7−84.2) in ST-B and the median time to first reporting SRFs was 3 years in both trials (range 1−7 years). In ST-A the numbers of SRFs reported were 8, 9 and 10 for the dose schedules of 50 Gy, 41.6 Gy and 39 Gy respectively. In ST-B the numbers of SRFs reported were 18 and 16 for 50 Gy and 40 Gy respectively. Overall, 161/1421 (11%) RT treatment plans reviewed by the QA team were described as posterior border hot with higher doses in ribs. For patients with treatment plans available to the QA team, higher rib doses were seen in 3/7 (43%) patients who developed SRFs in ST-A and 1/9 (11%) SRF patients in ST-B. A review of all treatment plans of patients who developed SRFs has now commenced.
Conclusion: Hypofractionated radiotherapy for early breast cancer was not associated with an increased incidence of SRFs in the START Trials. Dose inhomogeneity with higher rib doses did not account for all the cases of SRF. Avoidance of hot spots in ribs may reduce the incidence of SRFs but planning techniques which significantly reduce the total dose to ribs may be needed to avoid this side-effect in all patients.

2038 POSTER

Personality predicts quality of life in breast cancer patients, not type of surgery

A.F.W. Van Der Steeg[1], J. De Vries[2], F.W.C. van der Ent[3], J.A. Roukema[4]. *[1]AMC, Pediatric Surgery, Amsterdam, The Netherlands; [2]Tilburg University, Health Psychology, Tilburg, The Netherlands; [3]Maaslandhospital, Surgery, Sittard, The Netherlands; [4]St Elisabeth Hospital, Surgery, Tilburg, The Netherlands*

Background: Quality of Life (QoL) is an important outcome measure in oncology. In breast cancer, QoL is influenced by surgical treatment. Women who are treated with breast conserving therapy (BCT) report a better QoL compared with women treated with mastectomy (MTC). Another factor of influence on QoL is personality. So far, only one study has assessed the relationship between personality and QoL in breast cancer patients but this study did not look into the possible influence of type of surgery. To assess the influence of both surgical treatment and personality on QoL a longitudinal prospective cohort study was done. Based on the previous study it was hypothesized that women with a high score on trait anxiety would experience a poor QoL, especially women treated with BCT since they would worry about the remaining breast.
Methods: Between September 2002 and December 2005 women with a first presentation of a palpable lump in the breast or an abnormality on the mammography were asked to participate in the study. A set of questionnaires was completed by 337 women prior to diagnosis and 1, 3 and 6 months after diagnosis and possible treatment. Of the 131 women that were diagnosed with breast cancer, 53 women were treated with BCT and 78 women received MTC. Personality was assessed using the

Neuroticism-Extraversion-Openness-Five-Factor-Inventory (NEO-FFI) and the State-Trait-Anxiety-Inventory (STAI). QoL was measured with the World Health Organization Quality of Life Questionnaire (WHOQOL-100).
Results: The two treatment groups did not differ on overall QoL. In the BCT group trait anxiety had a significant influence on overall QoL at all measurement times. Women in the BCT group with a high score on trait anxiety were 18 times more likely to have a low overall QoL one year after treatment (OR 18.7; 95% CI 1.50–232.29; p = 0.023) compared with women in the BCt group scoring not high on trait anxiety.
In the MTC group the scores on overall QoL were mainly influenced by extraversion and neuroticism. Women with a high score on neuroticism were 13 times more likely to have a low QoL one year after surgery (OR 13.1; 95% CI 1.00–172.70; p = 0.05) compared with women with a low to normal score.
Conclusion: Personality, especially trait anxiety and neuroticism, determined patients' overall QoL scores.

2039 POSTER

Radiotherapy after breast conserving surgery for ductal carcinoma in situ: an overview of randomized trials

K.P. Economopoulos[1], I.J. Dahabreh[1], S. Murray[2]. [1]*University of Athens Medical School, Medical Oncology, Athens, Greece;* [2]*Metropolitan Hospital, Molecular Biology and Genetics, Athens, Greece*

Background: More than 30% of newly diagnosed breast cancers are ductal carcinomas in situ (DCIS). Breast conserving surgery (BCS) is considered the standard of care for most DCIS but the addition of postoperative radiotherapy to BCS remains controversial. We performed a meta-analysis of randomized controlled trials to investigate the value of administering a course of radiotherapy after BCS for DCIS.
Methods: We searched the MEDLINE database, the online proceedings of the American Society of Clinical Oncology and the San Antonio Breast Cancer Symposium to identify trials randomizing patients with DCIS, to either radiotherapy or observation, following BCS. Data on post-treatment breast cancer events, both ipsilateral and contralateral, were abstracted from published reports. Random effects meta-analysis was employed to estimate pooled risk ratios (RR) and their confidence intervals, with values lower than one indicating a benefit from adding radiotherapy to BCS. When the calculated RR indicated a >50% effect, we calculated the number needed to treat statistic. Results are presented in accordance with the QUOROM guidelines.
Results: We identified 4 trials randomizing a total of 3899 women to either radiotherapy (1,965 women) or observation (1,934 women), following BCS. The addition of radiotherapy to BCS reduced the incidence of ipsilateral breast cancers (RR, 0.47; 95% CI, 0.39−0.56), both invasive (RR, 0.50; 95% CI, 0.40−0.62) and non-invasive (RR, 0.45; 95% CI, 0.35−0.58). The number needed to treat in order to avoid one breast cancer event was 8.3 for all ipsilateral tumors; 18.9 for invasive and 15.6 for non-invasive. There was a non-statistically significant trend towards an increased incidence of contralateral breast cancers (RR, 1.30; 95% CI, 0.98−1.73) in patients receiving radiotherapy. This was mainly due to an increased incidence of invasive contralateral cancers (RR, 1.40; 95% CI, 1.00−1.96), but not non-invasive ones (RR, 0.90; 95% CI, 0.28−2.92). The incidence of distant metastases (RR, 0.95; 95% CI, 0.65−1.38), and deaths due to breast cancer (RR, 1.17; 95% CI, 0.74−1.84) were unaffected by the administration of radiotherapy.
Conclusion: The addition of a course of radiotherapy after BCS for DCIS is effective in reducing the incidence of ipsilateral breast cancers, both invasive and non-invasive. Although it cannot be advocated for all women with DCIS, radiotherapy following BCS is a valid option in the management of this patient population. Further research is needed to define factors that may be predictive of an increased benefit from radiotherapy.

2040 POSTER

Increased prevalence of hypothyroidism after adjuvant treatment for stage II/III breast cancer

K.V. Reinertsen[1], T. Bjøro[2], M. Cvancarova[3], E. Løkkevik[4], T. Danielsen[5], A.A. Dahl[1], S.D. Fosså[1]. [1]*Rikshospitalet–Radiumhospitalet Medical Center, The Cancer Clinic Dept for Clinical Cancer research – unit for long term outcome, Oslo, Norway;* [2]*Rikshospitalet–Radiumhospitalet Medical Center, Dept of Medical Biochemistry, Oslo, Norway;* [3]*Rikshospitalet–Radiumhospitalet Medical Center, Dept of Statistics, Oslo, Norway;* [4]*Rikshospitalet–Radiumhospitalet Medical Center, The Cancer Clinic Dept of Oncology, Oslo, Norway;* [5]*Rikshospitalet–Radiumhospitalet Medical Center, The Cancer Clinic Dept of Medical Physics, Oslo, Norway*

Background: Breast cancer (BC) may be associated with hypothyroidism (Hypo). Adjuvant loco-regional radiotherapy (RT) with or without chemotherapy/hormones (CT/H) are suspected to increase such an association.
Patients and Methods: 3−5 years after treatment for stage II/III BC 315 consecutive patients (median age 56 years, range 30−75) were examined for the prevalence of Hypo by a questionnaire including eight thyroid-related questions and blood tests (TSH). The patients were compared to women from a cancer-free, age-matched general population cohort (GP) using descriptive statistics and a Cox regression model. Treatment for BC consisted of surgery (100%), loco-regional RT (100%), CT (81%) and/or H (76%).
Results: At the examination 13% of the BC patients reported earlier diagnosed Hypo compared to 7% of the GP (Table). 19 (6%) of the BC patients were diagnosed with Hypo before their malignancy which was similar to the prevalence in the GP. However, after the BC diagnosis the patients were significantly more likely to develop Hypo compared to the GP (HR 11, p < 0.001) – with 22 patients being diagnosed with Hypo at a median time of 16 months (range 5−51) after their BC diagnosis.

Age[a]	BC patients				GP	
	Total	Patients with Hypo			Total	Hypo
		Total	Pre BC	Post BC		
30−39	14	0			42	0
40−49	66	8	5	3	198	11
50−59	159	21	9	12	477	31
60−69	64	9	4	5	192	16
70−79	12	3	1	2	36	3
Total	315*	41 (13%)*	19	22	945*	61 (7%)*

[a]Age at examination.
*p < 0.001.

Thyroid function tests in patients without former or present thyroid disease: The prevalence of undiagnosed biochemical Hypo (TSH⩾10 mU/l) was 1.4% in the GP vs 0.0% in the BC patients. However, 9.4% of the BC patients vs 4.5% in the GP had TSH 4.1−9.9 mU/l (p < 0.003).
Conclusion: Self-reported Hypo and moderately elevated TSH (4.1–9.9 mU/l) are significantly more prevalent among patients treated for BC than in a cancer-free GP cohort. This high incidence of newly diagnosed Hypo during the first five years post-treatment indicates an association between treatment and the development of Hypo.

2041 POSTER

Radiotherapy of the breast and internal mammary and median supraclavicular (IM-MS) lymph nodes using a mono-isocentric technique

S. Petillion[1], K. Erven[2], C. Weltens[2], E. Van Limbergen[2], F. Van den Heuvel[1], W. Van den Bogaert[2]. [1]*U.Z. Gasthuisberg, Radiation Physics, Leuven, Belgium;* [2]*U.Z. Gasthuisberg, Radiation Oncology, Leuven, Belgium*

Background: The most commonly used technique to irradiate the IM-MS lymph nodes in breast cancer patients, consists of an anterior IM-MS field, matched to tangential breast fields. With the introduction of CT-based treatment planning it becomes obvious that dose heterogeneities in the junction region often occur with this field set-up and cannot be disregarded any longer.
Purpose: To compare a conformal technique with standard field set-up (3Dst) for locoregional breast irradiation to an optimised isocentric conformal technique (3Diso) with respect to dose homogeneity in the target volumes.
Methods: Target volumes and normal tissues were delineated on CT-scans of twenty patients (10 left and 10 right) and used to design two treatment plans. 3Dst is a fixed SSD technique that uses direct anterior mixed photon and electron beams, matched to tangential breast photon fields. 3Diso is an isocentric technique, consisting of 4 photon beams [1 median subclavian (MS), 1 internal mammary (IM) and 2 tangential breast fields] with asymmetric collimation. The common isocenter is located in the middle of the posterior beam edge of the breast tangents, in the plane through the upper border of the breast PTV. The MS field has a gantry angle of 10º. The IM field has the same gantry angle as the medial breast field to ensure a perfect match with the tangential fields. The field edge of the IM field was not allowed to be more then 3 cm heterolateral of the midline. Constraints for the lungs and heart were respectively V20 < 25% and V30 < 10%. Dose-Volume metrics were used to assess the target coverage (IM-MS and breast PTV) and normal tissue doses (lungs and heart). Heterogeneity indices were calculated for the IM-MS and breast PTV. Paired t-tests were performed to detect differences between plans.
Results: 3Diso produced significantly higher homogeneity for breast and IM-MS PTV than 3Dst (p = 0.02). The mean heart dose was significantly