**2009**

**POSTER**

An objective assessment of cosmetic outcome after intraoperative radiotherapy or external beam radiotherapy for early breast cancer in patients from a randomized controlled trial

M. Kershlag1, N.R. Williams1, T. Conicca2, M. Buxana2, C. Saulmers2, H. Fyger2, N. Benz2, J. Castro2, N. Michaelopoulos, D. Joseph1

1Royal Free Hospital, Surgery, London, United Kingdom; 2Clinical Trials Group UCL, Centre for Clinical Sciences Research and Technology, United Kingdom; 3Sir Charles Gardiner Hospital, Radiology, Perth, Australia; 4University of Notre Dame, St Frere, Australia; 5Sir Charles Gardiner Hospital, Surgery, Perth, Australia; 6Harbor Hospital, Surgery, Copenhagen, Denmark; 7INESC, Engineering, Porto, Portugal

**Background:** Non-inferiority between the randomised trial of TARGIT (Intra-operative radiotherapy with Intrabeam) 1 and conventional whole-breast external beam radiotherapy (EBRT) in women with early breast cancer, in terms of the primary outcome measure of risk of loco-regional recurrence within the treated breast, has been demonstrated in the international randomised controlled TARGITated Intraoperative RadioTherapy (TARGIT) trial. The very low recurrence rates have increased the importance of cosmetic as an outcome after breast conserving treatment with both surgery and radiotherapy. This study was performed to determine if the single high dose of TARGIT leads to impaired cosmetic, compared with a fractionated dose of radiotherapy given as EBRT.

**Materials and Methods:** BCCcore software is a validated, objective assessment tool for the evaluation of cosmetic outcome from frontal digital photographs. Images were analysed at baseline (before TARGIT or EBRT) and yearly thereafter for up to 5 years. The analysis produces a composite score (Excellent, Good, Fair, Poor) based on symmetry, colour and scar.

**Results:** 342 patients from two centres participating in the TARGIT trial were assessed. All were over 50 years old with an average age at baseline of 66 years (95% CI 61.8 to 69.9 years). There were statistically significant differences in the odds of achieving an outcome of Excellent who received TARGIT group relative to those who received EBRT group at year 1 (OR = 2.07, 95% CI 1.12 to 3.85, p = 0.021) and year 2 (OR = 2.11, 95% CI 1.0 to 4.45, p = 0.036).

**Conclusions:** This objective assessment of aesthetic outcome in patients from a randomised setting demonstrates that those treated with targeted intraoperative radiotherapy have a superior cosmetic result compared with those patients who received conventional whole-breast external beam radiotherapy.

No conflict of interest.

**2010**

**POSTER**

Analysis of different clinical target volumes of whole breast after breast-conserving surgery based on three-dimensional CT and four-dimensional CT images

S.Z. Wang1, J.B. Li1, H.Y. Xing1, Y.J. Zhang1, C.I.A. Shan1, M.J. Xu1, T.Y. Fan2, F.X. Li2, 1Shandong Cancer Hospital & Institute, Department of Radiation Oncology, Jinan, China; 2Shandong Cancer Hospital & Institute, Department of Radiation Oncology, Jinan, China

**Background and Purpose:** The four-dimensional CT (4D-CT) has more information of tumour movement with comparing threedimensional CT (3D-CT) during the whole respiratory. However, the workload of target delineation for the whole breast was heavier and the capacity of workload on the deep inspiration was increased greatly. In order to identify the necessary of the 4D-CT used for simulation in the MRT of the whole breast after breast-conserving surgery, this study investigated the difference of the clinical target volumes (CTVs) of whole breast manually delineated on 3D-CT and the 4D-CT for patients after breast-conserving surgery.

**Materials and Methods:** Thirteen patients after breast-conserving surgery underwent 3D-CT simulation scans followed by 4D-CT simulation scans of the thorax during free breathing. Then data sets for 3D-CT and 4D-CT scans were transferred to Eclipse treatment planning software. The clinical target volumes (CTVs) of whole breast were manually delineated on the registered images of the 3D-CT, 4D-CT and maximum intensity projection (MIP) images by a radiologist under the same delineation criteria. And all the clinical target volumes (CTVs) of whole breast were manually delineated on the internal target volume (ITV). The CTVs, CTVr, CTVo, CTVa were defined on 0%, 20%, 50%, MIP and 3D-CT images. The volumes of the CTV, the matching index (MI) and the degree of inclusion (DI) were calculated and compared.

**Results:** There was no difference in the CTV delineated by the same radiologist on 3D-CT and 4D-CT (F = 0.05). The volume demonstrated a significant difference between CTVo and CTVa, CTVr, CTVo, CTVa (P = 0.05). The difference of the MI and DI between CTVo and CTVa, CTVo and CTVr, CTVo, DI of CTVo and CTVa, DI of CTVo and CTVr, DI of CTVa and CTVr in 4D-CT were significant as well (P < 0.05).

**Conclusions:** The 3D-CT and MIP showed limited target movement information and it would not be a reliable clinical approach to replace 4D-CT by 3D-CT and MIP images when the clinical target volume of the whole breast was delineated. The volume of ITV was larger than that of CTVo and CTVa, the DI of ITV and CTVa, CTVr, CTVo, CTVa were in 4D-CT were significant as well (P < 0.05).

No conflict of interest.

**2011**

**POSTER**

Breast-held and volumetric IMRT for accelerated partial breast irradiation (APBI)

S.O.S. Oosena, M. Eussen, P.H. Portmans, 1, D. Bernard Verbakel Institute, Medical Physics and Radiation, Tilburg, Netherlands; 2, Dr. Bernard Verbakel Institute, Radiation Oncology, Tilburg, Netherlands

**Purpose/Objective:** To investigate the effect of using volumetric modulated arc therapy (VMAT) and/or voluntary moderately deep inspiration breath-hold (vmDBH) for patients treated with external beam APBI.

**Materials and Methods:** For three left-sided breast cancer patients, two CT-scans were acquired, in free breathing (FB) and in vmDBH. On each scan, five tumour volumes were contoured: upper-inner, lower-inner, central, upper-outer, and lower-outer. For each tumour location 3D conformal radiotherapy (3D-CRT) and VMAT plans both in FB and vmDBH were made. The prescribed dose was 39.5Gy given in 10 fractions, twice fractions per day. Dose parameters for the planning target volume (PTV), heart, lungs, ipsilateral (L) non-involved and contralateral (CL) breast were assessed and compared.

**Results:** VMAT dose conformity was significantly better compared to that of 3D-CRT (conformity index 0.91 ± 0.01 vs. 0.61 ± 0.01). The PTV volume covered with 99% of the prescribed dose increased from 94.8% for 3D-CRT to 98.7% for VMAT. Breast receiving ≥50% of the prescribed dose was on average reduced by 30% with VMAT compared to 3D-CRT. For doses to heart and (ipsilateral lung, the tumours were grouped as: 1) inner and central location, and 2) outer location. For group 1 the mean heart dose decreased from 2.1 ± 1.6Gy for 3D-CRT(FB) to 1.0 ± 0.9Gy for VMAT(FB), and 0.5 ± 0.6Gy for VMAT(vmDBH). The heart V5Gy was reduced to 2.3% with VMAT(vmDBH) compared to 14.0% and 3.8% with 3D-CRT(FB) and 3D-CRT(vmDBH). For group 2, the mean heart dose was 0.2 ±0.9Gy for all techniques. The V5Gy was 3.2% in 3D-CRT(FB) plans, while no heart received V5Gy in VMAT(vmDBH). VMAT(vmDBH) and FB resulted in significant reduction of the ipsilateral lung dose: V20Gy = 8.8 ±7.6% vs. 24.2 ±8.7% for 3D-CRT(FB). VMAT showed a slight but acceptable increase in the maximum CL breast dose (from 0.9 ± 0.4Gy), with the mean dose always below 1Gy.

**Conclusions:** APBI with VMAT offers improved PTV dose conformity and delivers lower doses to the ipsilateral breast and lung compared with 3D-CRT, at the cost of a slightly higher but acceptable dose to the contralateral breast. VMAT shows the largest reduction in heart dose for patients with tumours in the inner and central parts of the breast. Combining VMAT and vmDBH only slightly reduces the heart dose further.

No conflict of interest.

**2012**

**POSTER**

Screening patients for deep inspiration breath hold to reduce cardiac doses for adjutant left breast irradiation

R. Carlson1, K. Kiemstra2, X. Giu3, S. Pearson1, W. Xu1, A. Fyles1, C. Chung1, 1Princess Margaret Cancer Centre, Department of Radiation Oncology, Toronto, Canada; 2Princess Margaret Cancer Centre, Department of Biostatistics, Toronto, Canada

**Background:** When delivering radiotherapy to left-sided breast cancer, deep inspiration breath hold (DIBH) using active breath control (ABC) can significantly reduce radiation dose to heart and coronary arteries in selected patients. Currently, at our institution a cutoff of heart V50% >10Gy is used to determine which patients require ABC. This dose-volume measurement determines the reduction of a radiation plan to select patients for ABC, delaying the second ABC CT simulation. The purpose of this study is to determine if simple 2D measurement of the CTVa on 2D imaging can adequately screen patients for ABC. This would facilitate a streamlined process that minimizes delays for left-side breast radiation.

**Materials and Methods:** This study evaluated 2D simulation images from 56 randomly selected left-sided breast cancer patients treated with tangential RT alone from November 2009 to August 2012 (era when ABC was standard), where 50% of these patients were treated with ABC and 50% were not. On each CT dataset, a tangential line was drawn between the media