status, presence of positive lymph nodes, tumor grade, and, if applicable, time since treatment, ability to continue working, type of treatment (IORT or EBRT) or radiation tolerance.

Conclusions: Allowing patients to choose between two non-equivalent therapeutic options is common practice in breast cancer treatment. This study shows that some patients would choose to consider radiation treatment that is both experimental and less efficacious at local disease control, if it meets certain extra-therapeutic goals. Thus, it may be appropriate to offer additional choices in radiation.

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Sentinel node micrometastases in breast cancer do not affect prognosis: a population-based study

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Background: Sentinel node biopsy (SNB) for axillary staging in breast cancer allows the application of more extensive pathologic examination techniques. Micrometastases are being detected more often however coinciding with stage migration. Besides assessing the prognostic relevance of micrometastases and the need for administering adjuvant systemic and regional therapies, there still seems to be room for improvement. In a population based analysis we compared survival of patients with sentinel node micrometastases with those with node-negative and node-positive disease in the era after introduction of SNB.

Methods: Data from the population based Eindhoven Cancer Registry were used on all (n = 6803) women who underwent SNB for invasive breast cancer in the South-East Region of The Netherlands in the period 1996–2006.

Results: In 451 patients (6.6%) a sentinel node micrometastasis (pN_{1mi}) was detected and in 126 patients (1.9%) isolated tumor cells (pN_{itc}). Micrometastases or isolated tumor cells in the SNB did not convey any significant survival difference compared with node-negative disease. After adjustment for age, pT and grade, still no survival difference emerged (pN_{1mi}: HR 0.9 (95% CI, 0.6−1.3) and pN_{itc}: (HR 0.4 (95% CI, 0.14−1.3)) and neither was the case after additional adjustment for adjuvant systemic therapy.

Conclusion: Our practice based study showed that the presence of sentinel node micrometastases in breast cancer patients has hardly any impact on breast cancer overall survival during the first years after diagnosis.

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Health-related quality of life in patients with early stage breast cancer treated with breast conserving surgery and radiotherapy

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Background: Patient, tumour and adjuvant treatment factors can influence health-related quality of life (HRQoL). Aim was to study the impact of these factors on HRQoL in a cohort of women with early stage breast cancer treated with breast conserving therapy (BCT).

Material and Methods: Included cases were consecutive disease-free female patients treated for invasive breast cancer (stage I-III) with BCT, at the University Medical Center Groningen from 2005–2008. After completion of irradiation, HRQoL was assessed by questionnaires (EORTC QLQ-C30 and EORTC QLQ-BR23). Evaluated subscales were global health status (GHS), emotional functioning (EF), body image (BI) and sexual functioning (SF). Scores ranged from 0% to 100% and higher scores represent better HRQoL. Data were compared to a reference group [1]. Multiple linear regression analyses with Z-transformation were performed to assess the impact of patient, tumour and staging characteristics, adjuvant treatment modalities and time since local treatment on HRQoL.

Results: Questionnaires of 333 patients were available (90.2% response), with median follow-up of 32 (Interquartile range [ICR] 28−41) months. Mean age was 57.5 (Standard deviation [SD] 10.7) years at diagnosis. All subscales, except for sexual functioning, had relatively high scores and were slightly higher than reference scores, with median GHS of 83 (ICR 75–100), EF 92 (ICR 75–100), BI 100 (ICR 92–100) and SF 33 (ICR 0−33), respectively.

Regression analyses showed that high comorbidity lowered GHS with 6.5% (95% confidence interval [95% CI] 1, 12). Younger patients had more emotional problems (3%; 95% CI 1, 5) and issues with body image (2%; 95% CI 1, 4), but less with sexual functioning (−6%; 95% CI −9, −4) than older patients, in a 10 years age difference subscale. Furthermore, BI was reduced by 6% (95% CI 2, 9) in tumours >2 cm.

Conclusions: In our cohort of disease-free early stage breast cancer survivors, treated with BCT, HRQoL was excellent, except for sexual functioning. Younger women had more problems with emotions and body image, although fewer sexual problems than elderly women. These findings stress the importance to address these issues during follow-up.

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EORTC Radiation Oncology Group survey of current technological clinical practice in breast radiotherapy

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Background: The purpose of this survey was to determine the current technological clinical practice of radiation therapy of the breast in Europe.

Materials and Methods: A survey was conducted between August 2008 and January 2009 on behalf of the Breast Working Party within the EORTC Radiation Oncology Group. The questionnaire comprised 32 questions on 4 main topics: fractionation schedules, treatment planning methods, volume definitions and position verification procedures.

Results: Sixty-eight institutions out of 16 countries responded (a response rate of 47%). The standard fraction dose was generally 2 Gy for both breast and boost treatment, although a 2.67 Gy boost fraction dose is routinely given in the United Kingdom. A simultaneously integrated boost fractionation is implemented in 23% of the institutions and is the standard choice of fractionation in a third of these institutions. The main boost modality was electrons in 55%, photons in 47% and brachytherapy in 3% of the institutions (equal use of photon and electron irradiation in 5% of the institutions). All institutions used CT based treatment planning. Wide variations are seen in the definition of the breast and boost target volumes, with margins around the resection cavity ranging from 0−30 mm. Inverse planned IMRT is available in 27% and breath-hold techniques in 19% of the institutions. The number of patients treated with IMRT and breath-hold varied per institution. Electronic portal imaging for patient set-up is used by 92% of the institutions.

Conclusions: This survey has established precise details of radiotherapy techniques currently implemented for breast irradiation in Europe.

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Definitive radiotherapy in non-responded breast cancer patients after neoadjuvant chemotherapy

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Background: Patients with locally advanced breast cancer who respond poorly to initial neoadjuvant chemotherapy remain a therapeutic challenge. Results of radiotherapy in over two hundred not operated patients after neoadjuvant chemotherapy are presented in this report.

Material and Methods: Between 1992 and 2005, 215 patients with advanced breast cancer received radiotherapy due to poor respond to adjuvant chemotherapy in Maria Sklodowska-Curie Memorial Cancer Center and Institute of Oncology, Gliwice Branch, Poland. Median age was 57 years. Sixty three (29%) patients were premenopausal, 85 were Er(+), 74 (34.5%) were Er(−), 54 (25%) had not known receptor status. Ninety eight percent of patients were in III stage disease. All had radiotherapy to the breast. Supraclavicular or axillar nodes were not irradiated in 10 (4.5%) patients. Median dose to breast, breast tumor, axillar and supraclaviular nodes were 60 Gy (44−80 Gy), 70 Gy (44−81 Gy), 60 Gy (44−81 Gy), 50 Gy (42−72 Gy) respectively. After radiotherapy 137 patients (64%) had additional hormonotherapy and 51 (24%) had ultimate mastectomy.

Results: In hundred and two (47%) patients distant failure was found. Among those, 49 patients (48%) had simultaneously local failure. Thirty three (15%) patients had sole local failure. The five year locoregional control (LRC) was observed in 63% of patients. The five-year disease-free survival (DFS) and metastases-free survival (MFS) were 44% and 51% respectively. Mastectomy and hormonotherapy significantly and independently influenced treatment results. Patients who ultimately underwent mastectomy had significantly higher LRC ($p < 0.001$), longer DFS ($p < 0.001$) and MFS ($p < 0.001$). Hormonotherapy significantly increased LRC ($p < 0.001$) and DFS ($p = 0.02$).

Conclusions: High-dose radiotherapy should be given to the patients with advanced, nonoperable breast cancer who did not respond to neoadjuvant chemotherapy, because long-term tumor control could be obtain in over half of them, mastectomy can be reconsidered then. Maintenance hormonotherapy and/or ultimate mastectomy improve treatment results.

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10-year results of intraoperative electron radiotherapy (IOERT) in boost modality in breast cancer patients treated with breast conserving surgery

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Introduction: The aim of this nonrandomized study was to compare ipsilateral breast tumor recurrence rates in patients with invasive breast cancer, who had been treated with breast conserving surgery and whole breast irradiation and conventional boost or intraoperative electron radiotherapy boost (IOERT).

Patients and Methods: 378 patients were included in the study, 188 patients in group 1 (conventional boost) and 190 patients in group 2 (IOERT boost). Patients were comparable with regard to age, menopausal status, tumor size, histological type, grading and axillary lymph node status. Included were patients with invasive breast cancer pT1 and pT2, N0, N1, N2, M0, and breast conserving surgery with clear margins >3 mm. Excluded were patients with DCIS only, patients with invasive breast cancers larger than pT2, patients after primary systemic therapy and patients with multicentric disease. All patients (group 1 and group 2) received postoperative whole breast irradiation of 51–56.1 Gy. Group 1 received postoperative electron boost irradiation of 12 Gy after whole breast irradiation and group 2 received one intraoperative electron boost of 9 Gy in a single fraction during surgery before whole breast irradiation.

Results: The 10-years actuarial rates of ipsilateral breast tumor recurrence (IBTR), true local recurrence (TLR), distant recurrence (DR) and disease free survival (DFS) were 7.1% (95% CI, 3.2–11.0%), 4.8% (95% CI, 1.5−8.0%), 14.2% (95% CI, 9.1–19.4%) and 82.4% respectively in group1 and 2.7% (95% CI, 0.0−5.9%, $P = 0.062$), 0.7% (95% CI, 0.0−2.0%, $P = 0.016$), 13.6% (95% CI, 5.0–22.2%, $P = 0.90$) and 84.0% ($P = 0.76$) respectively in group 2.

Conclusion: Patients treated with IOERT boost and whole breast irradiation achieve excellent local control rates at 10 years and exhibit statistically significant decreased true local recurrence rates compared to patients treated with whole breast irradiation and conventional electron boost.

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Postmastectomy adjuvant radiotherapy in patients with less than four axillary lymph nodes: a retrospective analysis

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Background: There is no consensus as yet regarding post mastectomy radiotherapy (PMRT) for patients with <5 cm tumor having less than 4 axillary lymph nodes although the same exists for patients with 4 or more positive nodes. But several recent publications (20 year result of British Columbia Study and DBCG 82 Protocol published by Overgaard et al) challenge 'this separation between 1 to 3 and 4 or more positive axillary nodes as a relevant descriptor of indication of PMRT'. This was the impetus that led us to review and analyze retrospectively from our institute data, the impact of post mastectomy radiotherapy (PMRT) in this controversial group.

Material and Method: Records of 785 patients with T1, T2 tumors who were registered in our department following mastectomy with axilla dissection with <4 positive axillary nodes between 2002 and 2007 were analyzed. 127/785 patients had 8 or less nodes dissected (as found in histopathology reports) and as such were excluded from the analysis. Of the remaining 658 patients, **528** received no PMRT, as per consensus. But **130** patients, as found in record, had received PMRT (possibly they appeared to be non-compliant regarding follow up). Locoregional recurrence, distant failure, disease free survival and overall survival of these 130 patients were studied and compared with 528 patients who were not offered PMRT.

As per erstwhile institutional policy, all patients had received FAC chemotherapy for 6 cycles. Receptor positive patients (164/528 of non-PMRT and 42/130 of PMRT subsets) were on Tamoxifen or an A.I.

Results: At a median interval of 30 months 132/528 patients not receiving PMRT suffered locoregional recurrence (chest wall recurrence alone in 36/528, supraclavicular recurrence in 81/528, chest wall + supraclavicular recurrence in 15/528, axillary and IMN recurrence in none). On the contrary only 4/130 patients receiving PMRT had locoregional failure ($p < 0.0001$). Distant metastasis was recorded in 37/528 of non PMRT subset and 8/130 of PMRT subset (p=NS). Survival data till September 2008 showed 4/130 deaths among PMRT subset against 26/528 of non PMRT (p=NS). 121/130 of PMRT are living without disease, contrary to 432/528 of non PMRT ($p = 0.001$).

Conclusions: This retrospective analysis revealed statistically significant reduction in locoregional recurrence as well as increased disease free survival with PMRT in T1 or T2 breast cancer patients with 1−3 positive axillary nodes. Deprivation of adjuvant radiotherapy for this subset of patients appears to be unjustified.

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Loco-regional recurrence after breast conservative surgery and radiotherapy to the breast in patients with T1−2 disease and 1−3 positive axillary nodes

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Aim: To assess relapse of invasive breast cancer after conservative surgery (CS), radiotherapy (RT) to the breast, adjuvant chemo (CT)- and/or hormone-therapy.

Patients and Methods: 575 patients (median age 53.6 years; range 25−82) with T1-T2 breast cancer and 1−3 (median 1) positive axillary nodes underwent CS. A median of 19 nodes (range 8−63) were examined (<10 nodes in 12 patients; unknown number in 1). Estrogen and progesterone receptors were respectively positive in 442 and 345 cases, negative in 107 and 200, unknown in 26 and 30. Lymphovascular invasion was present in 152 cases, absent in 417, not determined in 6. All patients received whole breast RT with standard fractionation (1.8−2 Gy/fraction up to 50.4−50 Gy) with boost (dose range: 10−16 Gy) to tumor bed in 561 (97.6%). Draining nodes were never irradiated. Adjuvant CT was given to 459 (80.2%) patients, tamoxifen to 432 (75.1%) and no adjuvant systemic therapy to 3. Kaplan Meter curves and log-rank test were used for survival analyses and Cox model for multivariate analyses.

Results: Median follow-up was 7.3 years (range 1.8−10). After a median of 4.4 years (range 1.7−9.1) from CS 24 patients (4.17%) had nodal relapses in the supraclavicular region (13), axilla (2), internal mammary nodes (2), more than 1 site (3). The 10 year nodal relapse-free survival was 94% (CI 95% 90.6–96.2). After a median of 4.2 years (range 1.0−9.3) from CS 27 patients (4.7%) had local relapse. The 10 year local relapse-free survival was 92.8% (CI 95% 89.0–95.3). In univariate analysis risk factors were higher grading and negative/unknown receptor status for nodal relapse; positive, close/unknown margin status and positive/excised node ratio for local relapse. In multivariate analysis, G3 tumors significantly increased the risk of nodal relapse (HR 5.1, 95% CI: 1.6–13.8 vs G1-G2 cases). ER and/or PgR positivity afforded significant protection (HR 0.33, CI: 0.14–0.78). Increased risk of local relapse was associated with close and positive margins (HR 3.2, 95% CI: 1.3−7.5) and positive to examined axillary node ratio (HR 1.006, 95% CI: 1.001–1.01). Older age