

after adjusting for tumour size. The results were similar when adjusted for tumour grade and age of the patient. For year 1 only there was a statistically significant 2.35 fold increase in the odds of having an outcome of EG for patients in the TARGIT group relative to the EBRT group (OR = 2.35, 95% CI 1.02–5.45, $p = 0.047$) after adjusting for age of the patient, tumour size and grade.

Conclusions: These results demonstrate a significantly better cosmetic outcome with TARGIT compared to EBRT in the first year after surgery.

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Effect of Radiation Therapy on Local Control in Patients with Positive Surgical Margins After Breast-conserving Surgery

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Purpose: The surgical margin status after breast-conserving surgery (BCS) has been associated with the risk of local recurrence. The purpose of study is to retrospectively evaluate the effect of a higher radiation dose on local control in patients with positive margins.

Patients and Methods: A total of 1,083 patients who underwent BCS followed by whole breast irradiation of 50 Gy between 1991 and 2009 were including in this study. 138 patients (13%) with positive margins were assigned to receive or not an extra boost dose of 10 Gy. **A positive margin was defined as tumor seen at 5 mm or less from the resection edge.**

Results: At a median follow-up of 8.5 years, the rate of local recurrence was 2.1% (23/1083). Positive margin status was found to be a significant risk factor for local recurrence. For patients with positive margins, the boost dose of 10 Gy reduced the local recurrence from 23% to 2%. There was no significant difference in local recurrence rate between patients with positive margin who treated with 50 Gy and boost and those with negative margin without boost. In addition, patients with positive margin who treated with 50 Gy and boost showed no significant difference in local relapse rate compared with patients who underwent additional local resection before whole breast irradiation.

Conclusion: Our results suggest that boost irradiation to the tumor bed in patients with positive margins after breast-conserving surgery reduces local recurrence.

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Poster

Patient Preferences for Adjuvant Radiotherapy in Early Breast Cancer – an Australian Sub-study of the International TARGIT Trial

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Background: The multicentre randomized TARGIT trial compares single dose intra-operative radiotherapy (IORT) with 6–7 weeks of conventional external-beam radiotherapy (EBRT) in women with early breast cancer (EBC) at low risk of local recurrence (LR). The primary endpoint is LR rates; the *a priori* hypothesis is that IORT will give a non-inferior risk of LR compared with EBRT. Early results suggest non-inferiority however mature results are not yet available. It is unclear what LR risk patients and clinicians consider 'non-inferior'. In order to guide women and their doctors making choices about radiotherapy for EBC, a Patient Preference study was performed to determine what increased risk of LR, without detriment to survival, women who have completed radiotherapy for EBC would accept, in return for the increased convenience and possibly decreased toxicity of IORT.

Methods: This is a cross-sectional study of patient preferences and their determinants in 209 women who had radiotherapy on the TARGIT trial in Western Australia. Preferences were obtained from 108 participants who received IORT and 101 who received EBRT. Preferences were determined by a self-rated questionnaire using validated trade-off methodology. Disease, treatment, and demographic details were collected, and quality of life during radiotherapy was self-rated by patients.

Results: While 36% of patients were prepared to accept a 4%-6% increase in risk of LR for the increased convenience of IORT, 22% would not accept IORT at all. Multivariate Poisson regression identified treatment received as the only significant determinant of patient preferences ($p < 0.0001$). This is despite significant differences found in two-sample Kolmogorov-Smirnov tests of quality of life scores during treatment all favouring IORT. Comparison of the treatment groups found that 60% of

IORT patients would accept IORT at an increased risk of 4%-6% in contrast to 12% of patients in the EBRT group. Only 2% of IORT patients indicated they would not have IORT at all, in contrast to 43% of EBRT patients.

Conclusion: Willingness of patients to accept IORT was discordant between the two treatment groups. The EBRT group were risk-averse, whilst patients who had IORT valued the convenience of IORT highly. Participants of this study have justified the treatment they were randomly allocated to, which questions the validity of post-treatment patient preference studies. Further research targeting patients who have not yet received radiotherapy will now follow, in order to better inform future patients and their clinicians. Given the early results of the TARGIT trial however, it is unlikely that the clinical difference in LR between IORT and EBRT will exceed what patients will accept.

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Poster

Simultaneous Integrated Boost in Breast Conserving Radiotherapy – Is Replanning Necessary Following Tumor Bed Change?

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Background: Tumor bed (TB) change is well-known phenomenon during the whole breast irradiation (WBI) in early stage breast cancer patients. The aims of this study were to evaluate change in seroma volume on repeat Computed Tomography (CT) scans and to explore whether replanning is necessary in breast conserving radiotherapy (RT) using the intensity modulated radiotherapy with simultaneous integrated boost (IMRT-SIB).

Methods and Materials: Thirty patients underwent WBI with 84 CT scans (24 patients with three CTs and 6 patients without the third CT) during the five weeks of RT were reviewed. TB and other target volumes on all CTs were delineated and compared. IMRT-SIB treatment plans with 50.68 Gy to the whole breast and 64.4 Gy to the boost in 28 fractions were constructed in the first CT. Replanning and hybrid plan (without replanning) on the second CT were reproduced. Dosimetric difference between the replannings and hybrid plans were compared.

Results: The mean TB volumes for the 1st CT, 2nd CT and 3rd CT were 42.1 cm³, 20.1 cm³ and 17.0 cm³, respectively. The mean TB reduction was 40.5% from the 1st CT to 2nd CT and 4.3% from the 2nd CT to 3rd CT. The difference of TB volumes between the 1st CT to 2nd CT was statistically significant ($p < 0.001$), but not significant between 2nd CT to 3rd CT ($p = 1.000$). For all patients, target coverage remained adequate with either hybrid plans or replannings. However, replanning can significantly decrease the whole breast mean dose (35.2 Gy vs. 35.6 Gy, $p = 0.026$) and breast volume outside the boost receiving 95% of the boost prescribed dose (39.5 cm³ vs. 68.2 cm³, $p < 0.001$).

Conclusions: TB change existed significantly during the WBI. Although boost volume could irradiate adequately without replanning after the shrinkage of seroma with IMRT-SIB, replanning could avoid the undesired high dose irradiation to the breast volume.

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Poster

Late Radiation Toxicity After Intraoperative Radiotherapy (IORT) for Breast Cancer: Results From the Randomized Phase III Trial TARGIT A

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Background: The first results from the randomized phase III trial TARGIT A (Vaidya et al., Lancet 2010) showed non-inferiority of intraoperative radiotherapy (IORT) compared to whole breast radiotherapy (WBRT) after breast-conserving surgery (BCS) regarding local recurrence. Here, we analyse long term toxicity.

Materials and Methods: Between February 2002 and December 2008, 109 patients were treated within the TARGIT A trial in a single center (Arm A (IORT, 20 Gy), $n = 34$ IORT, $n = 20$ IORT + WBRT (46–50 Gy); Arm B (WBRT 56 Gy) $n = 55$). Patients ($n = 196$) receiving an IORT boost followed by WBRT were used as a control. Follow-up was performed every six months during the first two years and yearly thereafter. Toxicity was assessed according to the LENT SOMA scales. Additionally mammography, ultrasound and photo documentation were done routinely. Cumulative incidences were calculated with Kaplan-Meier-estimates.

Results: In general long term toxicities were in range with the expected toxicities after radiation treatment of the breast. Fibrosis had a cumulative rate of 5.9% for Arm A IORT, 37.5% for Arm A IORT + WBRT and 18.4% for Arm B (38.2% for non-randomized control group) at 3 years. Chronic skin toxicities were very low after IORT alone (0% Arm A IORT vs. 17.5% Arm A IORT + WBRT vs. 17.7% Arm B). The calculated Hazard ratio

for all higher grade toxicities (fibrosis, telangiectases, edema, retraction, ulceration, lymphedema arm, hyperpigmentation, pain) was 0.36 for Arm A IORT in comparison to Arm B. No recurrences were seen in both Arm A and Arm B after a median follow-up of 40 months.

Conclusions: TARGIT IORT (followed by WBRT in patients with risk factors only) yields low toxicity rates and excellent local control.

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Is Pre-treatment CT Scan Helpful in the Boost Delineation for Patients Treated with Neoadjuvant Treatment in Breast Carcinomas ?

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Purpose: The benefit of boost to the tumor bed in conservative breast cancer treatment has been supported by two randomized studies. But, if the boost is recommended, the definition of the tumor bed volume could be difficult.

The aim of this pilot study is to evaluate the benefit of a CT scan before neoadjuvant treatment to improve tumor bed localization at the time of the radiation therapy.

Patient and Methods: This study concerns patients who underwent conservative surgery after neoadjuvant chemotherapy or hormonotherapy for the treatment of breast carcinomas. It was palpable breast tumor with histological proved invasive carcinomas.

A CT scan without contrast was performed using 3 mm slices, in the radiotherapy treatment position, before neoadjuvant treatment. The radiation oncologist circled the breast and the tumor with radio-opaque fiducial marker. A second CT scan was realized at the time of the radiation therapy, in the same conditions of the first one. The tumor bed were delineated on each CT scan separately, in a blind procedure, by at least 2 radiation oncologists. A matching of both exam was performed to analyze the intraobserver concordance of the delineation and the interobserver variation. The evaluation criteria was first, the boost volume concordance between pre and post-CT scan. Several others criteria will be analyzed, such as the tumor topography, the tumor size or the histological subtype, that may play a role on the boost delineation.

Results: Between June 2009 to July 2011, 25 patients underwent CT scan before neoadjuvant treatment, 22 receiving chemotherapy and 3 hormonotherapy. The median age was 45 years' old (25 to 71). It was almost stage T2 for 13 pts, 8 T3 and 4 T4. All patients underwent lumpectomy with the placement of surgical clips in the tumor bed region. The post-operative CT scan was realized at least 4 weeks after surgery. At that time the procedure is on going for a few patients. All the statistical results will be available in the beginning of 2012.

Conclusions: It's sometimes very difficult to delineate tumor bed even for experimented radiation oncologists. This study may help us to improve our technique and our multidisciplinary approach. A similar study may be done for patient eligible for partial breast irradiation.

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Overcoming Resource Restrictions: 10 Years of Intra-operative Radiotherapy in a Resource Restricted Country

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Introduction: Radiation services are at a premium in developing countries and prolonged courses of radiation tax the compliance of a largely poor and rural population. Single fraction, definitive intra-operative radiation (IORT) for breast cancer is ideal for these circumstances but currently is reserved for resource-rich environments. From 2002 to 2005 a pilot series of IORT was conducted in an extremely resource-restricted environment with adaptation of existing infrastructure. We here present long-term follow-up data.

Methods: After clinically complete tumor excision a specially developed applicator was introduced into the tumor bed. An existing after loader with an Ir192 afterloader was used to deliver 21 Gy in a single fraction to the tumor bed. Then the applicator was removed and the wound closed. Further regional and systemic oncologic management followed established protocols. Data recorded were age, menstrual status, stage, complications, recurrence and survival.

Results: Thirty nine patients were treated; the average age was 55 years (range: 35-68 years); fourteen patients had TNM stage 1, 22 stage IIA and 2 stage IIB cancers; the majority were infiltrating ductal carcinomas; the mean tumor diameter was 19 mm, 4 patients were node-positive. Early in the series, 2 patients suffered delayed wound healing; after change of the suturing technique no further problems were encountered. After a mean follow-up of 90 months, one patient suffered a local recurrence, four regional recurrences and four have systemic metastases. One patient has died of disease; 2 of unrelated causes for an overall local control rate of 95%, an overall survival of 92% and a disease-specific survival of 95%.

Conclusion: In this limited study, IORT using existing after loaders and a low cost, self-developed applicator has similar local control rates as external beam radiation (EBRT). Utilization of scarce health care resource in resource-restricted environments is greatly reduced. Consequently, the series was continued after a hiatus of 5 years due to political problems; since 2010 a further 18 patients have been treated.

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Is Post-mastectomy Irradiation Delayed by Immediate Breast Reconstruction?

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Purpose: Immediate breast reconstruction (IBR) is an option for the treatment of breast carcinomas. The consequence on post-mastectomy irradiation is not very well known.

The aim of the study was to analyze if post-mastectomy irradiation could be delayed by IBR.

Material and Methods: It's a retrospective study among 46 patients (pts) from the database of Bergonié Institute. All pts had IBR and radiotherapy(RT). Concerning IBR, three different technics were used, permanent implants, temporary skin expander or latissimus dorsi flap (LDF). Until december 2005, the technic used for post-mastectomy radiotherapy was 2D-RT. Since January 2006, a CT scan was performed for each pts allowed 3D conformal RT treatment. Some pts received neoadjuvant or adjuvant chemotherapy.

Results: Between 1998 to 2009, quarante-six pts were treated by mastectomy with IBR, latissimus dorsi flap for 20 pts, permanent implants for 7 pts and skin expander for 19. The mean age of the patient was 39 y (26 to 71) for the LDF, 50y (32 to 60) for permanent implant and 48y (33 to 71) for the skin expander.

The mean time between surgery and radiotherapy was 7.7 weeks for the pts without adjuvant chemotherapy or with neoadjuvant chemotherapy. When adjuvant chemotherapy was performed, the mean time between surgery and radiotherapy was 25.4 weeks. After 2005, in the radiation department, the data about the time between conservative surgery or radical mastectomy without reconstruction, and radiotherapy were collected. The radiation treatment was not delayed by using IBR.

All the results about the time between surgery and radiotherapy are summarized in the table.

	Pts receiving adjuvant chemotherapy		Pts receiving neoadjuvant chemotherapy or without chemotherapy	
	No. of pts	Time (wks)	No. of pts	Time (wks)
Latissimus dorsi flap	6	24.2	1	7
Permanent implant	6	25.8	14	7.6
Skin expander	16	26.1	1	7
Total	28	25.4	18	7.8

In the same time, the satisfaction of the patients was collected by subjective data, regarding the irradiation technic used, 2D vs 3D R. For 86% pts the cosmetic result was good in the 3D RT group and 82% for the 2D RT group. Nevertheless it's admitted that radiotherapy following breast reconstruction could decrease the cosmetic result.

Conclusion: This study shown that mastectomy with IBR does not delay post-mastectomy irradiation. Nevertheless, that pathern of care should be discuss in a multidisciplinary approach. A study using tomotherapy is on going to improve cosmetic result, after breast reconstruction.

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Comparison Between Two Radiation Planning Techniques for the Breast Boost in Patients Who Underwent Neoadjuvant Chemotherapy for Breast Cancer

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Background: For women undergoing breast conserving therapy boost radiotherapy on the tumor bed has been shown to significantly reduce the risk of local recurrence. Although the use of boost irradiation is recommended, the standard technique and the definition of the tumor bed volume have not been clearly established. We retrospectively analyzed two different planning techniques for the breast boost, comparing an advance boost technique on the tumor, administered with 'low dose fractionated radiotherapy' (LDFRT), and associated with neoadjuvant chemotherapy, with the standard sequential boost technique to the tumor bed, following