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OFFICIAL PROCEEDINGS, Volume XVI

Scientific Session Abstracts

Scientific Session Awards

Abstracts presented at the Society's annual meeting will be considered for the following awards:

- The **George Peters Award** recognizes the best presentation by a breast fellow. In addition to a plaque, the winner receives $1,000. The winner is selected by the Society's Publications Committee.

  The award was established in 2004 by the Society to honor Dr. George N. Peters, who was instrumental in bringing together the Susan G. Komen Breast Cancer Foundation, The American Society of Breast Surgeons, the American Society of Breast Disease, and the Society of Surgical Oncology to develop educational objectives for breast fellowships. The educational objectives were first used to award Komen Interdisciplinary Breast Fellowships. Subsequently the curriculum was used for the breast fellowship credentialing process that has led to the development of a nationwide matching program for breast fellowships.

- The **Scientific Presentation Award** recognizes an outstanding presentation by a resident, fellow, or trainee. The winner of this award is also determined by the Publications Committee. In addition to a plaque, the winner receives $500.

- All presenters are eligible for the **Scientific Impact Award**. The recipient of the award, selected by audience vote, is honored with a plaque.

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Scientific Session Oral Presentations I
Friday, May 1, 2015 2:30 pm–3:40 pm
Moderators: Judy Boughey, MD; David Brenin, MD

Scientific Session Oral Presentations II
Saturday, May 2, 2015 2:45 pm–3:55 pm
Moderators: Judy Boughey, MD; Irene Wapnir, MD

Quickshot Presentations
Saturday, May 2, 2015 Noon–1:45 pm
Moderators: Steven Chen, MD; Sarah Blair, MD

Quickshot Presentations (continued)

Poster Session
Friday, May 1, 2015 6:00 pm–7:30 pm

Scientific Presentations 2015

Note: Presenter indicated with underscore.

Scientific Session Oral Presentations I

Friday, May 1, 2015 2:30 pm–3:40 pm

Moderators: Judy Boughey, MD; David Brenin, MD

Complete Blood Count and Liver Function Tests As Routine Screening in Early-Stage Breast Cancer: Value Added or Just Cost?

Louie, Raphael J.; Tonneson, Jennifer; Gowarty, Minda; Barth, Richard J.; Rosenkranz, Kari M.
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Objective Current National Comprehensive Cancer Network guidelines for newly diagnosed breast cancer include pre-treatment blood count (CBC), liver function tests (LFT) and chest x-rays to screen for occult metastatic disease. To date, the reliability of CBCs and LFTs in detecting occult metastatic disease in early-stage breast cancer (stage I and II) has not been demonstrated. This study aims to determine the value of these labs in the evaluation of patients with early-stage breast cancer. We hypothesize that these labs may be of low yield in the detection of metastatic disease and may incur emotional and financial cost when additional diagnostic tests are required to evaluate abnormal lab values.

Methods An IRB-approved retrospective chart review was conducted on patients with biopsy-proven invasive breast cancer treated in a single Comprehensive Cancer Center from January 1, 2005–December 31, 2008. Patient data, including age, radiologic and pathologic staging, results from diagnostic blood work at the time of referral, were collected. Patients were stratified according to clinical stage at the time of diagnosis. Charge data for the most common diagnostic studies were reviewed. Sensitivity and specificity were calculated for each lab test.

Results From 2005–2008, 1306 patients with biopsy-proven invasive breast cancer were evaluated through the Dartmouth Hitchcock Medical Center (DHMC) System. Patients according to stage at diagnosis were: stage I - 733, stage II - 375, stage III - 140, and stage IV - 58. All metastatic disease was diagnosed based on symptoms at presentation or by staging CT scan or bone scan of patients presenting with stage III disease. In the review of practice patterns at DHMC, abnormal CBCs did not trigger additional testing, whereas elevated LFTs warranted repeat laboratory testing and/or additional radiographic imaging. The incidences of elevated LFTs according to stage were stage I - 15%, stage II - 16.8%, stage III - 12.1%, and stage IV - 25%. The most common diagnostic tests ordered for abnormal LFTs were abdominal CT scans. In early-stage disease, 66 additional imaging studies were conducted to evaluate these lab abnormalities. No occult metastatic disease was found. The sensitivity, specificity, and positive predictive values for elevated aspartate transaminase, alanine transaminase, and alkaline phosphatase were 22.7%/92.9%/14.1%, 25%/84.7%/7.7%, and 45%/88.4%/16.7%, respectively.

Conclusion Our findings suggest that due to low sensitivity and low positive predictive value, LFTs are poor screening tests for occult metastatic disease in early-stage breast cancer. Routine use of these lab tests may not be beneficial and lead to unnecessary costs. One hundred twenty of 767 patients presenting with early-stage breast cancer had evidence of LFT abnormality. One hundred ninety thousand dollars was spent in this group on additional imaging following abnormal lab results, which did not demonstrate occult metastatic disease. Changing current guideline recommendations may reduce these additional costs both financially and emotionally. Additional cost analysis may help shape future guidelines in the assessment of newly diagnosed early-stage breast cancer.

Cost-Effectiveness of Bilateral Prophylactic Mastectomy in Patients at High Risk for Breast Cancer Without a Known BRCA Mutation

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Objective Previous comparative effectiveness studies have demonstrated the cost-effectiveness of contralateral prophylactic mastectomy in younger breast cancer patients, as well as that of bilateral prophylactic mastectomy (BPM) with bilateral salpingo-oophorectomy in women with BRCA mutations, but high-risk patients without BRCA mutations or personal history of breast cancer are not addressed. We sought to identify the particular risk level beyond which BPM becomes more cost-effective than annual breast cancer screening.
Methods Using TreeAge Pro 2014 software, we developed a Markov model with 25,000 Monte Carlo simulations and conducted sensitivity analyses to simulate the costs and effects of BPM vs screening. Model parameters, including costs, cancer incidence, and mortality rates, as well as patient preference ratings, were derived from published literature or national databases. BPM was assumed to be associated with a 90% risk reduction of breast cancer based on published findings. Analyses were conducted with and without quality adjustment by patient preference. Base-case analyses focused on patients starting at 30 years of age and assumed that a patient's lifetime risk of breast cancer would be met at age 80. The lifetime risk of breast cancer and cost of MRI screening was varied to assess their impact on results.
Results Both unadjusted and patient preference-weighted analyses demonstrate that BPM becomes more cost-effective than screening with annual mammography alone at a lifetime breast cancer risk of 50% when mean costs of BPM vs screening were estimated to be $21,042.50 and $20,980.44, respectively. At the cost of MRI based on Medicare reimbursement rates, breast cancer screening using combined mammography and MRI was never more cost-effective than BPM at any level of lifetime risk. Varying the cost of MRI demonstrated that at a lifetime risk of 20%, the threshold at which annual MRI screening is recommended by the American Cancer Society, the cost of an MRI would have to be less than $177.74 to be more cost-effective than BPM.
Conclusion In women who are at increased risk for breast cancer without a known BRCA mutation or personal history of breast cancer, BPM becomes more cost-effective than annual mammographic screening at an estimated lifetime risk of 50% and therefore should be reserved for women at markedly elevated risk. Additional screening modalities for use in high-risk women with a lower cost than MRI are needed. The results are sensitive to varying costs of screening modalities and patient preferences.

Survival Outcomes and Pathological Features Among Breast Cancer Patients Who Have Developed a Contralateral Breast Cancer

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Objective Previous reports have shown that tumor characteristics of contralateral breast cancers (CBC) are more favorable than the primary breast cancer (PBC), but few studies have examined survival outcomes between those patients who develop a CBC and those who do not when adjusting for patient and tumor factors.
Methods Utilizing the Surveillance, Epidemiology, and End Results (SEER) database, we selected 350,651 female patients newly diagnosed with noninvasive or invasive breast cancer from 1975-2005. Patients that developed a CBC at least 1 year after their PBC were identified. Women with a contralateral prophylactic mastectomy were excluded. Chi-square tests, Cox-proportional hazard regressions, and propensity score matching were utilized for analyses.
Results Overall 13,821 (3.9%) patients developed a CBC over the study period. Of the patients who developed a CBC, the mean age was 57.2 (range, 25-84), and patients developed their CBC on average 7.2 years after their PBC (1.0–30.0 years). A majority (63.5%) of node-positive PBCs developed a node-negative CBC, and only 20.2% of node-negative PBCs developed a node-positive CBC. On average the PBC measured 1.9 cm compared to 1.6 cm for the CBC ($p < 0.001$), and 58.6% of patients developed a CBC of the same size or smaller. Of the estrogen receptor (ER) positive PBCs, a minority of patients (19.7%) developed an ER-negative CBC. However, a majority of ER-negative PBCs (51.0%) developed an ER-positive CBC. Of the patients who had a lumpectomy to treat their PBC, 29.2% had a mastectomy for their CBC, and 19.8% of the patients who had a mastectomy for their PBC had a lumpectomy for their CBC. No significant changes were observed between the grade of the PBC and CBC. Survival analyses were limited to 1990–2005 to include accurate ER data, and there was a median follow-up of 10.3 years. After adjusting for patient demographics, tumor characteristics, surgery, and radiation therapy, patients who

developed a CBC had worse disease-specific survival (HR: 1.23; 95% CI, 1.16–1.30; p < 0.001) compared to their counterparts who did not develop a CBC. No difference was observed upon examining overall survival between groups (HR = 0.97; 95% CI, 0.93–1.01; p = 0.1220). In a propensity-score matched sample (N = 10,770) based on a 1:1 matching of age, race, diagnosis year, tumor size, node status, tumor grade, and ER status, similar results were observed.
Conclusion Despite the fact that CBCs tend to have more favorable tumor features than the PBC, women who develop a CBC have worse disease-specific survival compared to those who do not develop a CBC. However, chemotherapy and endocrine therapy data are not available in SEER. Additional adjustment for these adjuvant therapies may diminish the observed disease-specific survival difference between groups.

Adjuvant Endocrine Therapy in Patients With Ductal Carcinoma In Situ in the National Cancer Database
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Objective Adjuvant endocrine therapy (ET) has been shown to reduce the risk of second breast cancer events in women with ductal carcinoma in situ (DCIS), particularly among women with estrogen receptor positive (ER+) disease treated with breast-conserving surgery (BCS). There is no population-level evaluation of ET use in DCIS patients subsequent to standardized reporting of ER status in cancer registries in 2004.
Methods We conducted a retrospective cohort study of women with unilateral DCIS in the National Cancer Database between 2005 and 2011. Patient, tumor, and treatment characteristics, as well as temporal trends associated with recommendation and receipt of ET, were evaluated.
Results Among 132,948 treated DCIS patients, clinician recommendation of ET increased from 44% in 2005 to 54% in 2011 for all patients, and 54% to 63% for ER+ patients. Eleven percent (11,758) of women who were recommended ET declined therapy. Receipt of ET after BCS in ER+ patients increased from 49% to 54% (p-trend < 0.001), and decreased among ER- patients (11% to 7.5%, p-trend = 0.001). Age, year of diagnosis, race, co-morbidity index, insurance status, DCIS grade, ER status, surgical procedure, margin status, and receipt of adjuvant radiation were associated with receipt of ET on univariate analysis. On multivariable analysis, black race was positively associated with receipt of ET (Table 1). Very young (<40 years) and older (≥60 years) patients were less likely to receive ET than patients aged 50-59 years old. Patients with public insurance were less likely to receive ET than patients with private insurance (OR, 0.88; 95% CI, 0.85-0.91). Those patients who underwent unilateral mastectomy were also less likely to receive ET when compared to those who underwent BCS (OR, 0.87; 95% CI, 0.84-0.91).
Conclusion Among women treated for DCIS between 2005 and 2011, clinician recommendations for ET increased among all patients. However, receipt of therapy increased only 5% among patients undergoing BCS for ER+ DCIS, the group of women most likely to benefit from its use. Further research is needed to determine the causes of variation and decision-making factors in the recommendation and receipt of ET.

continues

Table 1. Multivariable Analysis of the Receipt of Adjuvant Endocrine Therapy Among Treated DCIS Patients From 2005-2011 in the National Cancer Database

Characteristic	OR*	95% CI*
Patient Demographics		
Age, years		
	0.75	0.69-0.82
40-49	0.97	0.94-1.01
50-59	1.0	reference
60-69	0.88	0.85-0.91
≥ 70	0.52	0.50-0.55
Race/ethnicity		
White	1.0	reference
Black	1.15	1.1-1.2
Charlson-Deyo score		
0	1.0	reference
1	1.04	1.0-1.09
2	0.91	0.82-1.01
Primary payer		
Private insurance	1.0	reference
Public insurance	0.88	0.85-0.91
Not insured	1.08	0.97-1.2
Tumor Characteristics		
ER* status		
ER-positive	1.0	reference
ER-negative	0.09	0.09-0.1
Treatment Characteristics		
Definitive surgical procedure		
BCS*	1.0	reference
Unilateral mastectomy	0.87	0.84-0.91
Radiation treatment		
No radiation	1.0	reference
Whole-breast radiation	3.49	3.37-3.61

Multivariable logistic regression models were adjusted for age, year of diagnosis, race, co-morbidity index, insurance status, DCIS grade, ER status, surgical procedure, margin status, and receipt of adjuvant radiation.
*OR, odds ratio; CI, confidence interval; ER, estrogen receptor; BCS, breast-conserving surgery.

Tumor Expression of Vitamin D Receptor and Breast Cancer Histopathological Characteristics and Prognosis

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Objective Vitamin D may have anti-neoplastic properties. Our previous work has shown low-serum vitamin D levels in association with aggressive breast cancer, including estrogen receptor (ER) negative and triple-negative (TN) subtypes. Vitamin D receptor (VDR) is indispensable for vitamin D-mediated transcriptional regulation, and it is expressed in many organs, including breast. In this study, we examined the relationships between breast tumor

VDR expression and histopathological characteristics and patients survival, which have not been well studied in a large patient population.
Methods VDR expression in breast tumor tissue microarrays was determined by immunohistochemistry (IHC) in 1,114 female breast cancer tumors as negative, moderate, and strong expression based on an immunoreactive score calculated by average intensity score times percentage of positive nuclei score. Using chi-square test and logistic regression, VDR expression was examined with tumor histopathological characteristics, including tumor size, nuclear grade, IHC subtype, number of positive lymph nodes, ER, progesterone receptor (PR), and human epidermal growth factor-2 receptor (Her-2/neu), as well as tumor proliferative ability indicated by Ki-67 expression. VDR expression was also examined in relation to survival outcomes, including progression-free survival (PFS), breast cancer-specific survival (BCSS), and overall survival (OS) using Kaplan-Meier estimation and Cox proportional hazards model. Statistical analyses were performed using SAS v9.3 with a two-sided type I error rate of 0.05.
Results 42.7%, 31.8% and 25.4% of the patients had negative, moderate and strong VDR expression, respectively. Compared to negative VDR expression, moderate and strong VDR expression were associated, respectively, with 37% (OR = 0.63; CI, 0.45-0.87) and 55% (OR = 0.45; CI, 0.32-0.64) lower risk of large vs small (<2 cm) tumors; 50% (OR = 0.50; CI, 0.35-0.71) and 65% (OR = 0.35, CI, 0.24-0.53) lower risk of being ER-negative vs ER-positive tumors; 37% (OR = 0.63; CI, 0.45-0.87) and 50% (OR = 0.5; CI, 0.36-0.7) lower risk of being PR-negative vs PR-positive tumors; and 40% (OR = 0.6; 95% CI, 0.35-1.01) and 70% (OR = 0.3; 95% CI, 0.16-0.58) lower risk of TN vs luminal A cancer (all P for trend ≤ 0.001), with adjustment for age at diagnosis and family history of breast cancer. No statistically significant association was found with the number of positive lymph nodes or Her-2/neu status, and the associations did not differ by menopausal status. In addition, there were some suggestive inverse associations of VDR expression with histological grade and Ki-67 expression, which were limited to postmenopausal patients. In contrast to the associations with tumor histopathological characteristics, VDR expression was not associated with PFS, BCSS, or OS, except for a suggestively better BCSS seen in postmenopausal patients with moderate VDR expression (OR = 0.49; CI, 0.24-1.03) but not in patients with strong VDR expression.
Conclusion VDR is expressed in a majority of breast cancer tumors, and the expression is inversely associated with more aggressive breast cancer histopathological characteristics, including large tumor size, high histological grade, Ki-67 expression, negative ER and PR status, and the TN subtype. These findings corroborate our previous work demonstrating an inverse association of circulating vitamin D levels with aggressive breast cancer characteristics. However, VDR expression is not associated with breast cancer survival in our study. Our findings support a protective effect of vitamin D against the occurrence of more aggressive breast cancer subtypes, but the prognostic value of breast tumor VDR expression may be limited.

Scientific Session Oral Presentations II

Saturday, May 2, 2015 2:45 pm–3:55 pm

Moderators: Judy Boughey, MD; Irene Wapnir, MD

Competing Risks of Death in Older Women With Breast Cancer and Comorbidities

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Objective Assessing operative candidacy in an aging population can be challenging because of their increasing breast cancer risk and increasing comorbidities. This study was performed to assess the relative benefit of breast cancer surgery in older women who have comorbidities by determining their risk of death from breast cancer and risk of death from other causes.
Methods Using the SEER Medicare database, 85,597 women were identified who were diagnosed at age ≥ 66 years with AJCC stage I-III noninflammatory invasive breast cancer between 2001 and 2008. After initiating treatment, mortality from breast cancer and other causes was assessed at 6 and 12 months and adjusted for age, Charlson comorbidity index (CCI), surgery type, prior cancer diagnosis, and stage via competing risk regression models run separately by surgery status.
Results Overall these women were about twice as likely to die from non–breast cancer related causes than from their breast cancer (1.23% vs 0.58% within 6 months and 2.81% vs 1.40% within 12 months of first treatment, unadjusted). The greatest predictor of mortality was the CCI, which increased with increasing age (mean CCI = 0.47 at 66 years vs 0.73 at 85 years) and stage (mean CCI = 0.54 for stage I, 0.64 for stage II, and 0.71 for stage III).

When compared with patients having no comorbidities (CCI = 0), patients having a CCI = 1 had a higher likelihood of dying from both breast cancer and other causes at 6 and 12 months ($p < 0.0001$ for each, Table 1). A higher risk of non–breast cancer related death becomes more pronounced with each interval increase in CCI, compared with breast cancer–related death (Table 1). When CCI ≥ 4, patients have an approximate 3-fold increase in death from non–breast cancer causes as compared with the risk of death from their breast cancer. These findings persist in women managed without operative intervention and when measured from the time of cancer diagnosis (Table 1).
Conclusion In older women who have comorbidities, there is a substantially lower risk of dying from breast cancer than from other causes, whether or not they undergo surgical treatment. This data should be considered when having an informed consent discussion with older patients after diagnosis about the degree of benefit from operative intervention. We are currently developing a nomogram to assist in the assessment of operative candidacy for the treatment of breast cancer in older women.

Table 1. Predicted Mortalities After Diagnosis and Treatment From Breast Cancer and Other Causes

	6-Month Mortality*				12-Month Mortality*			
	Nonoperative Management		Surgical Treatment		Nonoperative Management		Surgical Treatment	
Charlson Comorbidity Index	Breast Cancer COD (%)	Other COD (%)	Breast Cancer COD (%)	Other COD (%)	Breast Cancer COD (%)	Other COD (%)	Breast Cancer COD (%)	Other COD (%)
0	8.8	7.5	0.5	0.8	14.1	10.9	1.2	1.9
1	11.1	10.5	0.7	1.5	16.9	16.0	1.7	3.3
2	12.8	14.3	1.0	2.5	18.8	22.1	2.2	5.3
3	12.8	18.3	1.3	3.7	18.4	27.5	2.7	7.5
4	11.4	22.2	1.6	5.1	16.2	31.9	3.3	9.8
5	9.6	26.4	2.0	6.5	13.5	35.6	3.8	12.3
6	7.9	31.0	2.4	8.4	11.1	39.5	4.4	15.2
7	6.6	36.1	2.9	10.7	9.1	43.5	5.1	18.7
8	5.5	41.9	3.5	13.5	7.5	47.8	5.9	22.8
9	4.5	48.1	4.2	16.9	6.1	52.9	6.8	27.6
10	--	--	5.0	21.1	--	--	7.9	33.0

COD, cause of death.
*Predicted probability of mortality estimated from competing risk regression models for specified levels of CCI, adjusting for patient's age, stage, type of surgery, and prior cancer status.

Overall Survival, Disease-Free Survival, and Nipple-Areolar Recurrence in the Setting of Nipple-Sparing Mastectomy: A Meta-Analysis
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Objective Surgical management of breast cancer has evolved since the Halsted era to preserve the breast skin envelope and nipple-areolar complex for enhanced cosmetic results. However, concerns exist regarding oncological safety of nipple-sparing mastectomy (NSM) due to potential for residual glandular breast tissue to harbor future cancer. The current study serves as a meta-analysis to evaluate overall survival (OS), disease-free survival (DFS), and nipple-areolar recurrence (NAR) in women undergoing NSM.
Methods A systematic literature review identified peer-reviewed studies published from 1991 to 2014 in MEDLINE, EMBASE, Cochrane Library, and PubMed, using key search terms (nipple-sparing mastectomy, subcutaneous mastectomy, and skin-sparing mastectomy). Two reviewers independently screened and selected articles using specific inclusion criteria. Descriptive statistics were determined using SPSS 22.0. An independent-samples *t* test compared mean OS, DFS, and NAR.
Results An analysis of 18 studies included 2,332 patients followed for an average of 44.7 months (range, 10.5-156). The mean patient age was 46.5 years (range, 35.6-52.8). Of 2,538 NSMs performed, 403 were prophylactic and 2,135 were therapeutic. The most common pathology was invasive ductal carcinoma (IDC). The majority of patients had stage I disease and 268 patients had positive lymph nodes. Average OS, DFS, and NAR were 96.3%, 90.9%,

and 1.3%, respectively. Subgroup analyses compared studies evaluating only therapeutic NSM to studies evaluating both therapeutic and prophylactic NSM. The therapeutic subgroup included 8 studies with 1,476 patients followed for an average of 68.5 months (range, 21.7-156). The most common pathology was IDC. The most common presentation was evenly distributed between stages I and II, and 179 patients had positive lymph nodes. The combined therapeutic and prophylactic subgroup included 10 studies with 856 patients followed for an average of 25.7 months (range, 10.5-50.3). The most common pathology was IDC. The majority of patients had stage I disease, and 89 patients had positive lymph nodes. In the therapeutic subgroup, OS (93.0%) and DFS (84.2%) were less than in the combined subgroup (OS = 99.0% and DFS = 96.2%). NAR was greater in the therapeutic subgroup (2.6%) compared to the combined subgroup (0.4%). Differences in mean OS ($p = 0.006$), DFS ($p = 0.012$), and NAR ($p = 0.001$) between subgroups were all statistically significant.

Conclusion This meta-analysis confirms NSM's oncological safety. However, subgroup analysis demonstrates significant differences in outcomes of therapeutic versus combined therapeutic and prophylactic NSM. Future studies need to stratify patients based on indication for NSM. Use of prospective data registries, notably the Nipple Sparing Mastectomy Registry, will aid further characterization of outcome measures.

Summary of Published Studies on Nipple-Sparing Mastectomy Outcomes

Study	Year	Patients (n = 2332)	Follow-up (months)	Overall Survival (%)	Disease-Free Survival (%)	Nipple-Areolar Recurrence (%)
Adam	2014	67	36.0	98.0	94.1	0
Alperovich	2013	8	10.5	100	100	0
Benediksson	2007	216	156	76.4	51.3	4.0
Crowe	2008	110	41.0	99.1	96.3	0.7
De Alcantara-Filho	2011	200	10.4	99.5	99.5	0
Gerber	2003	61	59.0	85.2	72.1	1.5
Jensen	2011	99	60.2	100	100	0
Kim	2010	152	60.0	97.1	89.0	-
Nava	2011	65	36.0	98.1	94.9	0
Poruk	2014	130	25.8	96.9	96.9	0
Rulli	2013	77	50.3	100	92.2	2.0
Sacchini	2006	123	24.6	99.2	95.9	0
Sakurai	2013	788	87.0	93.0	86.0	3.7
Shi	2012	35	68.0	94.2	88.6	5.4
Sood	2014	87	30.0	100	91.9	0.9
Sookahn	2008	20	10.5	100	100	0
Tancredi	2013	58	21.7	100	92.8	3.4
Voltura	2008	36	18.0	97.2	94.4	0

Assessment of Practice Patterns Following Publication of the SSO-ASTRO Consensus Guidelines on Margins for Breast-Conserving Therapy With Whole-Breast Irradiation in Stage I and II Invasive Breast Cancer

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Objective Recently published SSO-ASTRO consensus guidelines on margins for breast-conserving surgery with whole-breast irradiation in stage I and II breast cancer concluded that "no ink on tumor" was the standard for an adequate margin. However, it is currently unknown how the publication of this consensus guideline is aligned with current clinical practice. This study was undertaken to determine how surgeons in current practice clinically approach tumor margins in different clinical scenarios.

Methods A survey was sent electronically to 3,057 members of The American Society of Breast Surgeons (ASBrS). Questions assessed respondents' clinical practice type and duration, familiarity with the recently published guidelines, and provided 5 different clinical scenarios to assess preferences for additional margin excision based on pathologic margin width.
Results Of those surveyed, 777 (25%) of ASBrS members responded. Most (92%) indicated familiarity with the recently published guidelines. Of those respondents familiar with the guidelines, almost all (n = 678, or 95%) would perform re-excision all of the time or most of the time when tumor extended to the inked margin. In contrast, very few (n = 9, or 1%) would perform re-excision all of the time or most of the time when tumor was within 2 mm of the inked margin. Thirteen percent of respondents stated they would re-excise margins all of the time or most of the time in triple receptor negative breast cancer (n = 90) when tumor was within 1 mm of the inked margin. Three hundred and fifty-three respondents (50%) would perform re-excision all of the time or most of the time when imaging and pathology were discordant, and tumor was within 1 mm of multiple margins. Finally, 330 (46%) would perform re-excision all of the time or most of the time when an invasive tumor was present with extensive ductal carcinoma in situ (DCIS) with multiple foci of DCIS extending to within 1 mm of multiple inked margins and ducts with cautery artifact present at the margin.
Conclusion Surgeons are in agreement with the SSO-ASTRO guidelines to re-excise margins when tumor touches ink and to not re-excise margins when tumor is close to (but not at) the inked margin. However, for more complex scenarios, surgeons are utilizing clinical judgment to determine the need for re-excision.

What's a Breast Surgeon Worth? A Salary Survey of The American Society of Breast Surgeons
Manahan, Eric[6]; Wang, Li[2]; Dickson-Witmer, Diana[4]; Holmes, Dennis R.[5]; Chen, Steven[3]; Kass, Rena[1]
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Objective Breast surgeons negotiating employment agreements, either in private practice or with a hospital, have little publicly available national data to which they can refer. To reduce this knowledge gap, the Education Committee of The American Society of Breast Surgeons (ASBrS) elected to conduct a survey of current members of the Society.
Methods In 2014, anonymous online questionnaires were sent to all active members of ASBrS. Data collected included gender, type of practice, percent of practice devoted to breast surgery, volume of breast cases treated annually, wRVUs, location, benefits, and salary. Descriptive statistics were created for all categories and a multinomial logistic regression was performed to analyze the impact on salary of various potential factors.
Results Of the 2,784 members, 937 responses were obtained, 40 of which were outside the U.S. and thus excluded from the analysis. Fifty-four percent (479) of respondents dedicated 100% of their practices to breast surgery, 65% (575) were female, and 41% (362) were fellowship-trained in breast surgery or surgical oncology. The mean years-of-experience in practice was 16 years. Thirty-five percent (310) of respondents were hospital-employed, 20% in academic practice, and 45% in solo or group practice. The mean income in 2013 was $320K, with 6% lower than $150K and 12% more than $500K. Forty-four percent of respondents reported productivity-based bonuses. Results from fitting a multinomial model showed that gender ($P < 0.0001$), years of practice ($P < 0.0001$), practice setting ($P < 0.0001$), practice volume ($p < 0.0001$), proportion of breast surgery ($p = 0.02$) were statistically significant factors, with geographic location ($p = 0.07$) being marginally significant. After adjusting for other variables, the expected income was higher for males ($360K vs $305K) and generally increased with experience ($282K for experience of 5 years or less and up to $353K for experience of 20-30 years but down to $319K for experience of 30 years or more). The lowest expected income by practice setting was in solo private practice ($288K), followed by academic ($308K) and single-specialty private practice ($313K), with the highest being multispecialty group private ($341K) and hospital-employed practice ($343K). Practice 100% dedicated to breast surgery had a lower expected income ($315K vs $336K). The expected income by region from lowest to highest was Northwest (300K), Southeast (312K), Northeast ($315K), Southwest ($328K), Midwest (348K), and noncontiguous state or territory ($352K).
Conclusion Publicly available salary-specific data for breast surgeons are limited and this survey represents the first large sampling of our society. Differences in salary were seen across geographic regions, type of practice, and gender. Although this study was not designed to investigate the underlying causes of these discrepancies, this type of breast surgeon-specific data is essential to ensure fair and equitable compensation in this specialty.

A Biopsychosocial Intervention Program for Improving Quality of Life in Breast Cancer Survivors—Results of a Prospective Randomized Trial

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Objective There are 2.9 million breast cancer survivors in United States; this number is expected to be 3.7 million by 2022. Therefore, biopsychosocial issues of survivorship are increasingly important. A prospective randomized trial was designed to assess the impact of biopsychosocial intervention (BPSI), a 4-hour Change Cycle Model™ coping skills class, on the quality of life of breast cancer survivors utilizing Functional Assessment of Cancer Therapy–Breast (FACT-B) instrument.

Methods A prospective randomized trial was designed; intervention arm included a 4-hour biopsychosocial coping skills class using the Change Cycle Model once a month (BPSI); control arm received standard of cancer and follow-up care (SOC). Women diagnosed within 2 years of study initiation were eligible. Sample size was calculated based on 10-point difference in FACT-B score, with 90% power, 5% type I error, and 20% attrition. FACT-B questionnaire was administered to all patients at baseline and at 6-month intervals. One-year data are presented. SAS 9.3 software was used to analyze data using chi-square test for categorical variables and Wilcoxon rank sum for ordinal level data; linear mixed modeling was used for longitudinal analysis.

Results One hundred and twenty patients were randomized; 102 patients were available for analysis. Forty-seven patients were in BPSI arm, and 56 received SOC. The median (interquartile range) age [60 (52,68) vs 58 (52,68) yr, p = 0.9135], cancer stage [0:1:2:3 = 11%:41%:35%:13% for BPSI; 18%:46%:22%:15% for SOC; p = 0.4645], and biology [triple negative:HER2+:ER+ in BPSI = 9%:74%:17% for BPSI; 8%:72%:20% p = 0.8454] was similar across both groups. There were statistically difference in insurance status [commercial:underinsured = 64%:36% for BPSI; 42%:58% for SOC; p = 0.0413] and treatments [lumpectomy:mastectomy for BPSI = 85%:15%; for SOC = 60%:40%, p = 0.0110] [chemotherapy for BPSI:SOC = 60%:30%; p = 0.0141] [radiation therapy for BPSI:SOC = 90%:77%; p = 0.1024]. Adjusting for these confounders had little impact on overall quality of life measured by FACT-B scores. FACT-B was not significantly different from baseline at 6-month follow-up; however, at 1-year follow-up the intervention arm had significantly better overall and domain-specific quality-of-life scores, except additional breast cancer–specific concerns (Table). The difference between BPSI and SOC at 6 months also significantly improved by 1-year follow-up.

Conclusion Biopsychosocial intervention utilizing a 4-hour Change Cycle Model coping skills class significantly improved the quality of life of breast cancer survivors by 1 year post intervention.

Comparison of Biopsychosocial Intervention With Standard of Care in Terms of Quality of Life of Breast Cancer Survivors

	6-month			12-month			
	Mean (SE)		p value	Mean (SE)		p value	Interaction p value (a)
Quality of Life Domain	BPSI	SOC		BPSI	SOC		
Physical well-being	22.17 (0.59)	22.49 (0.53)	0.6858	24.25 (0.79)	18.46 (0.68)	<0.0001	<0.0001
Social well-being	22.98 (0.68)	23.70 (0.61)	0.4365	25.45 (0.77)	19.35 (0.66)	<0.0001	<0.0001
Emotional well-being	19.93 (0.48)	19.58 (0.44)	0.5929	21.90 (0.70)	16.43 (0.61)	<0.0001	<0.0001
Functional well-being	22.59 (0.67)	21.53 (0.61)	0.2411	24.32 (0.78)	18.42 (0.67)	<0.0001	0.0003
Additional breast cancer–specific concerns	26.75 (0.88)	27.30 (0.78)	0.6428	28.33 (0.96)	27.96 (0.83)	0.7702	0.4364
FACT-G	87.81 (1.61)	87.23 (1.45)	0.7900	96.04 (2.54)	72.65 (2.18)	<0.0001	<0.0001
FACT-B	115.06 (2.22)	114.58 (1.97)	0.8716	124.65 (2.78)	101.45 (2.40)	<0.0001	<0.0001

BPSI = Biopsychosocial intervention, SE = standard error, FACT = Functional Assessment of Cancer Therapy (G = General, B = Breast)

(a) = p value for time point × treatment arm (ie, whether BPSI vs SOC difference differs at 6 and 12 months)

Quickshot Presentations

Saturday, May 2, 2015 Noon–1:45 pm

Moderators: Steven Chen, MD; Sarah Blair, MD

Biologic vs Socioeconomic Causes for Late-Stage Breast Cancer in African-American Women

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Objective It is well known that African-American women tend to present with later stage breast cancer than white women. Initially it was felt that this was primarily due to socioeconomic and health access issues. However, in the past few years it has been realized that there may also be biological tumor differences that could contribute. Starting in 2010, the National Cancer Database (NCDB) began collecting data on Her2 expression, so this allows identification of molecular subtype in these patients. As a result, it is now possible to evaluate the influence of more sophisticated biologic factors along with socioeconomic factors within the same large dataset.

Methods The study population consisted of all white and African-American women with invasive breast cancer and known tumor stage diagnosed in 2010 or 2011 in the NCDB. Early stage was defined as AJCC stage 1 or 2, whereas late stage was defined as stage 3 or 4. Biologic factors consisted of patient age at diagnosis, tumor grade, and molecular subtype. Socioeconomic factors consisted of insurance status, and census-derived median income and education for the patient's ZIP code.

Results There were 308,810 patients who met the inclusion criteria of whom 37,772 (12%) were African-American and 49,189 (16%) were late stage. The table shows univariate associations between the identified biologic and socioeconomic variables and race and late stage. Multivariate logistic regression models to predict stage at diagnosis were created in which race was combined with biologic variables, socioeconomic variables, or both. The odds ratio for late-stage disease among African-American women was 1.62 (95% CI, 1.58–1.67) for race alone, 1.37 (95% CI, 1.33–1.41) for race adjusted for biologic variables, 1.38 (95% CI, 1.34–1.42) for race adjusted for socioeconomic variables, and 1.21 (95% CI, 1.17–1.25) for race adjusted for both biologic and socioeconomic variables.

Conclusion Tumor biologic factors and patient socioeconomic factors are of similar importance and each accounted for about 35% of the excess late-stage cancer in African-American women. About 30% of the excess is not explained by the variables available in the NCDB.

continues

Association of Biologic and Socioeconomic Factors to Race and Stage

Biologic and Socioeconomic Factors	Race			Stage		
	White	Black	P value	Early	Late	P value
Age	77%	23%	<0.001	74%	26%	<0.001
31-40	82%	18%		78%	22%	
41-50	85%	15%		83%	17%	
51-60	86%	14%		83%	17%	
61-70	89%	11%		86%	14%	
>70	91%	9%		85%	15%	
Grade 1	92%	8%	<0.001	95%	5%	<0.001
2	90%	10%		86%	14%	
3	82%	18%		77%	23%	
Molecular Type ER/PR+, Her2-	90%	10%	<0.001	87%	13%	<0.001
ER/PR+, Her2+	87%	13%		79%	21%	
ER/PR-, Her2+	84%	16%		73%	27%	
ER/PR-, Her2-	78%	22%		81%	19%	
Insurance Not Insured	77%	23%	<0.001	69%	31%	<0.001
Private insurance	89%	11%		86%	14%	
Medicaid	73%	27%		72%	28%	
Medicare	90%	10%		85%	15%	
Other government	85%	15%		84%	16%	
Unknown	84%	16%		80%	20%	
Income	68%	32%	<0.001	80%	20%	<0.001
$30,000-$34,999	86%	14%		83%	17%	
$35,000-$45,999	89%	11%		84%	16%	
$46,000+	93%	7%		86%	14%	
Education* >=29%	71%	29%	<0.001	80%	20%	<0.001
20-28.9%	83%	17%		83%	17%	
14-19.9%	91%	9%		84%	16%	
<14%	94%	6%		86%	14%	

*Percent with no high school diploma.

Single-Institution Experience With Lymphatic Microsurgical Preventive Healing Approach (LYMPHA) for the Primary Prevention of Lymphedema

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Objective The incidence of breast cancer–related lymphedema is as high as 40% in patients undergoing axillary lymph node dissection (ALND) and radiation. We report our experience performing lymphatic-venous anastomoses (LVA) using Lymphatic Microsurgical Preventive Healing Approach (LYMPHA) at the time of axillary node dissection. This preventative microsurgical procedure was first described by Boccardo, Campisi et al in 2009.
Methods Female patients with node-positive breast cancer requiring ALND were offered LYMPHA. Exclusion criteria included allergy to lymphazurin blue dye, pregnancy, and pre-existing lymphedema. Following ALND, a skilled microvascular surgeon performed LVA. Axillary reverse mapping (ARM) using blue dye injected in the ipsilateral upper arm allowed for the identification and preservation of afferent lymphatic vessels, 1–3 (mean, 1.5) were sutured into a branch of the axillary vein distal to a competent valve. Both pre- and post-operative lymphatic flow was evaluated using lymphoscintigraphy. Limb volume was assessed via circumferential arm measurements and (L-Dex®) bio-impedance spectroscopy.
Results Over 18 months, 29 patients were enrolled for LYMPHA. The majority had locally advanced disease, 48% receiving preoperative chemotherapy. One patient withdrew consent prior to surgery. LVA was successfully performed in 22 patients (76%). The 6 patients unable to undergo LYMPHA had no suitable lymphatic (1), vein (3), or both (1) identified. Extensive axillary disease precluded anastomosis in 1 patient. Of the 22 patients undergoing bypass, 18 had mastectomy, the remainder breast-conserving therapy. Mean current follow-up is 9.5 months (range, 1-18). Twenty-one of 22 patients (95%) had informative, normal, preoperative lymphoscintigraphy (LS). Among completed patients, 2 (9%) developed clinically apparent lymphedema; both have since resolved. Transient lymphedema in 1 of these patients followed postoperative chemo-radiation with symptoms locally around the site of a recent melanoma in situ excision. Three-month post-op LS showed patent LVA in 12 of 14 patients (85%). At 18-month post-op LS, 3 of 3 patients had patent LVA (100%). Subclinical limb volume increases defined by L-Dex® values and/or increased mid–upper arm measurements developed in 7 of 22 patients (32%), 4 of whom received radiation. Of these 22 patients, 4 (18%) had abnormal L-Dex® values and 6 (27%) had increased mid–upper arm circumferences (mean, 2.6 ± 0.9 cm; range, 2.0–4.0 cm). Among the 6 patients without LYMPHA, persistent lymphedema developed in 1 (16%). We estimate that performing LYMPHA added 45 min to operative time. No procedure-related complications were reported.
Conclusion LVA using LYMPHA is an important technique for the primary prevention of breast cancer–related lymphedema. In this highest risk group of patients, our clinical lymphedema rate was 9% and no LYMPHA patient developed permanent lymphedema, significantly lower than the 40% previously reported. Subclinical volume increase was noted in 32%, half of whom had received radiation. Given the strong association between radiation and secondary lymphedema/increased limb volume, modifying post-LYMPHA radiation technique may further reduce lymphedema risk. More experience with LYMPHA will allow us to refine our technique and patient selection criteria.

Multi-Gene Panel Testing Detects Equal Rates of Pathogenic BRCA1/2 Mutations and Has a Higher Diagnostic Yield Compared to Limited BRCA1/2 Analysis Alone in Patients at Risk for Hereditary Breast Cancer

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Objective After the Supreme Court ruling of *Association for Molecular Pathology v. Myriad Genetics,* patients at risk for hereditary breast and ovarian cancer were able to undergo expanded multigene panel testing with BRCA1 and BRCA2 (BRCA1/2) primarily, rather than in sequence after initial BRCA1/2 testing. Concerns with newer panel testing include inability to detect all deleterious mutations in BRCA1/2 and high rates of genetic variants of uncertain significance (VUS). The purpose of this study is to evaluate the rate of pathogenic BRCA1/2 mutation detection and VUS detection between previous restricted methods of gene testing and newer multigene panel testing.

Methods Data were collected retrospectively from patients who underwent genetic testing between January 2008 and September 2014 at 1 of 3 sites from a single institution. Patients were evaluated by a breast surgeon and/or a risk assessment counselor at time of visit if they met criteria for genetic testing based on National Comprehensive Cancer Network (NCCN) guidelines. Patients were excluded from the study if they underwent only targeted genetic testing for a known family mutation. Patients who underwent multigene panel testing were excluded if they had prior BRCA1/2 testing. Genetic testing results were compared between patients who underwent limited BRCA1/2 testing, including multisite testing (Ashkenazi panel) or full BRCA sequence testing with or without large rearrangement testing (limited testing group), to patients who underwent multigene panel testing consisting of a minimum of 5 breast cancer–related genes, including BRCA1, BRCA2, PTEN, TP53, CDH1, and up to 28 cancer-related genes (panel testing group).
Results A total of 973 patients underwent genetic testing; 355 patients underwent panel testing and 618 underwent limited BRCA1/2 testing only. Deleterious BRCA1/2 mutations were identified in 34 patients (3.5%). There was no difference in the rate of detecting BRCA1/2 mutations between limited and panel testing groups (3.6% vs 3.4%, respectively; p = 1.0). Thirty-nine patients (4.0%) were found to carry a VUS in a BRCA1/2 gene and this was similar between limited and panel testing groups (4.0% vs 3.9%, respectively; p = 1.0). Of patients undergoing panel testing, an additional 3.9% (n = 14) were found to harbor non-BRCA pathogenic mutations and an additional 10.1% (n = 36) had non-BRCA VUS. Mutations in PALB2, CHEK2, MUTYH, and ATM accounted for some of the more common additional non-BRCA mutations identified (n = 10, 2.8%). The most frequent non-BRCA VUS was in the ATM gene (n = 11, 3.1%).
Conclusion In this series, multigene panel testing detected pathogenic BRCA mutations at equivalent rates as limited BRCA1/2 testing and led to increased diagnostic yield. Multigene panel testing does increase the rate of detecting VUS; however, variant genes are more likely to be non-BRCA genes. Patients at risk for hereditary cancer syndromes can benefit from upfront, more efficient, multigene panel testing without any sacrifice to BRCA testing capability.

Axillary Ultrasound Findings Correlate With Nodal Metastatic Burden, But Standardized Reporting Is Needed

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Objective Post-Z0011, use of axillary ultrasound (AUS) for preoperative staging is controversial. Defining a role for AUS depends on its ability to discriminate between heavy (≥ 3 positive nodes, an exclusion criterion in Z0011) and minimal (0–2 positive nodes) metastatic burden. This study examined the relationship of AUS findings to nodal metastatic burden and the relationship of clinicopathologic characteristics to AUS sensitivity/specificity.
Methods From an institutional database, all newly diagnosed invasive ductal (IDC), lobular (ILC), or mixed ductal/lobular breast carcinomas from February 2011 through June 2013 with both preoperative AUS and surgical axillary staging were identified. Exclusion criteria were palpable adenopathy, neoadjuvant chemotherapy, or previous axillary surgery. AUS results, categorized as suspicious or not suspicious, were correlated with number of involved nodes on surgical pathology. For specific AUS abnormalities, sensitivity and specificity for ≥ 3 positive nodes were determined. Clinicopathologic characteristics were examined for association with AUS sensitivity/specificity.
Results Two hundred thirty-five IDC (74%), 38 ILC (12%), and 43 mixed (14%) tumors were included. Thirty-three tumors (10%) had ≥ 3 positive axillary nodes. For predicting ≥ 3 positive nodes on surgical staging, AUS was 73% sensitive and 80% specific (table). The most frequent AUS abnormalities were diffuse cortical thickening >3 mm (18%), ipsilateral nodal enlargement >10 mm (8%), and cortical nodule or asymmetric thickening (5%). Of these, the most sensitive for ≥ 3 positive nodes was diffuse cortical thickening (sensitivity, 61%; specificity, 87%), followed by ipsilateral nodal enlargement (sensitivity, 21%; specificity, 93%). No clinicopathologic characteristic studied (body mass index, age, histologic type, tumor size, ER, PR, HER2, Ki-67, lymphovascular invasion) was significantly associated with AUS sensitivity/specificity. However, higher prevalence of nodal metastasis in ILC made the negative predictive value for ≥ 3 involved nodes lower in ILC (87%) than IDC/mixed (98%, p = 0.02). Thus, among tumors with normal AUS, 13% of ILCs (n = 4) had ≥ 3 positive nodes, compared to 2% (n = 5) of IDC/mixed tumors (p = 0.02).
Conclusion AUS is useful to identify patients with ≥ 3 positive nodes. Inability of clinicopathologic characteristics to identify a subset of cancers in which AUS performs better emphasizes the need for a validated reporting scheme for AUS, analogous to BI-RADS, to better discriminate between minimal vs heavy nodal metastatic burden.

Although this study examined specific AUS abnormalities' relationship to nodal burden, lack of systematic recording could cause error in assessing these relationships. Further study is planned with systematic recording of AUS abnormalities and correlation with nodal metastatic burden as a step toward development of a validated reporting scheme for AUS.

Axillary Ultrasound Findings vs Number of Axillary Nodal Metastasis

AUS Findings			0 Positive Nodes (*n* = 234)	1-2 Positive Nodes (*n* = 49)	3 Positive Nodes (*n* = 9)	4-9 Positive Nodes (*n* = 12)	≥9 Positive Nodes (*n* = 12)
Overall suspicious AUS (*n* = 316)	No (*n* = 235)	IDC/mixed (*n* = 204)	172 (84%)	27 (13%)	3 (1%)	1 (<1%)	1 (<1%)
		ILC (*n* = 31)	20 (65%)	7 (23%)	0	3 (10%)	1 (3%)
	Yes (*n* = 81)	IDC/mixed (*n* = 74)	42 (57%)	14 (19%)	5 (7%)	7 (9%)	6 (8%)
		ILC (*n* = 7)	0	1 (14%)	1 (14%)	1 (14%)	4 (57%)
Diffuse cortical thickening >3 mm (*n* = 316)	No (*n* = 260)		209 (80%)	38 (15%)	3 (1%)	7 (3%)	3 (1%)
	Yes (*n* = 56)		25 (45%)	11 (20%)	6 (11%)	5 (9%)	9 (16%)
Ipsilateral nodal enlargement >10 mm (*n* = 316)	No (*n* = 290)		221 (76%)	43 (15%)	9 (3%)	8 (3%)	9 (3%)
	Yes (*n* = 26)		13 (50%)	6 (23%)	0	4 (15%)	3 (12%)
Cortical nodule or asymmetric cortical thickening (*n* = 316)	No (*n* = 301)		223 (74%)	47 (16%)	9 (3%)	11 (4%)	11 (4%)
	Yes (*n* = 15)		11 (73%)	2 (13%)	0	1 (7%)	1 (7%)

Data for 316 cancers is shown for each of 4 AUS findings. Percentages shown are by row.
AUS, axillary ultrasound; IDC, invasive ductal carcinoma; ILC, invasive lobular carcinoma.

Pilot Phase Study Results of a Prospective, Randomized Controlled Clinical Trial Evaluating Axillary Ultrasound vs Sentinel Lymph Node Biopsy for Axillary Staging in Early-Stage Breast Cancer Patients

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Objective Recent clinical trials suggest that the benefit of sentinel lymph node biopsy (SLNB) in early-stage breast cancer patients is limited to providing staging information. We hypothesize that axillary ultrasound (AUS) could provide clinically relevant staging information without the risks of SLNB.
Methods This randomized controlled clinical trial was designed to compare AUS to SLNB for axillary staging in clinically node-negative, early-stage breast cancer patients. Patients with clinical T1-2 N0 invasive breast cancer and a normal AUS are randomized to either no further axillary staging (group 1) vs SLNB (group 2) in a 1:1 ratio. AUS is defined as normal based on lymph node morphology, including maintenance of a fatty hilum and lack of focal cortical bulge. Patients randomized to group 1 are treated as pathologically node-negative for medical decision making. The primary endpoint is axillary recurrence and the secondary endpoints are disease-free and overall survival. This report uses descriptive statistics, *t* test, and Fisher exact test to describe the results of the pilot phase.
Results Current accrual is 46 patients (23 patients in each group). The median age is 60 (range, 40–80 years) in group 1 (no further staging) and 55 (range, 31–81 years) in group 2 (SLNB). Median follow-up for the entire cohort is 10.5 months (range, 1–18 months). There are no significant differences between the groups in terms of patient age, tumor size, tumor grade, or receptor status (ER, PR, and HER2). There have been no in-breast, axillary, or distant recurrences in any patients in either group. In 2 of the group 2 patients, micrometastatic disease was identified at SLNB and was considered clinically insignificant. In 1 of the group 2 patients, neither blue nor radioactive dye mapped, and 2 nodes were found to contain macrometastatic disease at axillary dissection. The negative predictive value (NPV) for AUS for identifying clinically significant axillary disease is 95%.
Conclusion AUS shows promise for the ability to exclude clinically significant axillary disease in early-stage breast cancer patients. This prospective, randomized study confirms that AUS has a high NPV. With short-term follow-up,

no axillary recurrences have been observed. Successful enrollment of the target accrual and longer follow-up will allow a meaningful evaluation of the noninferiority of this less invasive staging approach.

Sentinel Node Mapping With 99mtc-Tilmanocept: Clinical Trial Results and Follow-Up Data Show Consistent Performance Across Studies and Tumor Types

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Objective Sentinel lymph node biopsy (SLNB) is a real-time diagnostic component of the tumor excision procedure for breast cancer and other solid tumors. 99mTc-tilmanocept (Navidea Biopharmaceuticals, Dublin OH) is the first receptor-targeted (CD206) SLN detection agent. Two prospective, sequential, phase 3 multicenter, open-label, within-patient trials were conducted for SLN biopsy in patients with clinically node-negative breast cancer, using both 99mTc-tilmanocept and vital blue dye as detection agents. Subsequent to the first phase 3 study, a 3-year follow-up study was conducted.
Methods In the two phase 3 clinical studies, the localization rates of 99mTc-tilmanocept were compared with VBD on a within-patient basis. All patients received both agents; concordance (hot/blue and blue/hot) defined the localization differential of the 2 agents. We also assessed pathology of the blue nodes, hot nodes, hot/blue nodes, or not-hot/not-blue nodes for concordance of the findings. Following participation in the first 99mTc-tilmanocept phase 3 trial, voluntary enrollment in the follow-up study was open to patients with (pN+) or without (pN0) SLN metastases. Recurrence and survival data were collected at 6 to 36 months after primary tumor excision and SLNB. The primary endpoint was the regional (ie, draining lymph node basin) recurrence-free rate after SLNB with 99mTc-tilmanocept.
Results Among 148 patients with breast cancer enrolled in the 2 SLNB trials, 146 (98.7%) had 1 or more SLNs identified by 99mTc-tilmanocept, with 26 of 27 patients having the pathology-positive SLNs correctly identified by 99mTc-tilmanocept. The FNR by pooled analysis of the phase 3 studies was 3.7% (<0.02% by meta-analysis). Follow-up of 64 patients from the first phase 3 trial showed no recurrence in the studied nodal basin by 36 months, either for the pN0 or the pN+ patients. These SLN localization rates and FNR results are consistent with 99mTc tilmanocept performance in other tumor types studied in phase 3 registration trials: melanoma (98% SLN localization, 0% FNR) and head and neck squamous cell carcinoma (97.6% SLN localization, 2.6% FNR).
Conclusion The use of 99mTc-tilmanocept showed positive and consistent SLNB performance and accurate identification of the pathology-positive patients in phase 3 studies, follow-up data, and across multiple solid tumor types.

Association of Incision Type and Infection Rate in Nipple-Sparing Mastectomies: A Preliminary Analysis of The American Society of Breast Surgeons Nipple-Sparing Mastectomy Registry

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Objective The American Society of Breast Surgeons (ASBrS) Nipple-Sparing Mastectomy Registry (NSMR) is an ongoing, prospective, IRB-approved, multi-institutional registry assessing surgical technique, utilized metrics, aesthetic outcome, and oncologic outcome. The Registry has been open for enrollment 43 months. We analyzed the association of incision placement on rates of infection.
Methods This abstract specifically analyzes the association of incision placement on infection rates of individuals undergoing a nipple-sparing mastectomy. Also evaluated were nipple areolar complex (NAC) complications in association with incision technique and the presence or absence of infection (Table 1). Incision types include inframammary, peri-areolar, peri-areolar ellipse or hemi batwing, radial, radial with peri-areolar extension, previous lumpectomy scar, previous mastopexy scar, transareolar, and other. Infection was characterized as treated via: po antibiotics alone, iv antibiotics alone, antibiotics plus expander/implant removal, iv antibiotics plus washout/debridement.

Table 1.

Characteristic	*With Infection*	*Without Infection*	*Unknown*
Enrolled Cases (Breasts)	53	1077	237
Incision Technique			
Inframammary N (%)	9 (17.6)	375 (37.5)	124 (55.4)
Peri-areolar ellipse, or hemi-batwing N (%)	0 (0.0)	29 (2.9)	1 (0.4)
Previous lumpectomy scar N (%)	0 (0.0)	15 (1.5)	2 (0.9)
Previous mastopexy scar N (%)	0 (0.0)	8 (0.8)	0 (0.0)
Radial N (%)	18 (35.3)	226 (22.6)	48 (21.4)
Radial w/ Peri-areolar extension N (%)	13 (25.5)	232 (23.2)	14 (6.3)
Peri-areolar N (%)	0 (0.0)	0 (0.0)	1 (0.4)
Trans-areolar N (%)	1 (2.0)	5 (0.5)	0 (0.0)
Wise mastopexy incision N (%)	0 (0.0)	0 (0.0)	14 (6.3)
Other N (%)	10 (19.6)	110 (11.0)	20 (8.9)
Unknown N (%)	2	77	13
NAC Post-op Complications			
Epidermolysis Full recovery N (%)	4 (8.0)	111 (11.0)	3 (20.0)
Epidermolysis - Required Surgery N (%)	5 (10.0)	5 (0.5)	0 (0.0)
Necrosis N (%)	3 (6.0)	32 (3.2)	2 (13.3)
Other N (%)	4 (8.0)	26 (2.6)	1 (6.7)
No Complications N (%)	34 (68.0)	832 (82.7)	9 (60.0)
Unknown N (%)	3	71	222
NAC Post-op Treatments			
Topical Treatments N (%)	7 (14.3)	68 (7.0)	1 (6.7)
Debridement N (%)	3 (6.1)	13 (1.3)	2 (13.3)
Excision N (%)	5 (10.2)	15 (1.5)	1 (6.7)
Other N (%)	0 (0.0)	8 (0.8)	1 (6.7)
N/A N (%)	34 (69.4)	870 (89.3)	10 (66.7)
Unknown N (%)	4	103	222
Cosmesis			
Excellent N (%)	11 (31.4)	449 (55.4)	12 (66.7)
Good N (%)	19 (54.3)	335 (41.4)	6 (33.3)
Fair N (%)	5 (14.3)	26 (3.2)	0 (0.0)
Poor N (%)	0 (0.0)	0 (0.0)	0 (0.0)
Unknown N (%)	18	267	219
Patient Satisfaction			
Excellent N (%)	11 (30.6)	382 (50.2)	6 (50.0)
Good N (%)	20 (55.6)	340 (44.7)	6 (50.0)
Fair N (%)	5 (13.9)	39 (5.1)	0 (0.0)
Poor N (%)	0 (0.0)	0 (0.0)	0 (0.0)
Unknown N (%)	17	316	225
Program Name: NEWTAB1.sas Run Date 22OCT14:1	Program Name: NEWTAB1.sas Run Date 27OCT14:15:54:10		

Results Sixty-one surgeons from 67 institutions performed 1,367 mastectomies on 817 patients (550 bilateral and 267 unilateral) with indications of invasive carcinoma, DCIS, and prophylaxis. Analysis of incision technique and presence or absence of infection was performed on a subset of 925 mastectomies with recorded incision technique and infection status (Table 2). Infection was noted in 2.3% of mastectomies performed via an inframammary line incision, 0% of periareolar/periareolar ellipse or hemi-batwing incisions, 6.3% of radial/radial with periareolar extension, 0% previous lumpectomy scar, 0% previous mastopexy scar (p value, 0.0467). Among all above- listed incision types, a rate of infection of 4.3% was noted. Excluded from the above analysis is transareolar incision (1 of 6 demonstrated infection), other (represents multiple incision types), and unknown incision type. Mastectomies performed via radial and radial with periareolar extension incisions with infections had the highest rate of NAC complications requiring intervention/treatment (Table 2).

Table 2

Incision Technique	Inframammary	Periareolar and Periareolar Ellipse or Hemi-Batwing	Radial and Radial With Periareolar Extension	Previous Lumpectomy Scar	Previous Mastopexy Scar	*Total*
Infection						
Yes, N (%)	9 (2.3)	0 (0.0)	31 (6.3)	0 (0.0)	0 (0.0)	40 (4.3%)
No, N (%)	375 (97.7)	29 (100.0)	458 (93.7)	15 (100.0)	8 (100.0)	885
TOTAL	384	29	489	15	8	925
p-value[1]	0.0467					
NAC Post-op Complications						
Epidermolysis, full recovery N (%)	47 (77.0)	1 (20.0)	58 (57.4)	1 (100.0)	2 (66.7)	109
Epidermolysis, required surgery N (%)	0 (0.0)	0 (0.0)	5 (5.0)	0 (0.0)	0 (0.0)	5
Necrosis N (%)	7 (11.5)	2 (40.0)	20 (19.8)	0 (0.0)	1 (33.3)	30
Other N (%)	7 (11.5)	2 (40.0)	18 (17.8)	0 (0.0)	0 (0.0)	27
TOTAL	61	5	101	1	3	171
p-value[1]	0.0924					
NAC Post-op Treatments						
Topical Treatments N (%)	21 (72.4)	1 (25.0)	42 (61.8)	1 (100.0)	1 (33.3)	66
Debridement N (%)	2 (6.9)	0 (0.0)	12 (17.6)	0 (0.0)	0 (0.0)	14
Excision N (%)	5 (17.2)	1 (25.0)	9 (13.2)	0 (0.0)	2 (66.7)	17
Other N (%)	1 (3.4)	2 (50.0)	5 (7.4)	0 (0.0)	0 (0.0)	8
TOTAL	29	4	68	1	3	105
P value[1]	0.1129					

1. Fisher Exact for RxC table.
Program Name: STATTAB1.sas Run Date 28OCT14:08:35:09

Conclusion The variation of infection rates between the most commonly utilized incisions: Inframammary (2.3%), radial (7.4%), and radial with periareolar extension (5.3%) is within range of the overall infection rate of 4.3%. There appears to be no significant association between NAC complications to incision placement and infection status.

Once Is Rarely Enough: A Population-Based Study of Reoperations After Postmastectomy Breast Reconstruction

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Objective Postmastectomy breast reconstruction (PMBR) can be used to improve the quality of life (QOL) of breast cancer patients during their survivorship period. However, when additional surgical procedures required after initial PMBR are excessive, this can lead to increased postsurgical morbidity, decreased QOL for patients, and increased healthcare utilization and costs. The primary aim of this study was to determine the overall population-based re-operation rates following PMBR in the province of Ontario, Canada.
Methods A population-based retrospective cohort study was completed using provincial administrative and cancer registry databases in Ontario, Canada. The main cohort included women between the ages of 18 and 65 years who underwent a prophylactic or therapeutic mastectomy between April 1, 2002, and March 31, 2008, followed by an immediate or delayed PMBR (within 3 years of primary mastectomy). Reoperations following PMBR were identified through Ontario Health Insurance Plan (OHIP) billing codes submitted by general or plastic surgeons.

Patients were followed from the date of their reconstruction surgery to March 31, 2013, or death, whichever was earliest. Reoperations were categorized as anticipated, unanticipated, second oncologic breast, combinations of these categories, or unclassified. Anticipated procedures were considered an expected component of the reconstruction process. Unanticipated procedures were related to emergency operations or those requiring revision of the PMBR. Second oncologic breast operations also included prophylactic procedures. Unclassified were procedures that were unable to be categorized and consisted mainly of skin/scar-related procedures.
Results Overall 3,972 women underwent primary mastectomy and PMBR between 2002 and 2008. Among these women, 3,506 (88%) underwent at least 1 reoperation during an average follow-up of 5.1 years. Two-thirds (66%) of the cohort had more than 1 reoperation; median number of procedures per patient was 2 (interquartile range, 1–3) and the first operation was on average within 7 months of the PMBR. A total of 9,404 procedures were performed during the follow-up period, the majority of which were anticipated (55%) followed by unanticipated (22%).
Conclusion Our results provide the first long-term population-level data on the current state of PMBR reoperation rates. The results from this study will inform patient-physician surgical decision-making and provide quantitative expectations of morbidity related to PMBR. Future analysis will compare reoperations for implant vs tissue-based PMBR, immediate vs delayed PMBR, and identify factors contributing specifically to unanticipated reoperations - as these unplanned operations are an ideal target area for quality improvement.

Postmastectomy Breast Reconstruction Reoperation Results

Procedure Type		
	Anticipated	5,138 (55%)
	Unanticipated	2,063 (22%)
	Unclassified	1,453 (15%)
	Second oncologic breast	658 (7%)
	Combinations	92 (1%)
Time to First Procedure (days)		
	Mean (SD)	207.2 ± 246.7
	Median (IQR)	168 (58 - 261)
	Range (min, max)	(1, 3765)
Number of Reoperations (by patient)		
	1	1,207 (34%)
	2	918 (26%)
	3	615 (18%)
	≥4	724 (22%)

Reframing Women's Risk: Counseling on Contralateral Prophylactic Mastectomy in Non-High-Risk Women With Early Breast Cancer

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Objective Rates of contralateral prophylactic mastectomy (CPM) for average risk, early-stage breast cancer (ESBC) have been steadily increasing. We have demonstrated that non-high-risk women who choose UM+CPM often do so in response to fear. Despite surgeons describing no survival benefit and recommending against CPM, women continued to overestimate the risk of recurrence, contralateral cancer, and death secondary to ESBC, and overestimate the benefit of CPM. We sought to understand how surgeons might improve communication with non-high-risk women who are choosing UM + CPM.
Methods We conducted a qualitative study with surgeons to understand how communication with patients could be improved, specifically in those patients demonstrating an overestimated risk of ESBC and misperceived benefit of CPM. Purposive sampling was used to identify surgeons across Ontario, Canada, and the United States (U.S.) who

varied in length/location of practice, extent of training, and gender. Data were collected through focus groups at Canadian and American national meetings. Constant comparative analysis identified key concepts and themes. **Results** Data saturation was achieved after 3 focus groups, consisting of 20 surgeons, which lasted between 55-95 min. Surgeons were equally sampled across academic (10) and community/private (10) practice, 12 surgeons were from Canada and 8 were from the U.S. All surgeons had a high-volume breast practices with length of practice ranging from 5 to 25 years (median, 12 years). "Reframing risk" was the dominant theme. All surgeons described that non-high-risk women who choose UM + CPM do so in response to the misperceived risks associated with ESBC. Dominant ideas to reshape this risk included: (1) Slowing down the decision-making process: prolonging the timing to CPM, as women's initial fear response creates an immediacy to "get it all out." (2) Dealing with the emotionality of breast cancer: through supportive encounters with previous patients, nurse practitioners, or social workers; encouraging the discussion between patients and surgeons around patient's cancer knowledge and previous cancer experiences. (3) Role of a cohesive message across medical colleagues: including radiation oncology, medical oncology, and reconstructive surgeons; reinforcing the message that CPM does not alter the need for adjuvant therapy nor improve survival in non-high-risk women; ensuring women's expectations around reconstruction are appropriate, and symmetry can be achieved without the need for bilateral mastectomy. (4) Use of decision-making tools: including videos that women can watch prior to the consultation, visual tools that demonstrate unchanged risks across surgical treatment options, and visual aids depicting both positive and negative outcomes across all surgeries. (5) A formal statement from a national surgical body: describing for whom CPM is recommended/not recommended and providing formal treatment recommendations for patients with ESBC. **Conclusion** Both Canadian and U.S. surgeons describe that non-high-risk women with EBSC choose CPM in response to an overestimated risk. As CPM may not offer benefit and is not without risks, reframing a woman's perception of risk is fundamental to ensure that the choice for CPM is truly informed and not simply chosen for misperceived benefits.

The Relationship Between Year of Treatment and Local Recurrence (LR) of Ductal Carcinoma In Situ (DCIS): Analysis of 3,000 Women Treated With Breast-Conserving Surgery Over 30 Years

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Objective Ductal carcinoma in situ (DCIS) has minimal mortality but significant local recurrence (LR) rates, with half of local recurrences being invasive. Decreasing rates of LR after BCS for invasive breast carcinoma are well reported and largely attributed to systemic therapy. Little is known about temporal trends for LR in DCIS. We sought to determine the relationship between year of treatment and LR after BCS for DCIS over 3 decades at 1 institution.
Methods We performed a retrospective review of a prospectively maintained database of DCIS patients undergoing BCS from 1978-2010. Variables examined included age, menopausal status, family history (first- or second-degree family member with breast cancer), presentation (clinical vs radiologic), nuclear grade, necrosis, number of excisions (≤ 2 or ≥ 3), margin status (positive/close vs >2 mm), radiotherapy (RT), endocrine therapy, year of surgery (continuous), and LR. Cox proportional hazard models were used to investigate the association between year of surgery and LR, controlling for other variables.
Results Three thousand women were identified, of whom 2,682 had complete data. There were 321 LR events (12%); 175 (55%) were DCIS, 136 (42%) were invasive, 10 (3%) were of unknown type. The median follow-up for women without LR was 74 months (range, 0-30 years); 680 were followed for $\geq$10 years. One thousand four hundred seventy-one (55%) women received RT; 1,211 (45%) did not receive RT. Three hundred sixteen were treated from 1982–1995, 510 from 1996–2000, and 1,856 from 2001–2010. Controlling for age, family history, presentation, number of excisions, RT, endocrine therapy, and margin status, year of surgery was significantly associated with LR ($p = 0.008$), with later years associated with a lower hazard ratio compared to earlier years. When stratified by use of RT and controlling for other factors, the association of LR with year of surgery was significant in those without RT ($p = 0.002$), but not in those with RT ($p = 0.87$). For women without RT, 10-year actuarial LR rates by year of treatment for 1982-1995, 1996-2000, and 2001-2010 were 26%, 22%, and 19%, respectively. For women with RT, 10-year actuarial LR rates were 15%, 12%, and 11%, respectively.

Conclusion LR rates after BCS for DCIS have fallen over the past decades. This observation was statistically significant for women not receiving RT, even after controlling for other variables, suggesting that improvements in detection and completeness of resection may have contributed to the reduction in LR rate observed over time.

Cox Proportional Hazards Model

Characteristic	Categories	Hazard Ratio	P
Age (years)	Continuous	0.98	<0.0001
Family history	Yes vs No	1.33	0.01
Presentation	Clinical vs Radiologic	1.39	0.03
Number of excisions	≤ 2	1	0.02
	≥ 3	1.54	
Margin status	Positive/close (≤ 2 mm)	1	0.003
	Negative (>2 mm)	0.68	
Radiation therapy	Yes vs No	0.47	<0.0001
Endocrine therapy	Yes vs No	0.49	<0.0001
Year of surgery	Continuous	0.97	0.008

Modern Trends in the Surgical Management of Paget's Disease

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Objective Historically, Paget's disease of the breast has been treated with mastectomy; however, over the last several decades surgical management options have evolved to include central lumpectomy (including nipple resection) with radiation. We sought to examine the incidence and modern national trends in the management of Paget's disease, including the use of breast-conserving surgery (BCS), mastectomy, and axillary surgery.
Methods We identified 2,699 patients diagnosed with Paget's disease during 2000–2011 using Surveillance, Epidemiology, and End Results (SEER) data. Of these patients, 216 (8%) had Paget's of the nipple only, 966 (35.8%) had Paget's with ductal carcinoma in situ (DCIS), and 1,517 (56.2%) had Paget's with invasive ductal carcinoma (IDC). Trends in age-adjusted incidence, breast conserving surgery, mastectomy, sentinel lymph node biopsy (SLNB), and axillary lymph node dissection (ALND) were examined. Multivariate logistic regression was used to evaluate factors associated with receipt of BCS.
Results A decrease in the age-adjusted incidence of Paget's disease occurred between 2000 and 2011 (-4.29% per year, $p < 0.05$), and was most pronounced in Paget's disease with underlying invasive or in situ carcinoma. Approximately 97% of patients underwent a definitive surgical procedure; the overall rates of mastectomy in the Paget's only, Paget's with DCIS, and Paget's with IDC groups were 47%, 69%, and 88.9%, respectively. Only in the Paget's with IDC group did the proportion of patients undergoing BCS increase significantly, from 8.5% in 2000 to 15.7% in 2011 ($p = 0.01$). For axillary staging, overall rates were 40.5% for the Paget's-only group, 63.0% for the Paget's with DCIS group, and 92.9% for the Paget's with IDC group. Of those who received an axillary evaluation ($n = 2,062$), the proportion of patients undergoing SLNB increased between 2000 and 2011 for Paget's only (40.0 to 66.7%, $p = 0.13$), Paget's with DCIS (33.3 to 82.4%, $p < 0.001$), and Paget's with IDC (14.2 to 43.2%, $p < 0.001$). In adjusted analyses, Paget's subgroup, older age, central tumor location, low/intermediate grade, tumor size < 2.0 cm, and year of diagnosis after 2006 were significantly associated with receipt of BCS.
Conclusion In a modern cohort of Paget's disease, we found a decrease in overall incidence, a modest increase in the proportion of patients undergoing BCS for Paget's with IDC, as well as increasing use of SLNB in the surgical management of the axilla. Our findings suggest that, despite being a safe and less invasive alternative to mastectomy, BCS remains underutilized in the management of Paget's disease.

Resident and Fellow Participation in Breast Surgery: A NSQIP Clinical Outcomes Analysis

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Objective In our present cost- and outcomes-conscious health system, resident and fellow participation is under increasing scrutiny regarding their participation in surgery and the outcomes of the procedure. Various surgical subspecialties have evaluated this participation with a range of complication rates associated with resident participation. Our goal was to perform a clinical outcomes analysis investigating resident and fellow participation in breast surgery.

Methods Early postoperative complication rates and total operation times for partial and simple mastectomy cases were gathered from the ACS-NSQIP database between years 2009 and 2012. The cases were divided into 4 groups based on the training level of the participating resident surgeon: Junior (PGY 1-2), Senior (PGY 3-5), Fellow (PGY >5), as well as an Attending Only group (no resident present). We compared the clinical outcomes of each group to the Attending Only group. Outcome measures included complication rates in a number of clinical categories, as well as total operative times. Statistical analysis included odds ratios, as well as regression analysis that analyzed the correlation between years in training vs complication rate, and years in training vs total operation time.

Results A total of 13,254 cases were identified, and residents participated in 64% of them. These cases included 4,741 Junior; 2,646 Senior; 1,130 Fellow; and 4,737 Attending Only cases. Complication rates from each resident group were compared to those from the Attending Only group (see Table 1). There was no statistically significant difference in rate of complications between any of the resident groups when compared to the Attending Only group. Logistic regression analysis compared training year levels to complication rate, and the results were not statistically significant. However, total operative times were correlated with training year levels and found to be significantly lower with each year of training ($R2 = 0.53$, $p = 0.025$ for partial mastectomy; $R2 = 0.45$, $p = 0.046$ for complete mastectomy).

Conclusion Using a large-scale, multicenter database, the authors conclude that resident participation does not negatively affect early postoperative breast surgery outcomes, and that complication rates are unrelated to the training level of the participating resident surgeon. Additionally, average total operation time does decrease with increasing trainee experience, with no negative impact on outcomes.

TABLE 1 Total operation times and frequency of 30-day postoperative complications in patients with partial mastectomy versus complete simple mastectomy, broken down by the training level of the participating resident surgeon

	PGY 1-2		PGY 3-5		Fellow (PGY 6+)		Attending Only	
Procedure	Partial Mastectomy	Complete Mastectomy	Partial Mastectomy	Complete Mastectomy	Partial Mastectomy	Complete Mastectomy	Partial Mastectomy	Complete Mastectomy
Number of Cases	2,995	1,746	1,436	1,210	657	473	2,992	1,745
Average Total Operation Time (mins)	89.31	131.95	84.55	122.35	86.81	119.36	72.13	102.05
Avgerage Length of Hospital Stay (days)	0.40	1.31	0.29	1.50	0.36	1.39	0.21	1.19
Complication, %								
Overall	2.01%	5.33%	2.27%	5.92%	2.27%	6.22%	3.50%	6.55%
Wound*	1.17%	3.04%	1.89%	2.33%	1.65%	2.35%	1.67%	2.96%
Infectious**	0.53%	1.03%	0.28%	1.44%	0.41%	2.19%	0.76%	1.06%
Respiratory***	0.00%	0.17%	0.00%	0.00%	0.00%	0.17%	0.15%	0.42%
Thromboembolic****	0.20%	0.29%	0.09%	0.00%	0.00%	0.34%	0.46%	0.85%
Renal^	0.00%	0.00%	0.00%	0.00%	0.10%	0.17%	0.15%	0.21%
Neurologic^^	0.00%	0.11%	0.00%	0.18%	0.00%	0.00%	0.00%	0.21%
Cardiac^^^	0.03%	0.00%	0.00%	0.00%	0.10%	0.17%	0.00%	0.00%
Bleeding^^^^	0.07%	0.57%	0.00%	1.44%	0.00%	0.84%	0.30%	0.85%
Odds ratio (95% CI) (PGY group vs Attending Only group)	1.35 (0.80-1.61)	1.15 (0.86-1.54)	1.36 (0.91-2.05)	1.20 (0.88-1.65)	0.60 (0.29-1.27)	0.60 (0.34-1.04)	N/A	N/A

PGY post-graduate year; *CI* confidence interval, *N/A* not applicable

* Superficial surgical site infection (SSI), deep SSI, or wound dehiscence

** Organ space SSI, pneumonia, urinary tract infections, sepsis, or septic shock

*** Failure to wean, reintubation or intraoperative anesthetic complications

**** Deep vein thrombosis or pulmonary embolism

^ Acute renal failure or progressive renal insufficiency

^^ Coma, peripheral nerve deficit, or cerebral vascular accident

^^^ Myopcardial infarction or cardiac arrest

^^^^ Pre- or postoperative bleeding requiring transfusions

Poster Session

Friday, May 1, 2015 6:00 pm–7:30 pm

A Multi-Institutional Analysis of Intraoperative Radiotherapy for Early Breast Cancer: Does Age Matter?

Abbott, Andrea M.[1]; Laronga, Christine[1]; Valente, Stephanie[2]; Loftus, Loretta[1]; Tendulkar, Rahul D.[2]; Greif, Jon[3]; Bethke, Kevin[4]; Donnelly, Eric D.[4]; Ross, Darrel[5]; Lottich, Chase[5]; Friedman, Neil B.[6]; Bedi, Gauri C.[6]; Joh, Jennifer E.[6]; Kelemen, Pond[7]; Kang, Song K.[8]; Hoefer, Richard A.[8]; Ruffer, James[9]; Police, Alice M.[10]; Fyles, Anthony W.[11]; Graves, Gregory M.[12]; Willey, Shawna C.[13]; Tousimis, Eleni A.[13]; Small, William[14]; Lyons, Joanne[2]; Grobmyer, Stephen[2]

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Objective Duration of whole-breast radiation therapy (WBXRT) after breast-conserving surgery (BCS) may lead to noncompliance, especially among the elderly. Accelerated partial breast irradiation, including single-session intraoperative radiation therapy (IORT), may be an alternative that minimizes treatment demands while providing adequate local disease control and minimal morbidity. The purpose of this study was to evaluate the impact of age on outcomes after treatment with BCS and IORT.

Methods A multi-institutional retrospective data collection registry was created to collect/combine patient and treatment characteristics from 19 centers utilizing IORT for early-stage breast cancer from 2007-2013. Eligibility criteria were determined at each institution per consensus guidelines. The IORT system was designed to deliver 20 Gy of radiotherapy at the surface of the applicator. The primary endpoint was local recurrence rate and the secondary endpoint was complications. Outcomes were analyzed for ages <70 and ≥70 using mean and standard deviation or median and interquartile range. Comparisons between age categories were made using Welch two-sample *t* test or Wilcoxon sign-rank test.

Results The registry cohort included a total of 1,086 patients. This study evaluated 686 patients (all were margin and lymph node–negative, had no additional surgery, and ≥ 6 months of follow-up). Four hundred twenty-four patients were <70 and 262 patients ≥ 70. Mean age for patients <70 was 63 (range: 78, 66) years and 75 (range: 72, 80) years for the ≥ 70 cohort. Patients <70 were more likely to have longer operative times, higher rates of IORT used as planned boost, oncoplastic closure, receive chemotherapy, and postoperative external beam radiation. There were no significant differences between the groups in BMI, tumor histology, size, grade, receptor status, or IORT treatment times. The incidence of wound infection, hematoma, and seroma were not significantly different between the 2 cohorts (Table 1). The median follow-up was 1.06 (range: 0.51, 1.9) years for <70 and 1.01 (range: 0.5, 1.68) years for ≥ 70. There were no axillary recurrences and only 5 (0.73%) breast recurrences (4 in <70 and 1 ≥ 70, p = 0.65) during follow-up.

Conclusion On short-term follow-up, patients who received BCS and IORT experienced low local-disease recurrence rates, and the elderly were not at greater risk of wound complications compared to the younger cohort. IORT may be a reasonable alternative to WBXRT for patients with early-stage breast cancer treated with BCS, regardless of advanced age.

continues

Cohort Demographics and Complications

	< 70 N = 424	≥ 70 N = 262	P value
BMI (mean, SD)	29.08 ± 6.49	29.44 ± 7.28	0.54
Tumor type Invasive ductal Invasive lobular DCIS Mixed Other	 304 (73%) 13 (3%) 18 (4%) 79 (19%) 5 (1%)	 192 (74%) 11 (4%) 2 (0.8%) 48 (19%) 6 (2%)	0.051
Tumor size (mean, SD)	1.14 ± 0.59	1.17 ± 0.58	0.50
ER positive	382 (90%)	242 (94%)	0.12
PR positive	343 (81%)	223 (86%)	0.078
HER2 amplified	28 (7%)	11 (4%)	0.42
Tumor grade 1 2 3	 173 (42%) 172 (42%) 67 (16%)	 102 (40%) 125 (48%) 31 (12%)	0.92
IORT type Primary (at initial lumpectomy) Secondary (at second surgery) Boost (planned boost)	 315 (75%) 32 (8%) 72 (17%)	 215 (84%) 20 (8%) 20 (8%)	0.003*
Total OR time (median, range)	133 min [112, 169]	127 min [103, 152]	0.028*
IORT time (mean, SD)	29.2 min ± 8.63	29.3 min ± 9.39	0.93
Oncoplastics closure	172 (47%)	80 (35%)	0.008*
Chemotherapy	33 (8%)	8 (3%)	0.018*
External beam radiation	119 (29%)	28 (11%)	< 0.001*
Wound infection None Grade 0 (no signs of infection) Grade 1 (localized erythema) Grade 2 (early infection) Grade 3 (drainage required) Grade 4 (sepsis suspected)	 355 (84%) 33 (8%) 16 (4%) 12 (3%) 7 (2%) 1 (0.2%)	 210 (80%) 21 (8%) 15 (6%) 9 (3%) 7 (3%) 0 (0%)	0.21
Hematoma	7 (2%)	1 (0.4%)	0.16
Seroma	35 (8%)	17 (6%)	0.48

*Denotes statistical significance. Abbreviations: SD, standard deviation; DCIS, ductal carcinoma in situ; IORT, intraoperative radiation therapy; OR, operating room

Use of Tetracycline Sclerotherapy As an Option in Management of the Refractory Postmastectomy Seroma: Single-Institution Experience

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Objective Seroma is the most common complication after modified radical mastectomy and breast-conserving surgery. We review our experience with tetracycline sclerotherapy for the refractory postmastectomy seroma.
Methods Forty-four female patients who were complaining of persistent postmastectomy seroma underwent tetracycline sclerotherapy on an outpatient basis through installation of 1 gm tetracycline diluted in 25 ml normal saline plus 10 ml lidocaine 2% after aspiration of the seroma. Results were analyzed as regard number of amount of seroma, number of sclerotherapy session required to achieve cure, any side effects recorded, and if the patient was satisfied with the procedure or not.
Results Cure was achieved in 28 (63.6%) patients after single dose of sclerotherapy and 13 (29.5%) patients were cured after 2 sessions, while 3 (6.8%) patients required a third TCN sclerotherapy to achieve cure. Ninety-one

percent of patients were satisfied while 9% were not because of severe pain.
Conclusion Tetracycline sclerotherapy is a simple, effective, and cheap treatment with no serious side effects.

Postoperative Outcomes and Patient Satisfaction Following Oncoplastic Breast Reconstruction
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Objective Breast conservation therapy has become increasingly employed to treat breast cancer patients, and techniques reconstructing partial mastectomy defects have become more extensive and aesthetically tailored. While breast conservation therapy may offer several benefits, such as increased patient self-esteem and quality of life, poor cosmetic outcomes occur in approximately 30% of patients; rates of approximately 7% can be obtained after 2 years. Symmetry appears to be the most important determinant of cosmetic outcome. In this study, we aimed to study the postoperative outcome and patient satisfaction of patients who had undergone partial mastectomy with oncoplastic reconstruction.
Methods After obtaining Institutional Review Board approval, we conducted a retrospective chart review of all patients who underwent oncoplastic breast reconstruction by a single plastic surgeon between July 2011 and December 2013. Patient charts were reviewed for demographic information, comorbidities, breast size, need for radiation or chemotherapy, intraoperative technique, and postoperative complications. The patients in the cohort were then sent an adapted questionnaire based on the postoperative BREAST-Q.
Results All of the 85 patients were female, with an average age of 45.94 years and an average BMI of 25.65. All patients underwent tumor excision and immediate oncoplastic breast reconstruction. Fifty-three women underwent a symmetry procedure on the unaffected side, 25 of which were performed in a delayed setting. No symmetry procedures occurred before a patient underwent radiation therapy following oncoplastic surgery. The average time from initial operation to final operation was 4.5 months, ranging from 1 month to 16 months. Contracture was noted in 2 patients who underwent radiation therapy following their oncoplastic surgery; these patients will likely require symmetry procedures in the future. Four patients noted skin changes, including hyperpigmentation and a mild burn following radiation therapy. Complications occurred in 4 patients and included breast implant infection (n = 1), wound dehiscence (n = 1), infected hematoma (n = 1), and an uninfected hematoma (n = 1). Our survey response rate was 37.6%. Three-fourths of the patients reported being somewhat or very satisfied with regard to different aspects of their breast symmetry. Almost 78% of patients stated that they would undergo the procedure again, and 81% reported having no regrets about having the surgery.
Conclusion Our results indicate that a high level of patient satisfaction regarding oncoplastic surgery is obtainable, and a large majority of women have no regrets about undergoing surgery and would do it again. Consistent with previous studies, symmetry between breasts following oncoplastic surgery influences patient satisfaction.

Predictors of Pathologic Complete Response in Axillary Nodes After Neoadjuvant Chemotherapy for Breast Cancer
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Objective Breast cancer patients who present with positive axillary nodes require complete axillary lymph node dissection (ALND), an operation with significant risk of disability, such as lymphedema. The current trend is to give these patients neoadjuvant chemotherapy, aiming to completely annihilate the cancer in the lymph nodes. ALND can be avoided in patients whose lymph nodes are rendered clean by neoadjuvant chemotherapy (NC), also known as pathologic complete response (pCR). However, patients who have positive nodes after NC still need ALND. Predictors of pCR in axillary nodes could help to determine which patients would benefit the most from NC.
Methods De-identified records from our institution's Division of Oncology Breast Cancer Quality Assurance database (Jan. 2007–Dec. 2012) were extracted for patients receiving NC (with approvals from the Surgical Quality Data Users Group [IRB approved]). Pathologic features (human epidermal growth factor receptor 2 [HER2], progesterone receptor [PR], and estrogen receptor [ER] measured as both continuous and categorical, starting tumor size, and final tumor size), age at diagnosis, and treatment regimen characteristics were collected as potential predictors for pCR. All predictors were tested for bivariate significance at the 0.05 level using chi-square, *t* tests, and Wilcoxon rank sum tests; univariate odds ratios are also reported. Significant variables were entered into a forward selection multivariate logistic regression model. Hosmer-Lemeshow (HL) and c-statistic measures were used to assess model fit.

Results Of the 107 patients selected, 69 (64%) met the inclusion criteria of having both complete pathologic information and positive axillary lymph node status at diagnosis. There were no statistical differences in pCR rate for triple-negative status, ER status, different chemotherapy combinations, or starting tumor size. When treated as continuous variables, ER and PR percentage was significantly lower in the pCR group; when combined into an index variable, pCR rate did not differ between groups. However, a significantly higher proportion of categorical PR- and Her2+ patients had pCR, (43% and 46%, respectively). An index variable of Her2+ and PR- showed the highest rate of pCR (59%). This HER2/PR index remained in the multivariate selection model (c-statistic = 0.80, HL p = 0.46). Both continuous ER and age at diagnosis also remained in the model but were not significant predictors.
Conclusion Her2+ and PR- tumors seem to have a better chance of a pCR in the axilla. Lower ER values and younger aged patients may be important predictors, but more data are needed to examine these associations.

Table 1

Pathologic, Treatment, and Demographic Predictors		ALL N = 69%	Node Positive N = 47%	pCR N = 22%	Univariate Analysis OR 95% CI	Multivariate Model OR 95% CI
ER	NEG POS	25 0.36 44 0.64	14 0.56 33 0.75	11 0.44 11 0.25		
PR*	NEG POS	37 0.54 32 0.46	21 0.57 26 0.81	16 0.43 6 0.19	-Ref- -- 0.3 0.1,0.91	
HER2*	NEG POS	37 0.57 28 0.43	31 0.84 15 0.54	6 0.16 13 0.46	-Ref- -- 4.48 1.42, 14.1	
TN	NEG POS	56 0.81 13 0.19	39 0.70 8 0.62	17 0.30 5 0.38		
ERPR Index*	Either Negative Both Pos	38 0.55 31 0.45	22 0.58 25 0.81	16 0.42 6 0.19	-Ref- -- 0.33 0.11, 0.99	
ERPR2 Index	Both Negative Either Pos	24 0.35 45 0.65	13 0.54 34 0.76	11 0.46 11 0.24		
HER2PR Index*+	PR+ or Her2- PR- and HER2+	51 0.75 17 0.25	40 0.78 7 0.41	11 0.22 10 0.59	-Ref- -- 5.2 1.6, 16.8	-Ref- -- 5.2 1.3, 20.6
ER Continuous (median, IQR)*		0.7 0.90	0.90 0.95	0.025 0.90	0.22 0.07, 0.76	0.34 0.07, 1.60
PR Continuous (median, IQR)*		0 0.40	0.05 0.73	0 0.04	0.05 0.00, 0.62	
Age (mean, std)*		50.33 12.65	52.51 12.63	45.68 11.66	0.96 0.92, 0.99	0.96 0.91, 1.01

*Univariate significance at the <0.05 level.
+Multivariate logistic regression with forward selection, significance at the <0.05 level.

Differences Between Palpable and Nonpalpable Tumors in Early-Stage Breast Cancer: Beyond Size and Nodal Status

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Objective Studies show that palpable breast tumors have different histologic characteristics, higher incidence of lymph node involvement (independent of tumor size), and a worse prognosis, compared to nonpalpable tumors, suggesting intrinsic differences between them. A recent mammography screening trial suggests that there is no survival advantage with screening mammography vs clinical detection, challenging this knowledge. The aim of our study was to compare the different characteristics and outcomes of palpable versus nonpalpable, hormone-sensitive, early-stage breast cancers (ESBC).
Methods Patients from the prospective, randomized North American Fareston vs Tamoxifen Adjuvant (NAFTA)

trial were divided into palpable tumor (PT, n = 563) and nonpalpable tumor (nonPT, n = 1249) groups. Univariate analysis was conducted to identify the differences in pathologic features and locoregional therapy. Kaplan–Meier and Cox Regression analysis were used to study disease-free survival (DFS) and overall survival (OS).
Results A total of 1,812 patients were evaluated. On univariate analysis, patients with PT were older ($p < 0.001$), had larger tumors ($p < 0.001$), and had higher rates of sentinel node positivity ($p < 0.001$) and lymph node involvement ($p < 0.001$). On pathologic characteristics, PT were more likely to be poorly differentiated ($p = 0.002$), high nuclear grade ($p = 0.002$), and have lymphovascular invasion ($p < 0.001$). A trend toward less extracapsular nodal extension was also noted ($p = 0.052$). Patients with PT had a significantly lower rate of breast conservation (59.6% PT vs 68.6% nonPT, $p = 0.002$), but no significant difference in the fraction who received radiation therapy (53.3% PT vs 57.3% nonPT, $p = 0.125$). After a mean follow-up of 59 months, Kaplan-Meier analysis demonstrated that DFS was significantly lower for PT than nonPT (94.4% vs 98.4%, respectively, $p < 0.001$). Similarly, OS was lower for PT than for nonPT (89.7% vs 96%, respectively, $p < 0.001$). On Cox Regression, controlling for age, size, and nodal status, palpability was an independent factor for DFS (OR = 2.681; 95% CI, 1.44-4.98, $p = 0.001$) and OS (OR = 2.049; 95% CI, 1.33-3.13, $p = 0.001$).
Conclusion In a group of ESBC patients, nonPT were more likely to have less aggressive features and metastatic potential, which translated into higher rates of breast conservation, lower incidence of breast cancer-related events, and better survival with multimodality treatment. The differences in pathological characteristics could be a surrogate for tumor biology variability between PT and nonPT, beyond a difference in size and lymph node status. Further genomic and molecular studies could confirm this theory, and may suggest different treatment strategies.

Characteristics of Palpable and Nonpalpable Breast Tumors

Characteristics		Nonpalpable Tumors	Percentage	Palpable Tumors	Percentage	p value
Patient number	n	1249	68.9%	563	31.1%	
Mean age	years	67		70		<0.001
Mean size	cm	1.29		1.74		<0.001
Stage	I	991	84.8%	371	66.5%	<0.001
	II	178	15.2%	187	33.5%	
Hystologic grade	Low	379	30.3%	141	25.1%	0.002
	Intermediate	527	42.2%	253	44.9%	
	High	160	12.8%	103	18.3%	
	Unknown	183	14.7%	66	11.7%	
Nuclear grade	Low	249	19.9%	96	17.1%	0.012
	Intermediate	446	35.7%	201	35.7%	
	High	96	7.7%	69	12.3%	
	Unknown	458	36.7%	197	35.0%	
Lymphovascular invasion	No	784	94%	347	87.4%	<0.001
	Yes	50	6%	50	12.6%	
Extracapsular extension	No	1242	99.4%	554	98.4%	0.052
	Yes	7	0.6%	9	1.6%	
Sentinel lymph node status	Negative	629	94.4%	236	86.76%	<0.001
	Positive	37	5.6%	36	13.24%	
Axillary lymph node status	Negative	1158	92.7%	447	84.7%	<0.001
	Positive	91	7.3%	86	15.3%	
Breast conservation	Yes	857	68.6%	336	59.7%	0.002
	No	392	31.4%	227	40.3%	
Radiation therapy	Yes	715	57.3%	300	53.3%	0.125
	No	534	42.7%	263	46.7%	

Increasing Use of Neoadjuvant Treatment for T1 and T2 HER-2 Positive Tumors

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Objective Use of anti-HER-2 targeted therapy, such as tyrosine kinase inhibitors, for HER-2 positive breast cancer has led to marked improvements in disease-free and overall survival. Furthermore, dual HER-2 targeted therapy in the neoadjuvant setting is associated with improved pathological complete response (pCR) rates to as high as 60%. With a growing body of evidence showing these benefits, along with FDA approval in September 2013 of pertuzumab in the neoadjuvant setting, it is likely that patients with earlier stage HER-2 positive breast cancer are increasingly offered neoadjuvant therapy (NT). The aim of this study was to evaluate trends in the use of NT for early-stage HER-2 positive tumors.
Methods With IRB approval, we reviewed 271 patients with clinical T1 and T2 HER-2 positive tumors treated at our institution between October 2008 and September 2014. Patient demographics, tumor characteristics, treatment, and pathology were reviewed. Treatment patterns in October 2008 through August 2013 (early) were compared to September 2013 through September 2014 (recent). Statistical analysis was performed using likelihood ratio chi-square tests.
Results Two hundred seventy-two breasts with HER-2 positive breast cancer in 271 patients were included. Mean patient age was 59 years (range, 28-92). Clinical T stage distribution was 6 (2%) T1mic, 11 (4%) T1a, 43 (16%) T1b, 96 (35%) T1c, and 116 (43%) T2. Tyrosine kinase inhibitors used included trastuzumab, lapatinib, neratinib, and pertuzumab. The use of NT significantly increased from 51/219 (23.3%) in the early group to 21/53 (39.6%) in the recent group ($p = 0.02$). In the recent group, 38% (8/21) of patients received pertuzumab, compared to 0/51 in the early group ($p < 0.0001$). Mean NT patient age remained unchanged over the study period (54 years, $p = 0.82$). More clinically node-negative patients received NT in the recent period (12/43, 27.9%) vs early period (20/169, 11.8%), $p = 0.01$. For T1 tumors, the use of NT more than doubled between the 2 time periods (5.6% to 16.1%, $p = 0.07$) while NT use increased from 46.8% to 72.7% for T2 tumors, $p = 0.03$. Overall pCR rate was 47% (36/77); a pCR rate of 51% (31/61) for patients treated with single-agent and 45% (5/11) for patients treated with dual-agent HER-2 targeted therapy ($p = 0.74$).
Conclusion Increasingly, HER-2 positive breast cancer patients are being treated in the neoadjuvant setting. This includes greater use of neoadjuvant therapy for patients with smaller tumors and clinically node-negative disease.

Utilization of Multiple I-125 Radioactive Seeds in the Same Breast Is Safe and Feasible: A Multi-Institutional Experience

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Objective The widespread use of screening mammography, in addition to improvements in breast imaging techniques has resulted in the increased detection of nonpalpable breast lesions. Accurate preoperative localization is essential to guide intraoperative identification and to achieve clear resection margins. Radioactive seed localization (RSL) with Iodine-125 (I-125) seeds has been shown to be a reliable and safe alternative to wire localization in breast surgery, but little is known about the use of multiple localization seeds for the bracketing of larger lesions or to excise multiple lesions. This study aims to evaluate the utilization of multiple seeds in RSL for these purposes.
Methods All patients who underwent localization of breast lesions using multiple I-125 seeds at 3 academic sites between January 2004 and June 2014 were included. Patient demographics, clinicopathological details, type of lesion, imaging features, type of surgery, margin status, adequacy of resection, and reoperations were collected.
Results Four hundred sixty-one operations were performed over an 11.5-year study period. The mean age was 62.9 years. Lesions excised included both benign (17%) and malignant (83%) pathology. The indications for multiple seed placement in the same breast included multiple lesions (n = 310, 67%), bracketing (n = 114, 25%), and a second seed inserted for failed single-seed localization (n = 26, 6%). In the group of patients with multiple seeds placed for bracketing or multiple lesions, the success rate for I-125 seed localization was 99% (432/435) with 2 patients requiring wire localization and 1 requiring additional seed placement. Sentinel lymph node biopsy was performed on 274 patients with a 100% identification rate. Among patients with bracketing seeds, the mean distance

between seeds was 45 mm (range, 8-110 mm). Removal of the targeted lesion was successful in all cases and 96% of bracketed lesions were removed as a single specimen. A specimen radiograph was routinely obtained and demonstrated 452 seeds visible, giving a 98% rate of retrieval within the first specimen. No seed loss was documented in the series. Intraoperative pathologic assessment of margins and intraoperative excision of close/positive margins was performed in accordance with each institution's protocol. Overall, 106/461 (23%) patients had a close or positive margin requiring a second procedure. The rate of inadequate margins was higher in patients with bracketed tumors (39/114, 34%). The rate of conversion to mastectomy was 9% in the entire cohort but was again substantially higher in the patients with bracketed tumors (21/114, 18%). In total, 60/114 (53%) of patients with bracketing procedures required reexcision of positive margins or culminated in a mastectomy. Routine intraoperative frozen-section analysis was associated with a lower reoperation rate compared with a selective approach to intraoperative pathological margin assessment.
Conclusion The use of multiple radioactive seeds for localizing multiple lesions in the same breast is feasible and safe. Bracketing of lesions is selectively used in patients with extensive disease. I-125 radioactive seeds can be successfully utilized in this setting; however, by virtue of the extent of disease a substantial percentage of these patients require margin re-excision or conversion to mastectomy.

Impact of Neoadjuvant Therapy on Pathologic Axillary Nodal Status in HER-2 Positive Patients With Clinically Node-Negative Disease

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Objective Neoadjuvant therapy (NT) is increasingly used for operable breast cancers, especially HER-2 positive and triple-negative disease. Complete axillary nodal response after NT in clinically node-positive patients is documented in 40-70%. However, the impact of NT on clinically node-negative (cN0) patients, who may have occult axillary disease at presentation, is unclear. We investigated the impact of NT on axillary disease burden in cN0 HER-2 positive breast cancer patients.
Methods With IRB approval we studied 223 consecutive cN0 patients with HER-2 positive tumors from October 2008 to September 2014. Patient demographics, clinical T and N stage, tumor receptor status, tumor grade, NT use, breast and axillary operations, and pathology findings were reviewed. Data were analyzed using chi-square and two-sample *t* tests to compare groups; multivariable logistic regression was used to adjust for confounding variables in comparing NT vs primary surgery (PS) with respect to the outcome of pathologic nodal disease.
Results Clinical T stage distribution was 133 (60%) T1, 71 (32%) T2, 16 (7%) T3, and 3 (1%) T4. Forty-five patients (20%) received NT. NT use was strongly correlated with higher clinical T stage ($p < 0.0001$), with NT given in 7 (5%) of T1, 32% T2, 75% T3, and 100% T4 patients. NT patients were also significantly younger than the PS group (median, 52 vs 61; $p = 0.02$). No significant difference was noted with respect to ER/PR status or tumor grade. Despite the significantly higher clinical T stage in the NT group, the incidence of pathologic axillary disease was similar in both (NT 6/45 = 13.3%, PS 28/178 = 15.7%, $p = 0.69$). In multivariable analysis, after adjustment for confounding variables including clinical T stage and age, NT showed a significant reduction in odds of pathologic nodal disease (OR 0.28, 95% CI: 0.08-0.84, $p = 0.02$). The effect was most apparent in patients with T2 tumors (see Table), where the rate of axillary nodal metastases was 4% (1/23) among those treated with NT vs 23% (11/48) in those with PS ($p = 0.03$). Further, among those with pathologic nodal disease, the number of positive nodes, median 1 vs 2, was reduced with NT (adjusted $p = 0.07$). Extranodal extension was noted in 8/28 (29%) PS patients vs 1/6 (17%) of the NT patients (adjusted $p = 0.51$).
Conclusion Neoadjuvant therapy in patients with clinically node-negative HER-2 positive breast cancer results in a reduction in the rate of pathologically node-positive disease. Neoadjuvant therapy in this cohort may decrease the need for axillary node dissection.

continues

Proportion With Pathologic Nodal Disease Stratified by Neoadjuvant Therapy and Clinical T Stage

Clinical T Stage	Neoadjuvant Therapy	N	N (%) Clinically Node-Negative/ Pathologic Node-Positive	p value
T1	Yes	7	1 (14.3%)	0.85
	No	126	15 (11.9%)	
T2	Yes	23	1 (4.3%)	0.03
	No	48	11 (22.9%)	
T3	Yes	12	3 (25%)	0.36
	No	4	2 (50%)	
T4	Yes	3	1 (33.3%)	N/A
	No	0	-- --	

A Laboratory Comparison of the 21-Gene Assay and PAM50-ROR

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Objective The 21-gene Recurrence Score® assay is validated in patients (pts) with ER+ early-stage invasive breast cancer (EBC) and predicts 10-yr distant recurrence risk and chemotherapy (CT) benefit. The Prosigna® assay (ROR), which uses 46 of the PAM50 genes, was validated in postmenopausal pts with ER+ EBC and is a prognostic assay only. Despite differences in platforms and methods used for development and validation, it is frequently believed that the assay results are interchangeable. We performed a study comparing results from the 2 assays obtained from the same tumor blocks. The first 40 samples showed a substantial disagreement in how the assays stratify risk.

Methods Seventy sequential BC tumors from Marin Medical Laboratories with sufficient tumor material were selected to be tested with the standard 21-gene assay. Samples were sent to an independent lab where Prosigna ROR and intrinsic subtype was performed with the operators blinded to Recurrence Score results. The first 40 cases were stratified by Recurrence Score (20 low, 10 intermediate, and 10 high). Descriptive statistics were used to compare results from the 2 assays.

Results Of the 40 initial pts evaluated, 7 were excluded: 3 for low RNA signal in the Prosigna assay and 4 were ER(-) by RT-PCR. Of the 33 remaining cases; 24 ductal, 7 lobular; 27 N(-); 6 N+. The Spearman rank correlation between Recurrence Score and ROR was 0.40 (95% CI, 0.06–0.65). Risk group assignment (low/intermediate/high) between Recurrence Score and ROR was in agreement in 56% (15/27) of N(-). Prosigna classified 19 luminal A, 12 luminal B, 2 HER2 enriched, and 0 basal. In both the luminal A and B groups, there was a wide range of Recurrence Score results.

Conclusion Consistent with prior comparisons between the Oncotype DX and other genomic assays, there are substantial differences in the way pts are risk-stratified and it cannot be assumed that the assay results are interchangeable. These results suggest that there is only a modest agreement between Recurrence Score results and ROR, with almost half of N(-), ER+ pts classified differently, including ~30% of high ROR pts being classified as low risk by the Recurrence Score with expected minimal if any benefit from chemotherapy. Final data from 70 pts will be presented.

Do Close or Positive Mastectomy Margins Mandate the Use of Radiotherapy?

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Objective The influence of margin status on the risk of locoregional recurrence (LRR) after mastectomy for invasive carcinoma and ductal carcinoma in situ (DCIS) remains unclear. Patients at increased risk of LRR are likely to benefit from postmastectomy radiotherapy (PMRT); however, selecting those patients at high risk is difficult. The aim of this study was to quantitate the risk of LRR in patients with close or positive mastectomy margins who did not receive radiotherapy (RT). In addition, we sought to determine if margin status is a reflection of other high-risk tumor features known to be associated with LRR, and whether the significance of invasive carcinoma and DCIS at the margin differs.
Methods From a prospective, single-institution, HIPAA-compliant database, we retrospectively identified 225 patients with invasive carcinoma or DCIS treated between 1995 and 2012 who underwent mastectomy without PMRT and had close (<1 mm) or positive margins. Characteristics analyzed included age, T stage, N stage, hormone receptor status, HER2/neu status, use of adjuvant therapy, and type of cancer at the margin. Crude rates of LRR were calculated and the log-rank test was used to evaluate the association between each variable and LRR.
Results One hundred eighty-eight patients with invasive cancer and 37 with DCIS met eligibility criteria. The median patient age was 47 years, and median follow-up was 3.7 years (range, 0.9-16 years). Forty-five percent of invasive cancers were T1. The crude rate of LRR for the entire population was 6.6%. The rate of LRR for patients with positive margins (n = 36) was 2.7%, and for those with close margins (n = 189) 7.4% (p = 0.437). Median time to LRR was 2.6 years (range, 1-6.6 years). Patients with invasive carcinoma at the margin had significantly higher LRR rates than those with DCIS at the margin (10.2% vs 2.8%, p = 0.03). Patients 40-60 years of age had a higher LRR rate compared to their older or younger counterparts (p = 0.007). The median age of patients with LRR was 44 years (range, 24-86). LRR was significantly more common in those with T2/3 compared to T1 tumors (12. 5% vs 4.3%, p = 0.044). Estrogen receptor, progesterone receptor, and HER2 status and nodal status were not associated with LRR. The 5-year Kaplan-Meier LRR-free survival in this group was 92% (95% confidence interval, 87%-96%).
Conclusion LRR in patients with close or positive margins after mastectomy who do not receive RT was an infrequent event in our population and was associated with features, such as larger tumor size and younger age, known to be predictive of LRR independent of margin status. Our findings suggest that the presence of close or positive margins after mastectomy, in the absence of other factors increasing the risk of LRR, may not be an indication for PMRT, and are particularly unlikely to be important in patients with DCIS.

The Specimen Margin Assessment Technique (SMART) Trial: A Novel Method of Identifying the Most Accurate Method of Specimen Orientation in Breast Cancer Surgery

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Objective Achieving negative margins remains one of the most important determinants for local recurrence following breast-conserving therapy. Inaccuracies in margin labeling or orientation during surgery translates into additional unnecessary surgery for re-excision, additional emotional distress for patients, delays in subsequent adjuvant therapy for breast cancer, and associated additional health care costs from undergoing a second surgery. The objective of this study is to perform a clinical trial evaluating the accuracy of specimen orientation on 2 commonly used techniques for breast specimen orientation (intraoperative specimen inking by the surgeon vs suturing) on the same lumpectomy specimen, in a blinded fashion, using a novel technique. We hypothesize that intraoperative specimen inking technique increases accuracy in margin identification and specimen orientation.
Methods A prospective clinical trial was performed under ethics approval. All patients undergoing prophylactic mastectomy or breast reduction underwent a sham lumpectomy within the prophylactic mastectomy or the breast reduction tissue that was removed. Spatial orientation was noted and the specimen was inked intraoperatively by the surgeon using special phospholuminescent inks that dry clear but glow under black light. In addition, specimen suturing using 2 labeled sutures was performed by the surgeon as per usual on the same lumpectomy specimen. A third "mystery" suture was placed; the location of which is known only to the surgeon but blinded to the pathologist. Primary Outcome: Discordance rate between the surgeon and the pathologist in the mystery suture identification on

the lumpectomy specimen. Secondary Outcome: discrepancy in the surface area for each margin as defined by the pathologist vs the surgeon. Assuming a 15% discordant rate as being clinically significant rate, a 95% exact, two-sided confidence interval will required a minimum of 68 patients. Accounting for 10% screen failure, we attempted to accrue 75 patients.
Results Seventy sham lumpectomies were performed: 32 from patients undergoing prophylactic mastectomy and 38 from patients undergoing breast reductions. Mean sham lumpectomy volume was 48 cm^3. Discordance in the identification of the "mystery" suture location between surgeon and pathologist occurred in 42%. Discordance was inversely correlated with specimen volume and standing height of breast tissue. Discordance in identification of surface area of a margin occurred in 76%. A median of 4 additional "surgeon identified" margins were included in the "pathologist identified" anterior margins.
Conclusion Specimen disorientation and margin discordance is significant with the intraoperative suture method of orientation. Discordance between the surgeon and the pathologist in margin orientation would influence the accuracy of margin identification and the subsequent directed re-excisions, as well as subject patients to unnecessary surgeries. Intraoperative inking by the surgeon is a more accurate method of breast specimen orientation and should be used routinely.

Treatment and Prognosis of Lymphoma Breast, A Review of 31 Cases in Pakistani Population
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Objective Lymphoma breast is the rare form breast malignancies worldwide and in Pakistan. It does not have a well-defined treatment strategy. Purpose of this study was to review of histological types of breast lymphomas, treatment modalities, and outcome, according to stage, in 31 patients treated at a single institution.
Methods Thirty-one cases of lymphoma, breast, were registered and treated from the year 1995 to 2014 at our institute. Retrospectively their data were reviewed and analyzed. Demographics studied were age, gender, clinical presentation, histopathological subtypes, immunohistochemistry, staging workup, stage at presentation, treatment modalities, and outcome. Cases were further divided into primary breast lymphoma (PBL) and secondary breast lymphoma (SBL), according to Wiseman and Liao criteria.
Results A total of 31 patients were treated in our institute. Fifteen (48.38%) cases were of PBL, while 16 (15.61%) were SBL. Twenty-eight (90.3%) patients were female, whereas only 3 were male. Median age was 35 years (22-76). Diagnosis was made on core or excisional biopsy. Sixteen (51.6%) patients had left-sided, while 10 (32.3%) had right-sided tumors. Bilateral involvement was present in 5 (16.1%) cases only. B symptoms were present in 17 (54.8%) cases. Four (12.9%) cases were pregnancy associated. All patients underwent imaging of the breast, staging workup that included whole-body computed tomography, bone marrow biopsy, and bone scan, prior to start of treatment. Diffuse large B-cell lymphoma (DLBCL) was the most common type, present in 20 cases (64.5%), remaining 14 patients had anaplastic large cell lymphoma, low-grade B-cell lymphoma, lymphoblastic lymphoma, Hodgkin's lymphoma, follicular lymphoma, MALT, and small lymphocytic lymphoma. Nine (29%) patients had bone marrow involvement at the time of presentation. Mainstay of treatment was chemotherapy RCHOP (rituximab, cyclophosphamide, doxorubicin, vincristine, and prednisolone) for non-Hodgkin's lymphomas. Surgery at our institute was performed on 3 patients for progressive disease. Radiotherapy to the breast was offered in 14 (45.2%) patients. Complete response was achieved in 16 cases (51.6%), partial response in 5 cases, while disease progressed in 9 cases (29%). Three patients developed local relapse after complete treatment, while 4 developed bone and visceral metastasis; brain metastasis was present in 1 case only. Follow-up period was from 1 to 177 months. Twelve (38.7%) patients died. Five-year survival was 35.48 %, and 10-year survival was 6.45%.
Conclusion Patients of lymphoma breast should receive aggressive treatment, with combination of chemotherapy and radiation therapy. Surgery should be limited for diagnosis and palliation of local symptoms in progressive disease; bilateral breast lymphomas carries poor prognosis.

Breast Cancer Treatment in High-Risk Elderly Patients

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Objective Breast cancer is considered as disease of old age accounts for 35%-40% in women above 65 years. This age group usually has multiple comorbid conditions and therefore is not offered standard treatment, although this lacks scientific evidence.We present a review of elderly population treated at our hospital, to assess whether these patients can be offered standard treatment, despite multiple comorbid conditions.

Methods A total of 685 patients age 65 years and above were registered for treatment at our institute, from 2006 to 2012. Four hundred thirty-four patients were included; patients with incomplete data were excluded. Retrospectively the data of all male and female patients above the age of 65 diagnosed with breast cancer were reviewed using hospital information system .The demographics studied were age, gender, locally advanced disease at presentation, comorbid conditions, histopathology, receptors, metastatic workup, stage, treatment received, local recurrence, and distant metastasis. Patients were divided into 4 age groups, and 4 groups of comorbid conditions.

Results Results were analyzed using SPSS 19. Four hundred thirty-four patients met inclusion criteria. Age range was from 65 to 90 years; median age was 70 years. Four hundred twenty-five (97.9%) patients were females and 9 (2.1%) patients were males. Maximum number of patients 276 (63.6%) belonged to age group 65-70 years. One hundred thirty (30%) patients had locally advanced disease at presentation; 17 (3.9%) patients had bilateral breast cancer at initial presentation. Thirty-two (7.3%) patients had distant metastasis at the time of presentation. Invasive ductal carcinoma was the most common type (73.96%). Luminal A was the most common subtype, 261 (60.1%), followed by Luminal B subtype, 68 (15.7 %); 54 (12.4%) were triple negative. One hundred thirty-nine (32%) had single comorbid condition, while 58(13.4%) had 3 or more comorbid conditions. Three hundred ninety-five (91%) patients underwent surgery, among them 144 (33.2%) had breast conservation surgery (BCS). Only 41 (9.4%) patients were either not offered surgery due to very high risk for anesthesia or they refused. One hundred eighty-three (42.2%) patients received chemotherapy. Radiotherapy was given to 302 (69.6%) patients; 353 (81.33%) patients received hormonal therapy. Therefore 166 (38.2%) patients received standard treatment. Cancer-specific deaths were 20 (4.12 %).

Conclusion Elderly patients of breast cancer should be offered standard treatment according to the guidelines that are according to tumor biology; only patients with multiple comorbid conditions and those who are very fragile can receive selective treatment.

Effects of Preoperative Imaging Modality on Patient Selection for Intraoperative Radiotherapy

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Objective Following recent update of the TARGIT-A trial, there has been increased uptake of intraoperative radiotherapy (IORT) as a treatment modality. Appropriate patient selection for IORT is challenging, and tumor size on imaging is often used as a key selection criteria. The accuracy of imaging modalities in predicting pathologic size is variable and can therefore influence the inclusion or exclusion of patients from IORT. We report characteristics of patients selected for IORT and compare clinical and surgical tumor size to determine the optimal imaging modality, MRI, mammogram, or ultrasound, for patient selection.

Methods Patients undergoing IORT using the INTRABEAM System at our institution, starting August 2013, were consented for registration in a prospective database with ongoing recruitment and current enrollment of 50 patients. Demographic, preoperative staging, pre- and post-operative pathology, and surgical and radiation data were collected. We evaluated need for re-excision, postoperative external beam radiation therapy (EBRT), and variations between preoperative staging and final pathology. Variability in preoperative tumor size by imaging modalities was compared with final tumor size at surgical excision.

Results Patient characteristics included median age of 66 (range, 47-91), 92% postmenopausal. Final pathologic type was 28 IDC, 17 DCIS, 2 mixed type, and 3 ILC. Median preoperative tumor size by imaging was 1.28 cm (range, 0.3-7.6 cm). Mean tumor size at surgical excision was 1.0 cm (range, 0-3.0 cm; sd, 0.69). Four patients required re-excision for positive margins (8%). Seven patients have currently received postoperative EBRT (14%). Choice of preoperative imaging modality was at the discretion of the breast surgeon. The mean difference between final pathologic size and preoperative imaging size for invasive cancers was -0.18 cm for mammogram, -0.10 cm for

ultrasound (US), and 0.49 cm for MRI, with mammogram and US underestimating final size and MRI overestimating. The mean difference for DCIS was 0.10 cm for mammogram, -0.15 cm for ultrasound, and 1.62 cm for MRI. MRI was used in 26 of the 50 patients and in 3 of the 4 patients requiring re-excision. No patients requiring re-excision or EBRT had significant underestimation of tumor size on MRI, mammogram, or ultrasound.
Conclusion Accuracy of imaging modality can strongly influence patient's eligibility for IORT. Both mammogram and ultrasound showed acceptable accuracy in predicting size. MRI showed significant variability in accuracy with occasional large overestimates of size, most notably in patients with DCIS. Variations in imaging modality did not appear to affect rates of re-excision or EBRT. MRI may occasionally inappropriately exclude patients from IORT based on size criteria but may also show satellite, contralateral, or mammographically occult lesions not otherwise seen. It is likely that a combination of imaging modalities is necessary for accurate evaluation and ongoing follow-up for local recurrence and survival will further clarify appropriateness of patient selection.

Tumor Size Significantly Impacts Probability of Pathologic Complete Response in Basal Molecular Subtype Breast Cancer: Implications for Management

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Objective Neoadjuvant chemotherapy (NCT) was initially shown to downsize many large or locally advanced breast cancers, thus increasing the likelihood of clear margins with a mastectomy or lumpectomy. For triple-negative and HER2 tumors, pathologic complete response (pCR) correlates with excellent survival. The Neoadjuvant BReast Symphony Trial (NBRST) found that the 80-gene BluePrint (BP) functional molecular subtype is superior to conventional IHC/FISH subtyping for predicting complete pathologic response to neoadjuvant chemotherapy. The purpose of this substudy was to determine if the pCR rate is also impacted by tumor size.
Methods The NBRST study is a prospective registry of women aged 18 to 90 with biopsy-proven invasive cancer who undergo NCT (or neoadjuvant endocrine therapy, excluded in this substudy) following written informed consent. The largest pre-NCT size measurement from mammogram, ultrasound, or MRI was used. T stage was determined by the treating physician. NCT adhered to peer-reviewed established regimens. pCR was defined as no residual invasive cancer in either the breast or axilla of the resected specimen. BluePrint subtyping, combined with MammaPrint, classified patients into 4 molecular subgroups: Luminal A (MammaPrint Low Risk), Luminal B (MammaPrint High Risk), HER2, and Basal-type. Logistic regression was used to model the probability of pCR as a function of tumor size and molecular subgroup. Fisher exact test was used to compare pCR rates by T size.
Results A total of 591 patients were evaluable. The overall pCR rate was 26%. The Luminal-type patients had <10% pCR rate, statistically significantly less than the pCR rate for Basal and HER2 subtypes ($p < 0.0001$). Overall, the probability of pCR significantly decreased with increasing tumor size ($p = 0.007$). However, this relationship to tumor size was significantly impacted by molecular subgroup (interaction p-value = 0.005). The effect of tumor size was significant in the Basal subgroup ($p = 0.003$). pCR by T stage also decreased with increasing T size: T1, 32% (19/60); T2, 29% (102/354); T3, 17% (25/146). The p-value for pCR of T1 and T2 vs T3 tumors was 0.004.
Conclusion These data show that the likelihood of a pCR following NCT is less for larger tumors overall, driven mainly by a significant impact in the Basal subgroup. Luminal A and B do not usually have pCR with current neo-adjuvant chemotherapy (importantly, pCR does not predict survival in Luminal A/B). Targeted therapy in the HER2 group may reduce differences in response due to size of the primary. Larger basal tumors may need either longer (more courses) of NAC or perhaps a better delineation of targeted therapy (for example platinum/PARP inhibitor in BRCA/BRCA-like basal subtypes) to optimize pCR rates.

continues

pCR Rate by Tumor Size and BP Subtype

Tumor Size	# pCR/Total (%)	# pCR/Total (%) per MammaPrint/BluePrint Subtype Group			
		# Luminal A	# Luminal B	# HER2	# Basal
≤2 cm	26/81 (32%)	0/5 (0%)	2/27 (7%)	10/13 (77%)	14/36 (39%)
2.1–3 cm	51/179 (28%)	0/21 (0%)	2/54 (4%)	16/36 (44%)	33/68 (49%)
3.1–4 cm	33/112 (29%)	2/14 (14%)	4/45 (9%)	8/14 (57%)	19/39 (49%)
4.1–5 cm	18/76 (24%)	0/9 (0%)	1/27 (4%)	10/14 (71%)	7/26 (27%)
5.1-6 cm	9/55 (16%)	0/6 (0%)	4/18 (22%)	4/11 (36%)	1/20 (5%)
>6 cm	14/88 (16%)	0/13 (0%)	4/32 (13%)	4/12 (33%)	6/31 (19%)
Total	**151/591 (26%)**	**2/68 (3%)**	**17/203 (8%)**	**52/100 (52%)**	**80/220 (36%)**
Odds ratio for pCR* (95% CI)	**0.734 (0.587, 0.918)**	**1.405 (0.930, 2.124)**		**0.756 (0.463, 1.234)**	**0.568 (0.393, 0.820)**

*Odds ratio for pCR associated with 2.4-cm increase in tumor size (approximately interquartile range)

The SSO/ASTRO Consensus on Breast Margins: Has It Affected Clinical Practice?

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Objective Adequate margin width remains a subject of much controversy in breast-conserving surgery. The Society of Surgical Oncology (SSO) and the American Society for Radiation Oncology (ASTRO) presented a consensus statement on margins in December 2014. This guideline stated that re-excision is recommended only in cases where tumor is present on inked margin.

Methods In this study, we sought to determine the consensus statement's impact on re-excision practices at our institution. We examined re-excision rates 11 months before the release and 10 months after the release of the statement.

Results Patients included in this IRB-approved study had a diagnosis of invasive breast carcinoma, underwent breast-conserving surgery, and were treated with adjuvant radiotherapy. Patients with pure DCIS were excluded. One hundred and two women treated from January to November 2013 were included in the pre-consensus group. Sixty-one women were treated from December 2013 to September 2014 in the post-consensus group. The women treated prior to the consensus statement (n = 102) and those women treated after the statement (n = 61) were equally matched in terms of patient age, hormone positivity, and tumor size. A close margin at our institution is defined as <2 mm from the tumor edge. There were 16/102 women prior to the consensus who had close margins and 13/61 women in the post-consensus group. Of these, 68.8% (11/16) underwent re-excision for close margins in the pre-consensus group compared to 30.8% (4/13) after the consensus statement was released (p value = 0.6).

Conclusion The rapid adoption of the SSO/ASTRO margin consensus statement at our institution, although not statistically significant, led to a decrease in the number of patients who underwent a re-excision for close margins. Women with a close surgical margin were less likely to undergo additional surgery for re-excision after the guidelines were released. In our institution, using a standard criterion for re-excision, the re-excision rate decreased from 10.8% to 6.6%. Further studies are needed to examine the impact of the consensus statement on re-excision practices in a larger group of patients.

Close Margin Re-Excisions

	Pre-Consensus	Post-Consensus
Re-excision for close margins	11	4
No re-excision for close margins	5	9

The Effects of Hormonal Therapy on Outcomes in Women Over Age 70 Undergoing Breast-Conserving Surgery

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Objective The benefit of hormonal therapy (HT) for breast cancer in older women remains poorly defined. The majority of patients with breast cancer who are over 70 have medical comorbidities and die of causes unrelated to breast cancer. This study evaluates the value of HT for these women.
Methods A review of a prospectively maintained database was performed to identify women over age 70 undergoing breast-conserving surgery for invasive breast cancer from January 2000 to December 2011. Patient and tumor characteristics, including age at diagnosis, tumor size, grade, estrogen receptor (ER) and progesterone receptor (PR) status, Her2 status, and nodal status, were compared in those that received HT to those that did not. Recurrence-free survival (RFS), breast cancer–specific survival (BCSS), and overall survival (OS) were compared.
Results Five hundred sixty-eight patients were identified. Mean age at diagnosis was 78.2 years (range, 70-97; SD 6.1). Overall, average tumor size was 17.6 mm (SD, 12.5); they were largely ER/PR-positive (n = 535/568 [94%], n = 462/568 [81%]), Her2-negative (n = 504/563 [90%]), intermediate grade (n = 148/556, 27% grade I; n = 259/556, 46% grade II; n = 149/556, 27% grade III), and node negative (n = 333/568 [59%] node-negative; n = 93/568 [16%] node-positive; n = 142/578 [25%] not evaluated by node biopsy). Three hundred and thirty-four patients (59%) received no HT and 234 (41%) received HT. Thirteen patients (n = 13/234 [6%]) received chemotherapy in addition to HT. Patients in the HT group had significantly higher proportion of patients with ER-positive tumors compared to the no HT group (229/234 [98%] vs 306/334 [92%], $p < 0.01$) There was no difference between the 2 groups with respect to size, grade, PR status, Her2 status, or nodal involvement. With median follow-up of 65 months (range, 3-12 months), there was no difference in RFF, BCSS, or OS between the 2 groups (see Table 1).
Conclusion More than half of patients over 70 treated with breast-conserving surgery did not receive HT. HT added no significant benefit in terms of overall survival, recurrence-free survival, or mortality due to breast cancer in this population.

Table 1

	Estimated 5-year	Estimated 10-year	P value
Recurrence-Free Survival No HT HT	 93% 96%	 93% 89%	p=<0.57
Breast Cancer–Specific Survival No HT HT	 95% 99%	 93% 93%	p =< 0.16
Overall Survival No HT HT	 77% 85%	 57% 58%	p =< 0.35

Nipple Perfusion Is Preserved by Staged Devascularization in High-Risk Nipple-Sparing Mastectomies

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Objective Patients with ptotic breasts or high BMI are not suitable or ideal for nipple-sparing mastectomy (NSM). Devascularization of the nipple-areolar complex (NAC) prior to NSM has been shown to decrease ischemic complications in high-risk patients[1]. The perfusion pattern to the NAC can predict the risk of ischemic complications in NSM, being highest when it predominates from the underlying breast tissue[2]. We studied perfusion patterns in devascularization operations and described the rates of epidermolysis/necrosis.
Methods Women undergoing devascularization procedures prior to therapeutic or prophylactic NSM were included. Ptosis, BMI, smoking, prior breast surgery, and breast/chest irradiation were noted risk factors. Devascularization operation included tumor excision and subnipple biopsy in all patients. Perfusion was assessed via IC-Green and infrared camera imaging. NAC perfusion was classified as: V1 = underlying breast, V2 = surrounding skin, and V3 = combination of V1/V21. A fourth post-devascularization pattern was defined, V4 = diffuse capillary fill. Chi-square analysis for rates of ischemia was performed.

Results Thirty-nine breasts in 21 patients were studied. Median age was 48 (31-68) and median BMI was 26 (21-39), with BMI >30 in 9 patients. Two patients were smokers, 27 (69.2%) breasts had grade 2 /3 ptosis, and 3 had irradiation. Thirteen (33.3%) patients had 1 risk factor, 20 (51.3%) had 2, and 6 (15.4%) had 3. Baseline NAC perfusion at devascularization procedure was V1 in 10 (26%) patients. After devascularization, 5 changed to V2, 1 to V3, and 4 to V4. For the 16 (41%) patients with V2 patterns, 12 remained V2 and 4 changed to V4. Contrastingly, more than half of the 13 (33%) V3 baseline patterns switched to V2 after devascularization, 2 remained V3, and 4 became V4. Partial-areolar necrosis occurred after devascularization in 1 patient with BMI 38, grade 3 ptosis, V1 perfusion and use of batwing incision. Baseline perfusion pattern was predictive of ischemic changes post mastectomy (Table 1), but there were no significant perfusion deficits on imaging. Overall, 33% had minimal superficial epidermolysis after devascularization, often involving the surface of the nipple only. After mastectomy, no patient experienced nipple loss and only 13.5% had limited epidermolysis to the NAC. Neither prior radiation nor surgical scars affected rates of epidermolysis.
Conclusion Limited epidermolysis is observed after devascularization operation, indicative of ischemic insult. The adaptive circulatory changes documented herein support extending this operation to high-risk women who might be considered unsuitable for NSM.

Reference
1. Jensen et al. AnnSurgOnc. 19:171, 2012. 2. Wapnir et al. AnnSurgOnc. 21:100, 2014

Table 1. Postoperative Epidermolysis and Desquamation Rates

	N	Post-Devascularization Ischemia		Post-Mastectomy Ischemia	
Perfusion Pattern					
V1	10	50% (5)	P = 0.24	40% (4)	P = 0.043
V2	16	31.2% (5)		6.3% (1)	
V3	13	23% (3)		7.7% (1)	
BMI					
<30	30	23.3% (7)	P = 0.55	6.7% (2)	P = 0.21
≥ 30	9	66.7% (6)		44.4% (4)	
Ptosis					
None	3	0	P = 0.016	0	P < 0.001
Grade 1	9	22.2% (2)		22.2% (2)	
Grade 2	22	31.8% (7)		0	
Grade 3	5	100% (5)		80% (4)	

The Extended V-Y Latissimus Dorsi Myocutaneous Flap for Chest Wall Reconstruction After Locally Advanced Breast Cancer Resection

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Objective The surgical resection of locally advanced breast cancer remains a challenge, even with the development of neoadjuvant chemotherapy. The aim of this study is to confirm the usefulness of the extended V-Y latissimus dorsi myocutaneous flap as a method of closing large anterior chest defects.
Methods In the last 2 years, 9 patients with locally advanced breast cancer (TNM IIIB) and 2 patients with extensive local recurrence underwent wide mastectomy and axillary clearance and immediate chest wall reconstruction with the extended V-Y latissimus dorsi myocutaneous flap. The V-Y cutaneous flap is raised from adjacent tissue located on the lateral and posterior thoracic region. This flap is a triangle whose base is the lateral border of the mastectomy wound. All patients had received prior chemotherapy and had large thoracic wounds.
Results The mean age of the patients was 49.8 (range, 30–70) years. The defect size ranged between 15–20 cm and 17–34 cm. Mean follow-up time was 11 months. The V-Y design of the cutaneous flap allowed primary closure of chest wound and donor defect. Four patients had dorsal wound dehiscence and 1 patient had dorsal and chest wound dehiscence. All cases except 1 were treated by a conservative approach with good result. No flap loss was reported.

All patients underwent the adjuvant radiotherapy, starting between 2 and 5 weeks after surgery. Two patients had local recurrence 15 and 22 months after surgery, 2 patients developed breast cancer in the contralateral breast and 2 died from pulmonary and hepatic metastasis.
Conclusion The extended V-Y latissimus dorsi myocutaneous flap should be considered in cases of locally advanced breast cancer resection with large thoracic wounds that may not be suitable for primary closure. In selected patients, this approach has allowed us to perform wide resections with negative surgical margin and a robust wound cover without a significant donor defect and minor morbidity compared with transverse rectus abdominus myocutaneous (TRAM) flap.

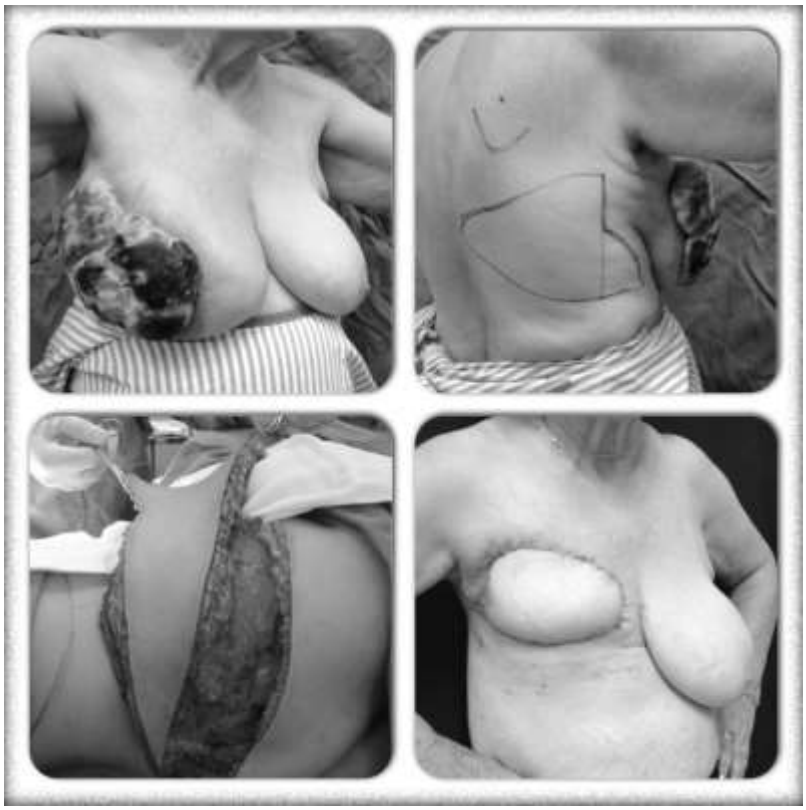

Figure. The surgical principles of the extended V-Y latissimus dorsi myocutaneous flap.

The High Risk of Breast Cancer and Secondary Malignancies Following Mantle Radiotherapy for Hodgkin Lymphoma in a Scottish Population
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Objective Mantle radiotherapy (RT) involved irradiation of all lymph nodes above the diaphragm using 1 extensive radiotherapy field, and was a highly effective curative treatment for Hodgkin lymphoma (HL). In the last couple of decades, several studies were published demonstrating increased risk of secondary malignancy following mantle RT for HL, especially with younger age of treatment. Therefore, all patients younger than 35 years who had previously received supradiaphragmatic RT prior to 2003, were recalled in the UK to discuss increased risk of breast cancer and offer annual breast screening. The aim of this study was to assess the incidence of breast cancer and other secondary malignancies in this cohort of patients at our local screening unit, during their ongoing follow-up over a period of 10 years since 2003.
Methods One hundred thirteen women were identified as "high risk" patients who had received supra-diaphragmatic mantle RT pre-2003 for HL by the Edinburgh breast screening unit. Data collected included: age at mantle RT, time to development, and type of secondary malignancies.
Results Eighteen patients were lost to follow-up. The remaining 95 patients were manually followed using electronic patient records. Of the 95 patients, 27 developed secondary malignancies (28.4%), including: breast

cancer (n = 9, 9.5%), malignant melanoma (n = 5, 5.3%), nonmelanoma skin cancer (n = 3, 3.2%), lung cancer (n = 3, 3.2%), laryngeal cancer (n = 1, 1.1%), esophageal cancer (n = 1, 1.1%) and thyroid cancer (n = 3, 3.2%). Four patients had gynecological malignancies including: cervical cancer (n = 1, 1.1%), an adnexal tumor (n = 1, 1.1%), vulval cancer (n = 1, 1.1%), and endometrial cancer (n = 1, 1.1%). Two women developed acute myeloid leukemia (2.1%). HL relapsed in 6 patients (6.3%). Six patients are now deceased. Risk of breast cancer development is multifactorial, but higher risk correlates to younger age of radiation exposure. Age of first exposure ranged from 11 to 44 years. Mean age of treatment was 25.5 years. Median latency period for breast cancer development from time of first radiotherapy exposure was 19 years (range, 5–47 years). All the breast cancers were located within the field of radiotherapy in all patients (7 upper outer quadrant, 2 medial). Breast cancer was bilateral in 1 patient. Six patients underwent bilateral mastectomy with reconstruction, while 3 patients underwent unilateral mastectomy with reconstruction due to personal preference.
Conclusion Mantle radiotherapy for HL significantly increases the risk of developing breast cancer and other secondary malignancies. Nine further patients are predicted to develop breast cancer in our cohort, with a mean age of onset at 41.7 years. Treatment of choice is bilateral risk-reducing mastectomy, as further radiation increases the risk of pulmonary and cardiovascular complications, as well as tissue necrosis. The physical and psychological morbidity endured by the patient after surgery is high. Therefore, it is imperative that patients are advised of available screening programs, and are counseled appropriately before deciding to undergo mastectomy. Despite the rapid decline in use of mantle radiotherapy treatment following 2003 in Scotland, its long-term side effects are still being felt by the current HL survivor population.

Is Surgical Re-Excision After Initial Breast-Conserving Surgery Associated With Higher Rates of Recurrence or Mortality? A Population-Based Analysis of Women ≤ 35 Years Old With Invasive Breast Cancer
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Objective Surgical re-excision of close/positive margins following breast-conserving surgery (BCS) has been reported to occur in up to 25% of women with invasive breast cancer (IBC). Young age is a known predictor of recurrence, as is the presence of positive margins. Little is known, however, regarding the incidence or factors predictive of re-excision, or its clinical impact in this unique population. We sought to describe the incidence and factors predictive of surgical re-excision after BCS in young women (≤ 35) with invasive breast cancer. In addition, we evaluated the impact of having surgical re-excision on recurrence and survival in a large population-based cohort.
Methods All women diagnosed with IBC aged ≤ 35 from 1994–2003 treated with BCS were identified from the Ontario Cancer Registry, a provincial dataset capturing population-based data of all incident breast cancer diagnoses in the entire province of Ontario. Patient demographics, complete tumor, treatment characteristics, as well as recurrence and survival data, were abstracted from primary chart review. Descriptive statistics were used for treatment patterns, and logistic regression was used to identify factors associated with performance of re-excision using odds ratios. Cox proportional hazard models were used to model disease-free survival and overall survival. The models were controlled for known predictors of both recurrence and mortality including age, tumor size, nodal status, ER/PR, LVI, histologic grade, systemic therapy, and adjuvant radiation.
Results Overall, there were 786 women identified during the study period who were treated with BCS. Of these, 266 (33.8%) had at least 1 re-excision done after a median of 17 days (range, 13–33) after initial attempt at BCS. Among the patients who had re-excision, 263 (98.9%) patients only had 1 re-excision procedure performed. On multivariable analysis, factors predictive of re-excision were multifocality (OR: 2.21, 95% CI [1.41–3.50]) and mixed tumor histology (ductal with lobular features) (OR: 3.16, 95% CI [2.15–4.64]). After a median follow-up of 13.2 years, 181 patients (23.0%) in the cohort had died, among which 122 (23.5%) were in the non–re-excision group and 59 (22.2%) were in the re-excision group (p = 0.686). Local, regional, and distant recurrences occurred in 61 (11.7%), 7 (1.4%), and 73 (14.0%) patients, respectively, in the group without re-excision, compared to 38 (14.3%), 12 (4.5%), and 26 (9.8%), respectively, in the group who had re-excision. There was no significant difference in recurrence (local, regional, and distant) or mortality observed in women that needed re-excision surgery compared to those who did not.
Conclusion We found the re-excision after BCS to be 34% in young women, and was associated with multifocality and tumors with lobular features. In spite of this, having re-excision surgery did not result in higher recurrence and

mortality rates when compared to those who did not; therefore, this should not be considered a predictor of worse outcomes.

Margins in Breast-Conserving Surgery: The Financial Cost and Potential Savings Associated With the New Margin Guidelines

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Objective The definition of clear margins for patients diagnosed with breast cancer who elect to undergo a lumpectomy has been an area of controversy for years. Past literature has demonstrated a lack of consensus regarding the definition of a clear margin and that which may require re-excision. Recently, a consensus statement by the Society of Surgical Oncology and the American Society of Radiation Oncology has defined a clear margin as no "ink on tumor," seemingly putting an end to the controversy. In this study, we compared the indications for re-excision, the findings of additional tumor (invasive or DCIS) in the re-excision specimen as they relate to margin status, and costs associated with re-excision.
Methods A retrospective analysis was performed on 581 patients who underwent at least 1 lumpectomy at our institution. The procedures were performed between January 2011 and December 2013. Patients who underwent an initial mastectomy were excluded. Postoperative data included margin status of the initial and any additional surgery. The decision to perform a re-excision was at the discretion of the surgeon and radiation oncologist. We also analyzed the number of re-excision lumpectomy where additional disease was found, as it relates to the margins status of the initial lumpectomy and the additional direct costs associated with these procedures.
Results Of the 581 patients sampled, 205 underwent a re-excision surgery, either 1 or 2 re-excisions (35.3%). At re-excision, 26.3% of patients were found to have additional disease (54/205). Of the patients with additional disease found on re-excision, 51 (94.4%) of them had a margin of <1 mm on their initial lumpectomy. The mean cost of the surgery for all 581 patients was $1,907.63. For the 205 total patients who underwent a re-excision surgery, the mean cost was $1,556.74. Thus, in order to find residual disease, a total of $319,132.40 was spent, with an average of $5,909.86 spent for each patient (total = 54) with additional positive margins found on re-excision.
Conclusion Our data suggest that a margin of <1 mm was most predictive of finding residual tumor on re-excision, as would be expected. Using old criteria, approximately 74% of patients who had undergone re-excision surgery with margins >1 mm did not have additional tumor, at a total cost of $243,456. Thus, the new consensus guidelines will lead to less overall cost at no clinical risk to patients. Furthermore, not having to undergo additional surgeries will reduce a patient's surgical risk and essentially eliminate delays in adjuvant care.

Is Obesity Consultation a Role for all Physician Providers?

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Objective Being overweight or obese is an established risk factor for the development of breast cancer in postmenopausal women, especially those who have not been previously exposed to hormone replacement therapy. The primary goal of this pilot study is to assess the prevalence of lifestyle modification counseling by primary care and specialist physicians among breast cancer patients and patients with a history of breast cancer.
Methods An anonymous survey about patient-physician interactions, as well as knowledge about the relationship between obesity and comorbidities, including cancer recurrence, patient motivation to pursue lifestyle modifications, and weight loss was distributed to all patients ≥ 25 years old presenting with breast symptoms. Additional patient information, such as BMI, was obtained from the medical record.
Results Seventy-six patients responded to the survey. There was a significant association ($p < 0.05$) found between success with weight loss and the type of physicians discussing importance of maintenance of health; patients lost more weight when consulted by more than 1 type of physician (Table 1). A majority of patients were aware that being overweight or obese is linked to an increased risk of postmenopausal breast cancer, hypertension, and diabetes. In addition, nearly one-third of patients with a current diagnosis or previous personal history of breast cancer were aware that being overweight or obese is linked to an increased risk of recurrence and lower overall survival. More than half of the patients surveyed were moderately motivated or highly motivated to adapt lifestyle modifications (ie, implement diet modification or exercise). However, no significant association was found between the type of physician speaking to the patient vs the patient's level of motivation.
Conclusion Results of this study reiterate the importance of educating all patients periodically on lifestyle

modifications. Data show lifestyle modifications reduce the risk of de novo postmenopausal breast cancers, as well as decrease recurrences and improve overall survival and outcome in breast cancer survivors. In addition, this study highlights the importance for all physicians, regardless of specialty, to communicate and motivate obese patients to lose weight. Obesity is a major public health problem and is being increasingly linked to various diseases (hypertension, diabetes, colorectal, postmenopausal breast, and endometrial cancer). As such, the obesity epidemic is linked to almost every specialized field of medicine, and addressing this issue is not the responsibility of only the primary care physician.

Table 1. Success With Weight Loss by Type of Physician Discussing Importance of Maintenance of Health (N = 64)

	Unsuccessful with Weight Loss n (%) (n=22)	Successful with Weight Loss n (%) (n=42)	X^2 (p-value)
Primary Care Physician OR Physician Specialist	17 (77.3)	20 (47.6)	5.21 (0.02)
Primary Care Physician AND Physician Specialist	5 (22.7)	22 (52.4)	

Feasibility of Mammary Ductoscopy in Management of Pathologic Nipple Discharge

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Objective Mammary ductoscopy provides direct visualization of the ductal epithelium, which is the source of most papillary and malignant lesions. Ductoscopy has been shown to increase the detection of intraductal lesions in patients with pathologic nipple discharge (PND), in addition to other imaging techniques, including galactography, magnetic resonance imaging, mammography, or ultrasound. Therefore, we investigated the feasibility of ductoscopy in diagnosis and management of patients presented with clinically pathologic nipple discharge.
Methods Mammary ductoscopy was performed on 57 breasts with PND in 54 patients for diagnostic and therapeutic purposes. Three of them presented with bilateral nipple discharge. Ductoscopic abnormalities included ductal irregularities, presence of erithematous patches, or presence of intraductal papillomas, whereas duct ectasia, or presence of dense fluid, has been considered as benign findings. Ultrasonographic (USG) abnormalities included presence of intraductal papilloma or papillomatosis or suspicious solid lesion (BI-RADS 4 and 5) or intraductal dilatation. Presence of intraductal papilloma or pathologic contrast enhancement was considered as a pathological finding in magnetic resonance imaging (MRI).
Results Median age was 46 (12-76). Of 54 patients, 2 were male patients presenting with spontaneous bloody nipple discharge. The majority of cases (48/57, 84%) presented with spontaneous uniduct bloody or serous discharge. Patients older than 40 (surgery [+]; >40 age: 90% vs ≤ 40 age: 63%, p = 0.025), or with an abnormality in ultrasound (surgery [+]; USG abnormality: 45% vs other: 8%; 0.005), or magnetic resonance imaging (surgery [+]; MRI abnormality: 60% vs other: 12.5%; p = 0.066), or ductoscopy (ductoscopic abnormality: 70% vs benign ductoscopic finding: 32%; p = 0.007) were more likely to undergo surgery for the diagnosis and treatment of PND. Surgical operations included central duct excision (n = 16) or specific duct excisions (n = 14) by either ultrasound or ductoscopic guidance. One patient diagnosed with male breast cancer in frozen section following central duct excision underwent mastectomy with sentinel lymph node biopsy. Furthermore, presence of an abnormal finding in ductoscope was found to be associated with an underlying specific pathologic lesion for PND, including papillary cancer (n = 1) or in situ ductal cancer (n = 1) or intraductal papilloma and papillomatosis (n = 14) (specific lesion for

PND [+], ductoscopic abnormality: 78% vs ductoscopic benign findings: 14%; p = 0.007). With a median follow-up time of 55 months (range, 3-67 months), nipple discharge ceased in patients without surgery who were conservatively observed after a benign finding in ductoscope. The sensitivity and specificity of an abnormal ductoscopic finding associated with a specific pathologic lesion for PND were 93% and 60%, respectively, whereas the sensitivities of an abnormal ultrasound or mammogram or MRI finding were 60% and 42% and 80%, respectively.
Conclusion Our results suggest that ductoscopy was found to have a high sensitivity to detect specific pathologic lesions for PND, including the papillary lesions, compared to other imaging techniques. Furthermore, use of ductoscopy plays a crucial role in patients with PND to decide which patients could be spared from surgery with close follow-up, and which patients should undergo a surgical excision for diagnosis and treatment of PND.

Retrospective Comparison of Blue Dye vs Blue Dye Plus Lymphoscintigraphy to Optimize Sentinel Lymph Node Identification in Breast Cancer

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Objective Given the findings of ACOSOG Z0011 clinical trial, it has become increasingly important to minimize the number of nontherapeutic axillary dissections in breast cancer patients. The purpose of our study was to determine the most effective technique for initial sentinel lymph node biopsy (SNLB). The debate of whether or not to use preoperative lymphoscintigraphy with intraoperative gamma probe guidance, in addition to retroareolar blue dye injection, for SLNB and staging breast cancer was evaluated retrospectively within our community-based surgical practice. Our study reviewed and compared the techniques and outcomes of 394 cases, in which either blue dye (BD) or blue dye plus lymphoscintigraphy and gamma probe-guidance (L+BD) was used for SLNB in breast cancer patients.
Methods The operative notes and pathology reports of 394 sentinel lymph node biopsies (SNLBs), performed by 4 surgeons between February 2006 and January 2014, were retrospectively reviewed. Data gathered from each case included: the primary surgeon, SNLB technique used, number of SLNs detected, number of times a SLN was not identified, and the number of SLNs proven to be histopathologically positive for metastasis. Success rates for each method, along with false-negative rates for the procedures that ended in axillary dissection were calculated. Statistical significances of the comparisons were calculated using the Student's *t* test for mean values, and chi-square tests for percentage values. P value <0.05 was significant.
Results The means for the numbers of sentinel lymph nodes taken were 3 ± 1.99 for BD cases and 3 ± 2.19 for L+BD cases (p = 0.48). The mean values for positive sentinel lymph nodes, confirmed by pathology, were 0.31 ± 0.7180 for BD and 0.35 ± 0.7184 for L+BD (p = 0.25). There were 7 failures (2.9%) in the BD group, providing a 97.1% success rate. There were 3 failures (1.9%) in the L+BD group, providing a 98.1% success rate (p = 0.4). 5.2% (8) of L+BD cases were achieved by lymphoscintigraphy alone (ie, "hot" but not blue). Here, the success of the gamma probe (in the event of dye failure) vs the success of both dye and probe together was not found to be significant (p = 0.7). The failure rates for blue dye within the L+BD group (5.2%) vs the BD group (2.9%) was also found to be statistically insignificant (p = 0.2). 1.9% (3) of these L+BD procedures, which were "only hot," resulted in the removal of positive SLNs, proven by pathology.
Conclusion In our study there was a 97.1% success rate in identifying at least 1 SLN in the BD group vs a 98.1% success rate in the L+BD group, with no statistical significance. Within the L+BD group alone, the difference between the numbers of times a SLN was found to be "hot and blue" vs the number of times it was found in to be "only hot" was also determined to be insignificant (p = 0.68). This suggests that if surgeons currently using the L+BD method abandoned the use of lymphoscintigraphy and gamma probe guidance, they could expect no significant increase in SLNB failure rate. However, although not statistically significant, it was shown that in the event of blue dye failure, the gamma probe detected positive SLNs in 3 patients, making it clinically significant. As we move away from axillary dissection in breast cancer patients with positive SLNs, surgeons should continue to review and refine their techniques to maximize identification of SLNs and minimize false-negative rates within their practices.

Racial Differences in Temporal Trends of Breast Cancer Surgery and Reconstruction Among Asian-American Women: A Review of Surveillance, Epidemiology, and End Results Data

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Objective Breast cancer surgery varies widely across racial groups, but is not well studied amongst Asian-American women. We aim to determine if the rates and temporal trends of breast conservation surgery (BCS) and mastectomy differ between Asian and non-Asian women.
Methods 275,549 women with stage 1 and 2 breast cancer from the Surveillance, Epidemiology, and End Results (SEER) database were examined for racial variations in temporal trends of BCS and mastectomy between 1988 and 2010, including 232,573 whites; 16,819 Asians; 21,282 blacks; and 4,875 other race.
Results Overall, 56.2% of women underwent BCS, while 43.8% underwent mastectomy. Mastectomy rates have declined over time for both stage 1 and 2 breast cancer, but are rising for stage 2 cancer in the past 10 years, such that rates of BCS and mastectomy are converging. Asians had the highest mastectomy rate (45.4%), compared to whites (43.8%), blacks (42.7%), and others (41.6%), $p = 0.0001$. Reconstruction rate was the lowest among Asians (5.4%), with both whites (9.1%) and blacks (10.5%) having higher rates. Within Asian subpopulations, foreign-born Filipino women were least likely to choose BCS (OR, 0.75).
Conclusion Compared with other racial groups, mastectomy appears to be overused among Asian women with early-stage breast cancer, while breast reconstruction rates are lower. Further studies of racial preferences and cultural norms are needed to improve treatment disparities.

A Cost-Utility Analysis Comparing the PlasmaBlade to Thermal Cautery in Mastectomies

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Objective In our evolving health care system, breast surgeons face increasing cost containment pressures while being held to a high standard of quality care. New forms of alluring surgical technology constantly arise but the adoption of more expensive technology often requires a cost justification. Cost utility analysis empowers the surgeon to potentially justify the cost-effectiveness of a technology by not only analyzing the costs but also weighing the clinical importance of a newer device over the status quo. To demonstrate cost-utility analysis in breast surgery, our goal was to perform a cost-utility analysis to see if the PlasmaBlade was cost-effective when performing a mastectomy when compared to standard thermal cautery.
Methods Cost-utility methodology involved a literature review compiling outcomes for mastectomies done with either the PlasmaBlade or thermal cautery, obtaining utility scores for complications to estimate quality-adjusted life years (QALYs), accruing costs using DRG and CPT codes for each intervention, and developing a decision tree that could portray the more cost-effective strategy. Mastectomy complications were limited to those specifically related to the use of either device. An incremental cost utility ratio (ICUR) was calculated from the ratio of cost differences over clinical effectiveness differences between each device. The upper limit for willingness to pay was set at $50,000. Sensitivity analysis was performed to check the robustness of our results.
Results Based on the literature review, the PlasmaBlade arm had a lower overall complication rate (12.5%), compared to the thermal cautery arm (18.1%). Surprisingly, there were no reported differences in mastectomy skin necrosis. The cost of the PlasmaBlade per mastectomy case was more ($300), compared to the cost of a cautery tip ($4). The decision analysis tree (Figure 1) noted outcomes with their associated costs for each treatment arm and found that the PlasmaBlade was more costly by an incremental $156.98 and had an improved clinical efficacy of 0.0045 QALYs leading to a cost-effective ICUR of $34,577.31/QALY. One-way sensitivity analysis revealed that the PlasmaBlade was cost-effective up to a pricing of $370 per mastectomy case.
Conclusion Based on outcomes gathered from the literature, which were then valued in a decision tree analysis, the PlasmaBlade is a cost-effective technology compared to thermal cautery when used in mastectomies. It remains cost-effective up to a cost of $370 per mastectomy case.

continues

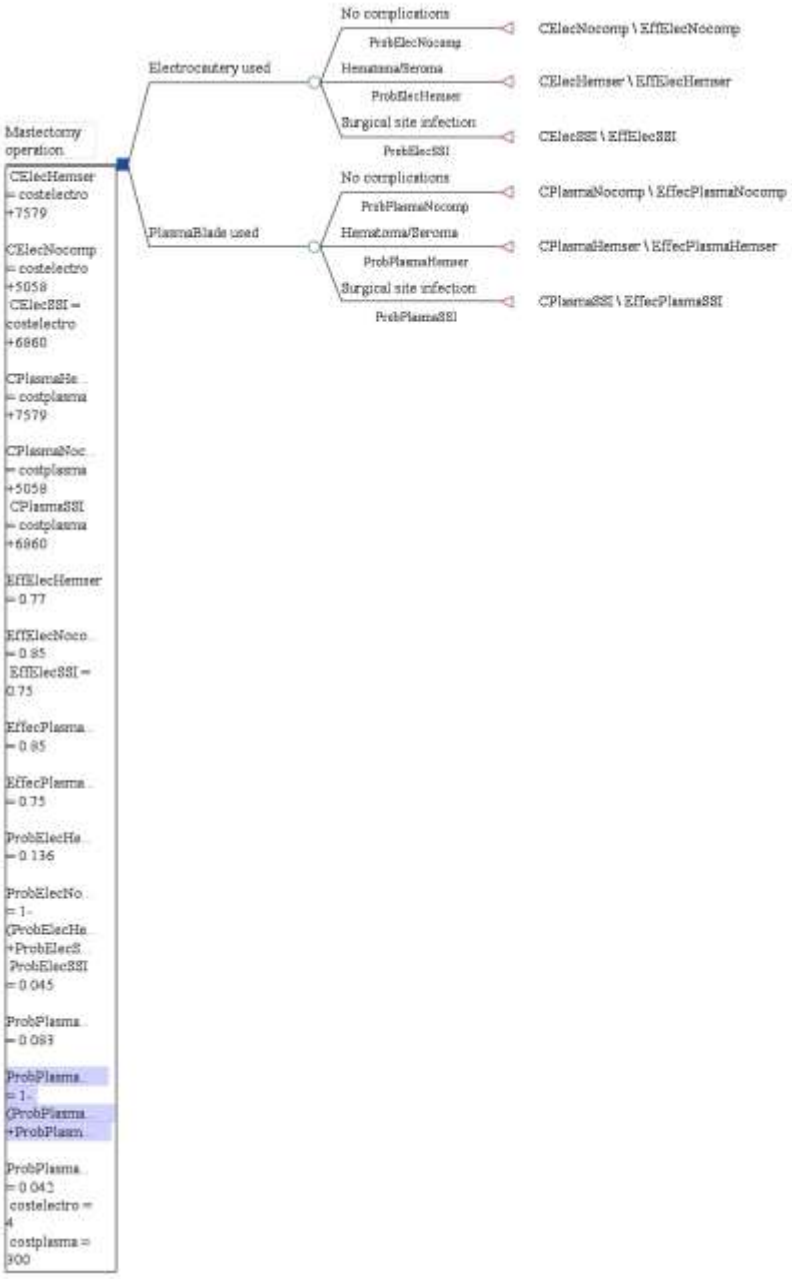

Figure 1. Decision Analysis Tree Comparing the PlasmaBlade and Thermal Cautery

Thyroid Diseases in Patients With Breast Cancer

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Objective The possible existence of a correlation between thyroid diseases and breast cancer has been evaluated during last decades, but the relationship between these 2 pathological conditions remains controversial. The dependence of breast cancer by hormonal substances and controversial data shown in literature on the relationship between thyroid function of patients and the neoplastic disease suggested that the expression of thyroid hormone receptors could be an important marker in the characterization of breast cancer.
Methods During the period January 2009–December 2013, 867 patients were treated for breast cancer in our breast unit (5 male; average age, 61 years). We analyze the incidence and the characteristic of thyroid disease in these patients.

Results Histology in 725 cases were ductal carcinoma, 71 lobular carcinoma, and the remaining 71 were distributed among less frequent histological types. Among these 867 patients, 141 (16%) were affected by benign or malignant thyroid disease, while the remaining 725 had no history of thyroid disease. The analysis of 141 patients with thyroid disease established that 138 cases were benign disease, whereas the remaining 3 were malignant. Fifty-three patients had autoimmune thyroid disease, while the remaining 88 had a non-autoimmune thyroid disease. We found a statistically significant association between breast cancer and chronic autoimmune thyroiditis ($p < 0.03$), postmenopausal age ($p < 0.003$), and the correlation between estrogen receptor positivity in breast cancer and chronic autoimmune thyroiditis ($p < 0.03$). There were no statistically significant differences regarding the characteristics of breast cancer, such as family history, tumor size, lymph node metastasis, distant metastasis, clinical stage and histopathology, grading, estrogen and progesterone receptor profile, and the expression of Ki67, p53, and HER2.
Conclusion The relationship between breast cancer and thyroid disease remains controversial also related to the contradictory results reported in the literature. It appears to be an association between autoimmune thyroid disease, specifically chronic autoimmune thyroiditis and the occurrence of breast cancer at young age. However, the pathophysiological mechanism linking the 2 entities remains to be investigated. Multicentric studies are needed to confirm the correlation between these 2 diseases in order to accurately identify a subpopulation of high-risk patients for developing breast cancer.

Patterns of Axillary Surgery in DCIS Patients Within the U.S. National Cancer Database
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Objective Consensus guidelines have been established by the National Comprehensive Cancer Network (NCCN) and the American Society of Clinical Oncology (ASCO) for axillary nodal evaluation in patients diagnosed with ductal carcinoma in situ (DCIS). The objective of this large population based study was to determine compliance rates with national guidelines and identify the factors associated with axillary nodal evaluation in patients with DCIS.
Methods Utilizing the National Cancer Database (NCDB), we conducted a retrospective review analyzing axillary evaluation (sentinel node and/or axillary dissection) in patients diagnosed with pure DCIS. Logistic regression analysis was used to assess the multivariate relationship between patient demographics, clinical and tumor characteristics, facility factors, and the probability of axillary evaluation.
Results We identified 90,277 patients diagnosed with DCIS from 1998-2011; 32,776 patients (36%) underwent mastectomy and 56,586 patients (63%) underwent breast conservation. For patients undergoing mastectomy for DCIS, axillary nodal evaluation rates increased from 72.9% in 1998 to 93.1% in 2011. For patients undergoing breast conservation, axillary nodal evaluation rates increased from 22.4% in 1998 to 44.7% in 2011. Compared with women older than 68, younger patients were more likely to have axillary evaluation (OR, 1.25 [95% CI, 1.17-1.33]). In comparison with other races, white patients were most likely to undergo axillary evaluation (OR 1.15 [95% CI, 1.03-1.28]). Lesion size was statistically associated with axillary evaluation (p value <.0001); in comparison to those patients with a small lesion (<1 cm), those with larger lesions (>5 cm) had a higher likelihood of axillary evaluation (OR, 2.12 [95% CI, 1.88-2.38]). Rates of axillary evaluation varied among location of primary tumor with axillary tail tumors having the highest (OR 2.36 [95% CI, 1.34-4.17]) in comparison to retroareolar tumors. Among facility types, axillary evaluation was highest in community cancer programs compared to academic programs and among facilities located in the east south central region of the U.S., compared to those located in the New England region (OR, 1.40; [95% CI, 1.29-1.51] and OR, 3.09 [95% CI, 2.72-3.52], respectively).
Conclusion Despite clear clinical guidelines, there continues to be wide variability in compliance with national guidelines, especially among women undergoing breast conservation. Practice type and location-based differences in axillary evaluation suggest opportunities for education and reduction in the overuse of axillary evaluation in DCIS patients.

Intraductal Papilloma Is Associated With High-Risk Breast Lesions in Hispanic Women

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Objective Our aim was to evaluate the upgrade rate of benign breast papillomas diagnosed on initial percutaneous biopsy to high-risk lesions and malignancy after surgical re-excision among Hispanic women. Although numerous studies have recently studied the upgrade frequency of benign papillomas of the breast, we are unaware of other studies that have done so in a predominantly Hispanic population.
Methods We searched our pathology database using keywords for all cases of papilloma and/or papillary lesions of the breast diagnosed by a percutaneous biopsy vacuum-assisted rotational cutting device or a spring-loaded core needle from April 2012 to June 2014. Exclusion criteria included cases without follow-up pathology results and cases with concurrent high-risk lesion or carcinoma findings on initial biopsy. The resulting cohort included female patients with an initial diagnosis of a papillary lesion, but without a concurrent diagnosis of a high-risk lesion or carcinoma, who also had a follow-up biopsy. We reviewed lesions in 75 patients who had biopsies yielding papilloma or papillary lesions and underwent subsequent follow-up excision. Follow-up pathology results were compared with initial biopsy findings.
Results Of 76 cases, 27 lesions were excluded. Of the remaining 49 lesions, 38 patients (77.55%) had concordant benign findings at excisional biopsy and 11 lesions (22.45%) were upgraded to high-risk lesion or malignancy. The upgraded cases were diagnosed atypical ductal hyperplasia (ADH, 8 (16.33%)), ductal carcinoma in situ (DCIS, 2 (4.08%)), and lobular carcinoma in situ (LCIS) + ADH (1 (2.04%). Our data reveal a 22.45% rate of upgrade to a high-risk pathology or a noninvasive breast cancer from benign papilloma diagnosis in a population of Hispanic women.
Conclusion Excision of papillomas identified by percutaneous biopsy is recommended for Hispanic women based on our results. Prior similar studies have reported a wide range of upgrade rate upon evaluation of excisional biopsies for intraductal papilloma, ranging from 0 to 25%. While our results are within this range, a significant number of patients were diagnosed with DCIS (2, 4.08%) and ADH (8, 16.33%). An additional patient had ADH and LCIS (1, 2.04%) These patients might benefit from further therapeutic options, including radiotherapy in the setting of DCIS and/or chemoprevention.

Study Results

Final Pathology	Number of Lesions	%
Benign	38	77.55%
DCIS	2	4.08%
High-risk lesions*	9	18.37%

*High-risk lesions include 8 ADH cases and 1 ADH + LCIS case.

Prophylactic Use of Pentoxifylline and Vitamin E to Prevent Capsular Contracture After Implant Reconstruction in Patients Requiring Adjuvant Radiation Treatment

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Objective Pentoxifylline combined with vitamin E has been reported to reduce radiation fibrosis in patients who have already experienced significant consequences of radiation therapy post immediate reconstruction, such as contracture or loss of implants. We questioned whether prophylactic use could lower morbidity of radiation after implant reconstruction.
Methods This was a prospective study of 30 women with implant or tissue expanders post mastectomy that required postoperative adjuvant chest wall radiation. All subjects took 400 mg pentoxifylline 3 times a day in combination with 400 IU of vitamin E twice daily. The treatment drugs were started within 4 weeks of radiation treatment completion and continued for 180 days. Subjects were assessed at months 0, 3, 6, 9, 12, and 18 using the following objective tools: visual analog scale (VAS), quality of life (SF-12), Baker grade assessment, breast photographs, adverse event assessment, and implant loss or revision.
Results Of the 30 enrolled, 4 were excluded due to loss of contact or other unrelated complications in health. Of the 26 evaluable subjects there were 2 implant revisions (7.5 %) on the radiated side, 1 (3.8 %) on the nonradiated side

and no loss of implants (0%). Two of the 3 revisions were due to contracture and 1 was due to malposition of the nonradiated breast. There were a total of 49 reconstructed breasts and 26 of these were radiated. Nine of the 26 subjects had nipple-sparing mastectomy. Twenty-two of the 26 irradiated breasts had a Baker Grade of II or lower and only 4 were Grade III at 12-18 months post radiation. The nonirradiated breasts all had grades of II or below with 18 at Grade I at the same time point. There were only 3 Grade 2 adverse events and 29 events Grade I with nausea being most common.
Conclusion The combination of pentoxifylline and vitamin E prevented significant contracture in patients receiving radiation after immediate breast reconstruction. This treatment plan resulted in successful immediate reconstruction for patients requiring postoperative radiation with no implant losses and only 7.5% of the subjects requiring revisions on the radiated side. Historically, reports of implant loss in similar patients have been between 11% and 18%. Our study has shown that with prophylactic use of vitamin E and pentoxifylline implant loss may be dramatically reduced. A larger multicenter study to validate this approach for patients receiving radiation post reconstruction would make possible implant reconstruction for many more patients.

Same-Day Major Breast Cancer Surgery Is Safe: An Analysis of Short-Term Outcomes Using NSQIP Data
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Objective The postoperative length of stay for patients undergoing major breast cancer surgery has steadily been decreasing over the years. However, the vast majority of patients undergoing mastectomy and/or axillary lymph node dissection (ALND) are still staying in hospital for at least 1 night. We sought to determine whether there was any difference in the rate of complications between patients undergoing major breast cancer surgery as: a same-day procedure, staying in-hospital overnight, or staying longer than 1 night.
Methods We performed an analysis of the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) participant user files. Patients with a diagnosis of invasive breast cancer or ductal carcinoma in situ undergoing either a mastectomy and/or an ALND between 2005 and 2012 were examined. Those with high-risk comorbidities, undergoing a breast reconstructive procedure, or having high-risk concurrent surgery were excluded. Thirty-day postoperative morbidity (using composite outcomes) and mortality were analyzed. Univariable and multivariable logistic regression analyses were performed to identify if postoperative hospital admission was independently related to a higher rate of postoperative complications.
Results 63,990 patients who underwent a mastectomy and/or ALND were identified from the database. After applying our exclusion criteria, the final cohort consisted of 8,365 patients having same-day surgery, 23,252 staying overnight, and 8,958 staying in hospital longer than 1 night. Characteristics of patients admitted to hospital post-operatively included: older age, higher body mass index (BMI), higher American Society of Anesthesiologists (ASA) class, presence of medical comorbidities such as chronic obstructive pulmonary disease (COPD), hypertension, and bleeding disorders, as well as those undergoing bilateral breast surgery. The overall 30-day morbidity for the entire cohort was 4.7%. On unadjusted analysis, patients undergoing same-day surgery had a significantly lower 30-day morbidity (2.4%), compared to patients either staying overnight (3.9%) or staying longer than 1 night (8.8%) ($p < 0.0001$). On adjusted analysis, when controlling for the demographic differences between the 3 groups, staying in hospital overnight led to a minimally increased odds of postoperative complications [1.37 (95% CI: 1.16, 1.63; $p = 0.0037$)]. Patients who stayed in hospital longer than 1 night had over 2 times the odds of complications [2.65 (95% CI: 2.21, 3.18; $p < 0.0001$)].
Conclusion This is the largest study to examine the safety of same-day major breast cancer surgery. We found the rate of 30-day complications to be significantly higher in patients admitted to hospital postoperatively, even after controlling for the general health of the patient. This suggests that it is safe to perform major breast cancer surgery on a same-day basis. These results could be applied to help predict those patients who will benefit most from same-day surgery. This may have significant implications for institutions, surgeons, and the thousands of patients undergoing major breast cancer surgery every year.

Pilot Study of a New Surgical Guidance Technology to Localize Nonpalpable Breast Lesions

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Objective The standard preoperative technique for localizing nonpalpable breast lesions is wire localization (WL). Radioactive seed localization (RSL) has been described as an alternative approach to address the number of clear disadvantages associated with WL. Yet, despite its proven advantages, the adoption of RSL has been impacted by considerable regulatory requirements for the handling of radioactive materials. To advance the progress made with RSL and eliminate the issues associated with radioactive components, the SAVI Scout® surgical guidance system has been developed. The SAVI Scout® surgical guidance system is an FDA-cleared medical device that utilizes electromagnetic wave technology to provide real-time guidance during excisional breast procedures. The purpose of this pilot study is to determine the safety and efficacy of SAVI Scout® in localizing and directing the removal of nonpalpable breast lesions during excisional biopsy and lumpectomy procedures. The preliminary results from 2 institutions are reported.

Methods Following a feasibility study using SAVI Scout® in resected breast tissues ex vivo, Institutional Review Board approval was granted for both institutions for women with a nonpalpable breast lesion requiring preoperative localization for excision. Participating patients underwent localization and excision with SAVI Scout®, which consists of an infrared-activated electromagnetic wave reflective device (reflector), handpiece, and console. Using mammographic or ultrasound guidance, the reflector was implanted into the target tissue up to 7 days prior to the scheduled excisional procedure. Before making an incision, the surgeon used the handpiece, which emits infrared light and electromagnetic waves, to detect the location of the reflector and subsequently plan the surgical incision. During the procedure, the surgeon used the handpiece to guide the localization and removal of the reflector along with the surrounding breast tissue. The console provides audible feedback of reflector proximity to the handpiece. Successful reflector placement, localization, and retrieval were the primary endpoints.

Results After the first training case (data not used), a total of 11 patients have participated in the study to date. The reflectors were successfully placed with mammographic guidance in 8/8 patients and with ultrasound guidance in 3/3 patients. Reflectors were placed an average of 2.0 days (range, 0-6 days) before surgery. Five patients underwent reflector localization during an excisional biopsy and 6 patients had lumpectomy. The intended lesion and reflector were successfully removed in 11/11 patients. Of 10 patients in which final pathology is currently available, the average amount of tissue excised was 56.7 cm^3 (range, 6.9–191.0 cm^3). The margins were in clear in 5/6 cases in which invasive cancer or DCIS was present, although 1 patient was recommended for re-excision due to close margins (1 mm). Reflector migration did not occur. In 1 patient, the reflector was difficult to locate but was successfully removed along with the intended lesion. No adverse events occurred.

Conclusion The preliminary data show the SAVI Scout® surgical guidance system to be a safe and effective tool for the localization of nonpalpable breast lesions. Ongoing accrual to this pilot study will validate these findings with planned enrollment of a total of 50 patients in the next 60 days at up to 3 additional sites.

Oncoplastic Breast-Conserving Surgery Reduces Mastectomy and Re-Excision Rates

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Objective Oncoplastic breast conserving surgery (BCS) integrates partial mastectomy with tissue transfer techniques and plastic surgery incisions to clear surgical margins and preserve breast cosmesis. Breast cancer surgeons try to balance the oncologic need for wide local excision of cancer with the desire to achieve a good cosmetic outcome. Oncoplastic BCS ameliorates this conflict, allowing for appropriate oncologic resection while maximizing breast cosmesis. In 2011, oncoplastic BCS was introduced and adopted as standard surgical treatment for breast cancer patients at Virginia Mason Medical Center in Seattle, WA. The goal of this study is to evaluate the changes in mastectomy and re-excision rates with the adoption of oncoplastic BCS.

Methods This retrospective study reviewed surgical breast cancer patients treated at Virginia Mason Medical Center between January 2009 and September 2014. Breast cancer patients treated from January 2009–December 2010 were identified through the cancer registry, while patients treated between from January 2013 to September 2014 were obtained through a prospectively collected, IRB-approved breast cancer database. The patients treated from January 2011 to December 2012 were excluded from analysis to accommodate for learning curve associated with acquisition of new skills. The standard surgical group (SS) included all patients treated before the introduction of oncoplastic

surgery techniques (2009-2010) while the oncoplastic surgery group (OS) included all surgical patients treated by surgeons trained in oncoplastic surgery (2013-2014). We compared the rate of mastectomy performed, and rate of re-excision needed in patients undergoing breast-conserving surgery.
Results A total of 822 patients were evaluated. Four hundred thirty-five patients were treated in the standard surgery (SS) group compared to 387 patients in the oncoplastic surgery (OS) group. In the SS group, 144 patients underwent mastectomy while 281 patients underwent BCS. In the OS group, 58 patients underwent mastectomy while 329 patients underwent oncoplastic BCS. The mastectomy rate in the SS group was 33% compared to 18% in the OS group ($p < 0.001$). The average tumor size for patients undergoing BCS was 12.7 mm (1 mm–95 mm) in the SS group compared to 15.4 mm (1 mm–110 mm) in the OS group. Despite the larger tumor size treated with BCS, the re-excision rate for patients undergoing BCS in the SS group was 30% (86), compared to 18% (70) in the OS group ($p < 0.001$).
Conclusion The adoption of oncoplastic BCS significantly reduced the rate for mastectomy and re-excision in breast cancer patients undergoing surgery. This study suggests that breast surgeons using oncoplastic surgery techniques can effectively treat larger cancers while still maximizing breast cosmesis and minimizing the need to resort to mastectomy.

Long Before Angelina: Trends in Media Reports of Celebrities' Breast Cancer Treatment Decisions, 1995–2014

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Objective Over the past 2 decades there has been a significant increase in the proportion of women with breast cancer who opt to undergo a contralateral prophylactic mastectomy (CPM), despite an absence of evidence suggesting a survival benefit. While this rise may be related to changes in breast imaging, reconstruction options, or genetic testing, it is largely driven by patient choice. The availability of health information in the media, such as exposure to well-publicized instances in which celebrities opted for CPM, may influence patients' decision-making. We sought to identify trends in media reports on celebrities undergoing breast cancer surgery.
Methods We examined trends in popular press coverage of celebrities' breast cancer between 1995 and 2014. Data are drawn from 5 wide-circulation newspapers (*The New York Times, Chicago Tribune, Los Angeles Times*, *Washington Post*, and *USA Today*) and a set of popular magazines. We identified 17 female celebrities who had been diagnosed with breast cancer during the study period and searched for all stories referencing the celebrity and breast cancer (including associated terms like "mastectomy" and "oncology").
Results Reports of celebrities diagnosed later in the study period were more likely to report undergoing a bilateral mastectomy (vs breast conservation or no discussion of treatment) than those diagnosed earlier (before 2005; $p < .05$). There was significant variability in the number of articles per celebrity (eg, more than 200 stories mention Elizabeth Edwards, whereas other celebrities averaged 47 stories). We examine how reports of breast cancer surgery have changed over this time period, including the framing of different treatment options, whether news reports suggest differences in treatment outcomes, and the variability regarding discussions of risk and prophylaxis among articles on bilateral mastectomy.
Conclusion Testimonials and personal stories can be highly influential in breast cancer decision making. We report a significant increase in media reports on celebrities with breast cancer undergoing bilateral mastectomy. This is commonly referred to as the "Angelina Jolie effect," in reference to the American actress who openly discussed her bilateral mastectomies; however, these trends pre-date her 2013 announcement. The availability of health information in the media, such as exposure to well-publicized instances in which celebrities opted for CPM, may influence patients' decision-making.

Absolute Number of Positive Sentinel Lymph Nodes Is Predictive of Overall Survival

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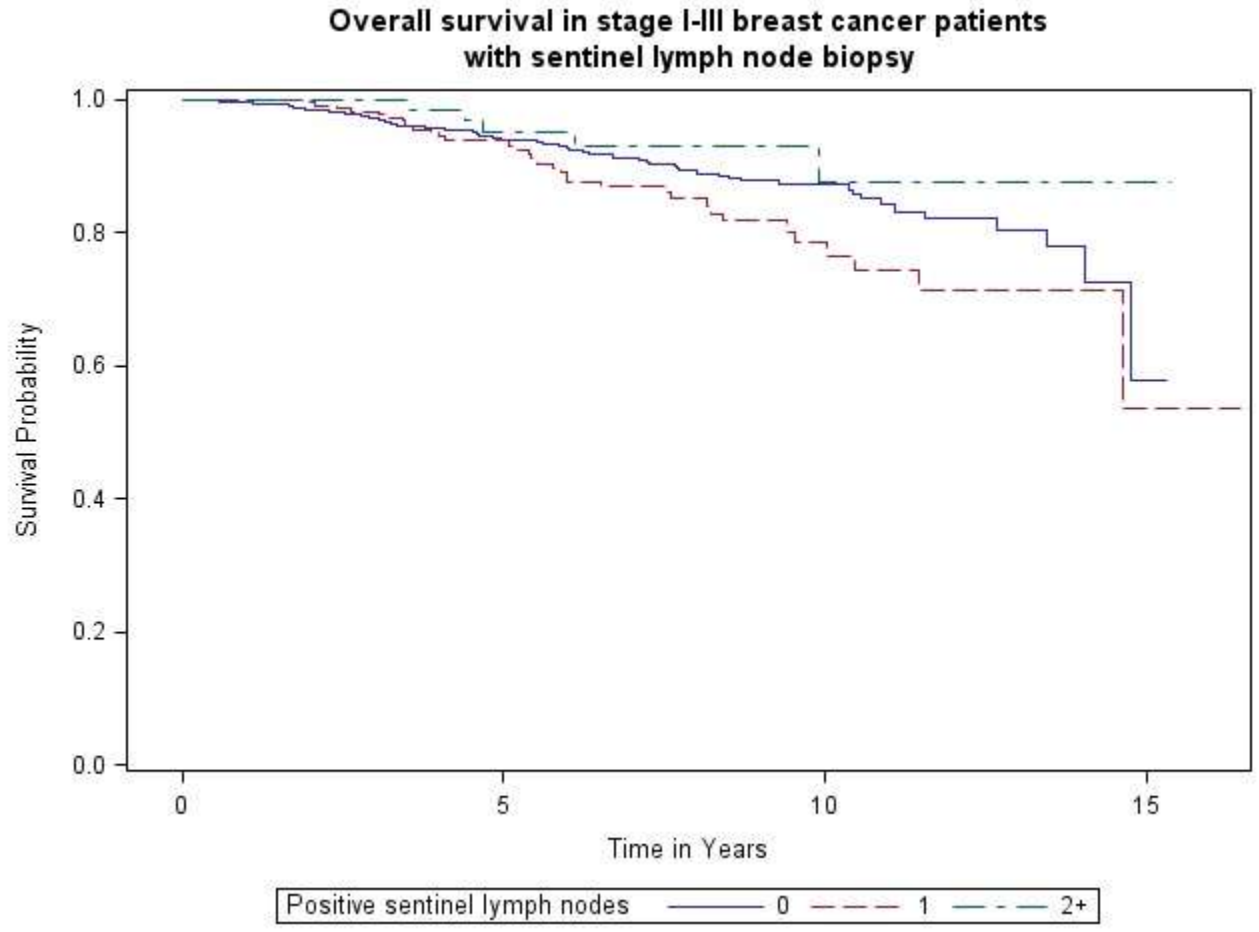
Objective Axillary dissection (AD) has traditionally been performed for its prognostication. In the post-Z11 era, fewer undergo AD. There is concern that surgically understaging the axilla may compromise prognostication and guidance of treatment. We investigated whether information gained from sentinel lymph node biopsy (SLNbx) alone is prognostic for overall survival (OS).
Methods Using institutional data collected for the National Comprehensive Cancer Network database, we identified women diagnosed between 1997-2010 with primary, unilateral, stage I-III breast cancer underwent SLNbx. Those

receiving neoadjuvant chemotherapy or no surgery were excluded. Patient demographics, tumor characteristics, and survival data were evaluated. Kaplan-Meier curves were constructed to evaluate OS, stratified by number of positive sentinel lymph nodes (SLN) (0, 1, 2+) using the log-rank test. A Cox regression model was performed for multivariable analysis to control for age at diagnosis, race/ethnicity, co-morbidity, overall stage, grade, hormone receptor status, and receipt of adjuvant radiation, chemotherapy and hormone therapy, definitive surgery, histology, Her2Neu status, and lymphovascular invasion. Variables that violated proportional hazards were included in the model as stratified. Chi-square tests were used to examine any association between number of positive sentinel lymph nodes and receipt of adjuvant therapy and definitive surgery.

Results We identified 1,073 eligible women with a median age of 55.9 years. Positive SLNs were associated univariately with receipt of chemotherapy ($p < 0.0001$), radiation therapy ($p < 0.0001$), and definitive surgery ($p < 0.0001$). Unadjusted OS was significantly stratified by number of positive SLN harvested is shown in the figure. After controlling for stage ($p = 0.022$), age at diagnosis ($p < 0.0001$), co-morbidities ($p < 0.0001$), grade ($p = 0.003$), hormone receptor status (strata variable), chemotherapy ($p = 0.010$), radiation ($p = 0.78$), hormone therapy ($p = 0.86$), and definitive surgery ($p = 0.17$), the individual number of positive SLN remained statistically significant ($p = 0.04$). Those with fewer positive SLNs (0 positive: hazard ratio [HR] = 2.0, 95% confidence interval [CI] = 0.67–5.9; 1 positive: HR = 3.1, 95% CI = 1.1–8.5) appear to have increased hazard of death when compared to those with 2 or more positive sentinel lymph nodes.

Conclusion Despite controlling for covariates, absolute number of positive SLNs remained prognostic for OS, even in those with a low axillary burden of disease. The decreased survival noted in the 2+ SLN group could be attributed to more aggressive treatment. Further analysis is warranted to explain this relationship. Regardless, the information gained from SLNbx alone is uniquely important and can be used to guide treatment.



A Multi-Institutional Analysis of Intraoperative Radiotherapy for the Treatment of Ductal Carcinoma In Situ of the Breast

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Objective Single-dose intraoperative radiotherapy (IORT) has been shown to be a safe and acceptable treatment for women with early-stage invasive breast cancer. There is limited data about the use and outcomes of IORT for ductal carcinoma in situ (DCIS). The objective of this study is to define early outcomes, toxicities, and adjuvant therapy of patients treated in a multi-institutional registry.

Methods A multi-institutional retrospective data collection registry was created. Institutions using low-kilovoltage IORT for the treatment of breast cancer were invited to participate and enter data on patients treated prior to 2013. Patients with pure DCIS who were treated with IORT were analyzed as a subset of the total 1,086 patients enrolled.

Results Nineteen centers entered data on patients treated from 2007 to 2013. Ninety-five patients entered in this registry were treated with lumpectomy and IORT for DCIS and were evaluated. The median age was 65 years with a mean follow-up of 1.3 years (range, 0.6-4.9 yr). The median size was 0.8 cm (range, 0.1 cm–2.5 cm). Most women had estrogen receptor positive (78%), progesterone positive (69%), and low-grade (73%) DCIS. The type of IORT performed was primary IORT (93%), as a secondary procedure (4%), or as a planned boost (3%). Adjuvant whole breast radiotherapy (WBRT) was given to 26% (n = 25) of patients. Nine patients had a margin re-excision and 5 had mastectomies. Anti-estrogen therapy was used in 44% of those treated. Complications were low and included seroma requiring aspiration (8%), hematoma (1%), and infection requiring IV antibiotics (2.6%). Local in-breast recurrence for DCIS occurred in 3 (3%) patients and 92 (97%) patients are disease-free at time of this analysis. Of the 3 reported local failures, 1 occurred out of quadrant (4 cm away from lumpectomy site), 1 occurred in a patient with positive margins who refused further surgery or WBRT, and 1 occurred in a 40-year-old premenopausal patient with high-grade DCIS. None of the patients with a recurrence received adjuvant WBRT. Two of the patients did receive adjuvant hormonal therapy.

Conclusion This is the largest study to evaluate IORT for the treatment of breast DCIS. Short-term safety and oncologic results are favorable and suggest that IORT may be an emerging therapeutic option for select patients with DCIS. Continued follow-up of this unique registry will allow further insight into patient selection and to the oncologic safety of this approach.

A Standardized Clinical Breast Exam

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Objective Although clinical breast exam (CBE) is used daily to aid the diagnosis of breast cancer, we have little information as to which components have the most value and what combination yields the best results as adjunct to modern breast imaging.

Methods We performed a retrospective analysis of prospectively collected electronic charting on 26,883 consecutive CBE by a single surgeon done in a standardized fashion from 3/2001–6/2013. All exam findings associated with the diagnosis of an ipsilateral breast cancer within 12 months of exam were analyzed and ranked to develop a CBE score system 1–5, similar in clinical impact to the BI-RAD score for imaging. Presentation of the

breast cancers was divided into 4 common groups: asymptomatic image screening abnormalities, masses or lumps, nipple discharge, and breast pain.
Results Exams for abnormalities to rule out breast cancer included 858 asymptomatic abnormal image screening, 764 breast mass, 712 nipple discharge, and 901 breast pain cases. The table demonstrates the sensitivity and specificity of the CBE score, BI-RAD image score, and the combination. To directly compare to imaging data, we plotted the ROC curves and show in the table the changes in AUC (area under the curve) for each. The AUC calculations were performed by the DeLong method and comparison of sensitivity and specificity compared by the McNemar method. In cases of asymptomatic image screening abnormalities, CBE added 4% to the AUC measurement. For symptomatic presentations, CBE increased sensitivity 8.16% and added 5% to the combo AUC over imaging alone. All data in table shown with an asterisk is highly significant with $p < 0.00001$ when comparing to imaging BI-RAD alone.
Conclusion A brief clinical exam focused on scoring a few items adds small but substantially to imaging in improving detection of breast cancer. Most elements of CBE, as it is commonly taught, add little or no value to breast cancer detection in the era of modern breast imaging.

Comparison of CBE, BI-RAD, and Combo

	CBE Score	BI-RAD Score	Combination
Sensitivity (%)	68.3*	90.7	96.1*
Specificity (%)	76.1*	59.5	52.3*
Positive predictive value	0.52	0.50	0.48
Negative predictive value	0.87	0.93	0.97
Accuracy (%)	73.99*	69.22	65.94*
AUC of ROC curve			
For asymptomatic patients	0.734*	0.785	0.825*
For symptomatic patients	0.812*	0.801	0.825*

Nipple-Sparing Mastectomies: Clinical Outcomes
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Objective Recently nipple-sparing mastectomies (NSMs) have become common practice in the surgical treatment of breast cancer patients. Several retrospective studies have demonstrated that NSMs are oncologically safe and cosmetically superior to standard mastectomies. This study was performed to review the outcomes of patients undergoing NSMs at a single large university setting.
Methods A retrospective chart review was performed on all patients undergoing NSMs at a single institution between September 2008 and June 2014. Charts were reviewed for demographic data and patient characteristics, such as BMI and smoking status. Tumor and breast size, cancer recurrence, and complications, such as nipple areolar complex (NAC) necrosis, were also evaluated. Descriptive statistics were used for analysis and statistical significance was determined utilizing a chi-square test.
Results During the specified time period, 110 patients underwent 197 NSMs. Mean patient age was 44.4 (range, 20-77). Average BMI was 24 with a range from 18 to 47. Breast weight was available for 106 specimens, with a mean weight of 475.5 gm (range, 124.1–1625.0 gm). Thirteen (11.8%) patients were smokers. Seventy-three NSMs were therapeutic (25 for stage 0, 32 for stage I, 14 for stage II, and 2 for stage III) and 124 were prophylactic. Twenty-nine (26.3%) patients underwent neoadjuvant or adjuvant chemotherapy. Ten (9%) patients underwent adjuvant chest wall radiation due to positive or close (<1 mm) margins. Mean tumor size was 1.38 cm (range, 0-6.0 cm), with an average nipple to tumor distance of 5.87 cm (range, 2.93–10.0 cm). Three (4%) patients were found to have cancer deep to the nipple resulting in removal of the nipple areolar complex (NAC). A total of 34 (17.2%) complications occurred, including infections, hematomas, and nipple necrosis, with 9 (4.5%) resulting in removal of the NAC. Smokers had a 36.0% (9/25) complication rate, compared to 14.5% (25/172) of nonsmokers ($p < 0.05$). In follow-up, 1 recurrence was noted of the skin and NAC.
Conclusion This study is one of the larger retrospective reviews of nipple-sparing mastectomies to date. Tumor recurrence was low and the complication rate was comparable to the reported literature. Patients who were smoking

at the time of surgery were at an increased risk of developing complications. This study adds to the growing literature demonstrating that NSMs can safely be performed without compromising oncologic outcomes or increasing complication rates.

Mammograms Impact Survival of Elderly Breast Cancer Patients

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Objective Breast cancer screening in elderly women is controversial. Many suggest that breast cancer in the elderly is not of concern because of indolent biology or competing co-morbidities. However, we have observed that this assumption may not be true in that not only do elderly women (age 80 and older) develop aggressive breast cancers, but that early diagnosis via breast cancer screening has a significant impact on OS in this population. We sought to test this theory.

Methods Via the cancer registry at our institution we queried all women age ≥ 70 year diagnosed with invasive breast cancer from 2004-2010 who received treatment at our facility. These results were entered into an IRB-approved database. A trained data manager recorded 40 fields in 5 major categories, including health history, diagnostic method, pathology data, treatment, and follow-up. Patient age was analyzed for any association to the various data points (ANOVA and Likelihood Ratio). Overall survival was compared via the generation of Kaplan-Meier curves. All statistics were performed using XLSTAT with p values less than 0.05 being considered statistically significant. A grant for this study was awarded from the Florida Breast Cancer Foundation.

Results Three hundred thirty-seven consecutive female patients age 70 and older were available to study. The average follow-up time was 91 months. There was no association between patient age and tumor grade, pathologic stage, tumor hormonal status, or HER 2 status. Women diagnosed by BE were older than those diagnosed by mammogram. More women > 80 were diagnosed by BE as compared to women age 70–79. Method of diagnosis (mammogram vs BE) had a significant impact on OS, and this impact was larger in women >80 as compared to women age 70–79. (Table 1)

Conclusion This study suggests that a change in clinical practice of the primary care physicians needs to be considered including increase awareness of the unique needs of this population. Of the patients reviewed, those diagnosed by exam were older than those diagnosed by mammogram. In this population the older the patient, the larger the impact of screening mammogram had on her overall breast cancer–related survival. Impact was not related to biology or stage. We recommend that women >80 continue to be encouraged to have an annual mammogram, especially those with a favorable life expectancy.

Table 1. Age As Related to Method of Diagnosis and Outcome

	Total	Mammo	BE	
All pts ANED or non-BC death	308	75% (230/308)	25% (78/308)	
Pts age under 80	210	77% (161/210)	23% (49/210)	
Pts age over 80	98	70% (69/98)	30% (29/98)	
All Pts with BC-related death	29	38% (11/29)	62% (18/29)	p < 0.001
Pts age under 80	13	54% (7/13)	46% (6/13)	p = 0.09
Pts age over 80	16	25% (4/16)	75% (12/16)	p < 0.001

Intraoperative Assessment of Sentinel Lymph Node by One-Step Nucleic Acid Amplification (OSNA) in Breast Cancer Patients After Neoadjuvant Treatment Reduces the Need for a Second Surgery for Axillary Node Dissection

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Objective Sentinel lymph node (SLN) biopsy has been shown to be both accurate and feasible for women who receive neoadjuvant chemotherapy (NAC). Axillary lymph node dissection (ALND) after a positive SLN is the standard treatment in breast cancer patients after NAC. The OSNA assay can assess a whole lymph node and yields definitive semi-quantitative results. The aim of this study was to assess intraoperative OSNA assay in comparison with frozen sections (FS) for detection of SLN metastasis in breast cancer patients treated with NAC.
Methods A multicenter cohort of 320 consecutive breast cancer patients treated with NAC between 2010 and 2014 was analyzed. FS was performed intraoperatively in 166 patients and OSNA assay in 154 patients. Patient characteristics were evaluated in both groups and rates of metastasis detected by both methods were compared.
Results There were no statistically significant differences between both groups regarding age, histology type, tumor size (cT) and regional lymph nodes (cN) pre-NAC, hormone receptors, Her2neu expression, ki67 or lymphovascular invasion status. A median of 2.15 SLNs were assessed by FS and 1.22 SLNs by OSNA (p = 0.03). SLN metastasis were found in 44 patients (26.5%) by FS and in 48 (31.2%) by OSNA (p = 0.4). There was a trend to statistical significance in rates of macrometastasis, micrometastasis, or ITC when assessed by FS (75%, 20.5%, and 4.5%; respectively) compared to OSNA (52.3%, 36.3%, and 11.4%) whether it is paired by patients or by number of positive SLNs (p = 0.06). When compared OSNA to definitive pathology, there were neither differences in rates of macrometastasis, micrometastasis, or ITC (61.1%, 33.3%, and 5.6%, respectively) (p = 0.5). There were no differences in axillary pathological complete response in both groups (Table 1). Fifty-four patients in the FS group and 44 in the OSNA group had an ALND after positive SLNs. ALND was performed in a second surgery in 10 patients (18.5%) in the FS group for intraoperative false-negative results, being 90% micrometastasis. All patients in the OSNA group had an ALND in the same surgery (p = 0.03).
Conclusion OSNA assay detect SLN metastasis as accurately as conventional pathology in the NAC setting with no increase in rates of positive SLNs. Intraoperative definitive assessment of the SLN by OSNA reduces the need for second surgery in 18.5% of breast cancer patients with positive SLN after neoadjuvant treatment.

Table 1. Axillary Nodes Status

Characteristics	OSNA (n = 154)	H&E* (n = 166)	p
Regional lymph nodes (cN), n (%).			
cN0	119 (77.3)	118 (71.1)	0.25
cN1-2	35 (22.7)	48 (28.9)	
Axillary pathological response post-NAC, n (%)			
ypN0	104 (67.5)	109 (65.7)	0.1
ypN0(i+)	5 (3.2)	2 (1.2)	
ypN1mi	10 (6.5)	13 (7.8)	
ypN1	26 (16.9)	25 (15.1)	
ypN2	7 (4.5)	14 (8.4)	
ypN3	2 (1.2)	3 (1.8)	
ypN0 (% of cN1 patients)	8/35 (22.8%)	15/48 (31,2%)	0.3
ypN1-3 (% of cN0 patients)	28/119 (23.5%)	24/118 (20.3%)	

*H&E: Hematoxylin and eosin SLNs definitive pathology.

Oncotype Recurrence Scores in Patients Receiving Intraoperative Radiotherapy: Are "Favorable" Characteristics a Surrogate for Low Recurrence?

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Objective External beam breast radiotherapy is standard adjuvant treatment for women with early breast cancer who undergo breast-conserving surgery; however, this is a lengthy treatment modality with well-documented toxicities and limitations. Intraoperative radiotherapy (IORT) has been evaluated in the setting of early-stage breast cancer in Europe and more recently the U.S. with noninferior results. Based upon size, hormone reception expression and other factors, these malignancies are believed to represent a less aggressive phenotype than node-positive, hormone receptor–negative lesions. Recurrence risk as determined from multigene assays has been utilized to guide decisions for adjuvant chemotherapy by stratifying node-negative breast cancers into low, intermediate, or high risk for distant recurrence based on their genomic profile. We therefore sought to evaluate the Oncotype DX (Genomic Health®) recurrence score (RS) as a component of a retrospective review evaluating the characteristics of our IORT cohort in order to determine if these early-stage lesions deemed appropriate for IORT have a lower risk for recurrence based on their tumor characteristics.
Methods A multicenter, retrospective chart review was performed on patients with invasive breast carcinoma who were eligible for and received IORT over a 2-year period. Data collection included patient demographics (age, race, medical history), tumor characteristics (size, grade, receptor status, histopathologic results), nodal status, mode of delivery/duration of IORT, Oncotype DX RS score (if available), and adjuvant therapy decisions.
Results A total of 64 patients were identified. Of these, 60% (n = 38) had Oncotype DX score available. The majority of these lesions were stage Ia (89.5%), and the remainder were stage IIa invasive duct carcinoma (10.5%). Of the 38 patients who received RS portfolios, 68.4% (n = 26) were determined low risk for recurrence (Oncotype DX scores 0-17), with 31.6% (n = 12) at intermediate risk for 5-year recurrence (assuming tamoxifen therapy for 5 years). From a histologic perspective, 66% (n = 25 pts) of patients who received IORT for invasive criteria also had at least 1 focus of DCIS present, and half of the patients deemed intermediate (RS scores 18-30) had grade 2 or 3 Nottingham scores and additional foci of DCIS present. Nearly 40% (n = 25) patients who received IORT had no Oncotype score obtained; reasons for this included: documented low index of suspicion of recurrence risk due to small tumors and favorable histology (mucinous, n = 2), patient refusal (n = 1), and poor performance status (n = 1).
Conclusion More data are needed to determine if patient selection for IORT truly embodies the population of patients with favorable tumor biology. Though not entirely surprising, the wide range of Oncotype scores for these mainly stage Ia tumors, combined with the presence of concomitant DCIS on final pathology in intermediate risk, grade 2 and 3 invasive ductal carcinomas may provide additional support for obtaining Oncotype DX scores in the majority of patients who undergo IORT as an alternative for adjuvant radiation for invasive disease. Future directions will seek to evaluate long-term follow-up data to assess disease-free survival and recurrence.

A Single Institution's Randomized Double-Armed Prospective Study of Lumpectomy Margins With Adjunctive Use of the MarginProbe in Nonpalpable Breast Cancers

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Objective The goal of breast conservation surgery (BCS) is to remove all cancerous tissue while minimizing the amount of noncancerous tissue removed. Up to 30% of patients undergoing breast-conserving-surgery require a second operation for re-excision to obtain negative margins. Previous studies reported a lower re-excision rate with the adjuvant intraoperative use of the MarginProbe device (Dune Medical Devices Ltd, Israel). The MarginProbe device utilizes radiofrequency spectroscopy to detect differences in cancerous and normal tissue. We describe our institution's experience using the MarginProbe device in BCS and report a significantly lower re-excision rate than that reported in the multicenter trial.
Methods Forty-six patients diagnosed with breast cancer who elected BCS enrolled in this study from July 2009 to January 2010. An initial roll-in of patients was required for surgeons to gain experience with the study and these patients were excluded from our analysis. Conventional lumpectomy was performed, followed by clinical assessment of the margins. The surgeon had the option of obtaining additional shavings where the lumpectomy margins were felt to be either close and/or positive prior to intraoperative randomization. In the device arm, the MarginProbe was used to examine the lumpectomy specimen after standard intraoperative assessments were performed. If a lumpectomy margin was deemed positive using the MarginProbe device, an additional shave was

performed. In the control arm, only standard intraoperative assessments were performed. All specimens were evaluated by pathologists who were blinded to the study arm.
Results Seventy-two percent of the patients had invasive ductal carcinoma (IDC), 20% had ductal carcinoma in situ (DCIS), and 8% had invasive lobular carcinoma (ILC). The average specimen size was 5.6 cm, average volume was 37.8 cm^3, and average weight was 32.7 grams. The mean size of DCIS was 1.4 cm. For invasive specimens, 32 were T1 and 7 were T2. Prior to randomization, 43 patients were felt to have positive or close margins and underwent additional shavings. Twenty-three patients were randomized to the device arm, and 23 patients were randomized to the control arm. In the device arm, 21 of 23 patients had additional shavings done based on the MarginProbe device lumpectomy margin reporting. Fourteen (60%) patients had ICD, 7 (30%) had DCIS, and 2 (8%) had ILC. In the control arm, 19 (82%) patients had IDC, 2 (8%) had DCIS, and 2 (8%) had ILC. Eight (35%) patients in the control group vs 1 (4%) in the device group underwent re-excision for margin involvement ($p < 0.05$).
Conclusion The use of the MarginProbe device at our institution significantly improved the ability of our surgeons to obtain clear margins during initial BCS. Our results show a lower re-excision rate in the device arm (4%) than those published in the multicenter trial (19.8%). The results are even more striking since there were more patients having DCIS in our device group (30%) vs our control group (8%). We postulate that our surgeons responded by taking thicker shavings when the MarginProbe device reported margin involvement during the initial lumpectomy, thereby resulting in a significantly lower re-excision rate than previously reported with the MarginProbe device.

Close Margins Correlate With Local Recurrence in a Mastectomy Population
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Objective SSO/ASTRO recently published consensus guidelines regarding margin status for patients undergoing lumpectomy; however, little data exist addressing the impact of close margins and need for re-excision on the rates of local recurrence (LR) in patients undergoing mastectomy. Furthermore, adjuvant radiation therapy is frequently not indicated in this patient population. This study was undertaken to determine if a close or positive margin requiring re-excision or if a close final margin confer an increased risk for LR.
Methods After excluding patients with less than 12 months follow-up, a retrospective review identified 1,382 consecutive patients who underwent a total of 1,447 mastectomies for breast cancer from 2006 to 2010. A margin was considered positive if invasive or in situ disease was present at the margin. Close margin status was analyzed as a binary measure with close being chosen as within 2 mm and next as a continuous variable. Intraoperative pathologic margin assessment was performed in all cases and re-excision was performed on an individual case-by-case basis. Univariate and multivariate analyses were utilized to assess the association of re-excision, proximity of the final margin, adjuvant and neoadjuvant therapy, type of mastectomy, and other clinical and pathological factors with LR.
Results Forty-six patients developed an LR with a mean follow up of 55 months and the cumulative 5-year probability of a local recurrence was 3.6%. In 183 (12%) mastectomies, a re-excision was performed for a close (N = 101) or positive (N = 82) margin. All were identified intraoperatively utilizing frozen-section analysis and excised to a negative final margin. The mean distance of tumor to the final margin was 15 mm (range: 1 mm–105 mm). Re-excision rates for skin-sparing and nipple-sparing mastectomy (SSM/NSM) were higher than simple mastectomy (18% vs. 9%). The 5-year cumulative probability of LR for patients who required re-excision was 6.3% and 3.2% for those who did not require re-excision; this association was not statistically significant ($p = 0.06$, HR = 1.9). In a multivariate model, lymphovascular invasion was found to be a significant risk factor for LR ($p = 0.01$) while hormone therapy was found to be protective ($p = 0.01$), and for a patient with a final margin ≤ 10 mm, for each millimeter closer there was a 22% increased risk for an LR ($p = 0.003$).
Conclusion In patients undergoing mastectomy for breast cancer, the proximity of the final margin correlates with the risk of local recurrence. However, the need for intraoperative re-excision did not result in increased risk for local recurrence. SSM/NSM had similar rates of local recurrence as simple mastectomies.

continues

Variable		p value	Hazard Ratio	95% CI
Final margin†	Per 1 mm closer	0.003	1.22	1.09–1.36
Hormone therapy	Yes No	0.01	0.39 1.0 (reference)	0.19–0.81
Lymphovascular invasion	Present Absent	0.01	2.67 1.0 (reference)	1.25–5.73

†In patients with a margin ≤ 10 mm.

Neoadjuvant Chemotherapy for Breast Cancer – Is Practice Changing? A Population-Based Review of Current Surgical Trends

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Objective Neoadjuvant chemotherapy in breast cancer has been used to downstage locally advanced and inoperable tumors. More recently, expanded benefits of neoadjuvant therapy include downstaging of tumors to allow breast-conserving surgery (BCS) and assessment of in vivo tumor response. We sought to identify the patterns and predictors of neoadjuvant therapy use in a modern single-payer system to determine if this has been translated into practice on a population level.

Methods All patients undergoing surgery for invasive breast cancer in the province of Alberta between January 2012 and June 2014 were identified from our provincial synoptic OR report database (WebSMR). This is a prospective, preoperatively entered dataset that captures >93% of breast cancer surgery performed in the province. Patient demographics, hospital, operating surgeon, pre-op clinical tumor characteristics, neoadjuvant treatment, and type of surgery performed were collected. Descriptive statistics and multivariable analysis were used to identify predictors of neoadjuvant chemotherapy use. A random effect was utilized to account for clustering by the operating surgeon.

Results A total of 4,256 patients were identified and included in the analysis; 363 (8.53%) underwent neoadjuvant chemotherapy. There was a significant increase in the use of neoadjuvant therapy over time during the study period. In multivariable analysis, use of neoadjuvant therapy was significantly associated with pre-chemotherapy tumor size, multicentricity, LN positivity, and decreasing patient age (Table 1). In addition, there was significant variability in neoadjuvant chemotherapy use between operating surgeons. Of patients who underwent neoadjuvant therapy, 68.9% were not considered pretreatment candidates for BCS. At the time of definitive surgery, however, 72.1% had mastectomy with 18.7% opting for contralateral prophylactic mastectomy. As reported by the surgeon, this was due to the tumor being advanced/too large (50.4%), patient preference (12.6%), multicentricity (8.8%), and margins, genetics, and previous radiotherapy (4%).

Conclusion Although we identified a significant increase in the use of neoadjuvant chemotherapy over time, treatment with mastectomy as definitive surgical management remained high. There was significant variability in neoadjuvant chemotherapy use by the operating surgeons, in addition to factors generally associated with more locally advanced tumors. Further study is required to better identify appropriate operable patients who are best served with the use of neoadjuvant therapy.

continues

Table 1. Independent Predictors of Neoadjuvant Therapy on Multivariable Analysis

Predictor	Odds Ratio	95% CI
Patient age	0.61/10 years	0.53-0.71
Tumor size		
T1	Reference	Reference
T2	3.72	2.42-5.72
T3	27.85	14.98-51.76
T4	121.98	39.93-372.61
Multicentric tumor	1.95	1.18-3.24
LN status		
Negative	Reference	Reference
Positive	24.58	10.78-56.02
Matted	4.42	2.64-7.41
Treatment year		
2012	Reference	Reference
2013	1.39	0.94-2.04
2014	2.23	1.38-3.61

Margin Width Is Not Predictive of Residual Disease on Reoperation in Breast-Conserving Surgery After Neoadjuvant Chemotherapy

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Objective The margin consensus guidelines recently published in JCO established that "no tumor on ink" is an adequate margin for breast-conserving surgery (BCS). This practice-changing meta-analysis specifically excluded cases treated with neoadjuvant chemotherapy (NAC). It is still standard practice to reoperate in cases of close margins after NAC, but there is no clear evidence to support this. We hypothesize that margin width alone does not predict residual disease at reoperation in patients treated with NAC and thus we examine the value of margin width as well as other clinicopathologic variables in predicting residual disease on re-excision.

Methods Two hundred fifty-four cases of BCS after NAC at our institution between 2005 and 2013 were retrospectively reviewed. Cases of positive and/or close margins (<2 mm) necessitating additional surgery were included. Patient and tumor characteristics, including response to NAC and details of specimen margins, were recorded. Factors associated with residual disease present at re-excision were assessed.

Results Forty-four of 254 patients underwent additional surgery for close/positive margins. Of these, 19 had ≥ 1 positive margin at initial excision, while 25 had negative margins but at least 1 close (<2 mm) margin. Thirty of 44 (68.2%) patients had no residual disease on reoperation. Seventeen patients underwent completion mastectomy (38.6%), 8 of whom had no further disease in the breast. There was no difference in finding residual disease between positive and close margins ($p = 0.53$). Less than 3 close margins predicted for lack of residual disease at reoperation ($p = 0.006$, Table 1). Tumor volume reduction (measured pathologically) ranged from 0–85% and was not associated with presence of residual disease. Tumor phenotype, pattern of response to NAC, and margin width were also not associated.

Conclusion In our series, margin width was not independently predictive for residual disease in the breast. Greater than 60% of patients underwent second surgeries for no residual disease in the breast, a quarter of which were mastectomy. As NAC rates increase, it is important to identify which patients do not require additional surgery for close, but not positive, margins. After NAC, the number of involved margins appears to be more predictive of residual disease than margin width. Our findings call into question the need for routine reoperation in cases of 1 or 2 close margins. Larger scale study is necessary to confirm that "no tumor on ink" is an adequate margin in this patient population.

continues

Table 1

		Additional Disease on Reoperation, n (%)	No Additional Disease at Reoperation, n (%)	p value
Total		N = 14	N = 30	
Clinical T stage pre-therapy				0.19
	T1	0	1 (100)	
	T2	2 (13.3)	13 (86.7)	
	T3	7 (38.9)	11 (61.1)	
	T4	5 (50.0)	5 (50.0)	
Tumor phenotype*				0.528
	Triple negative	3 (50.0)	3 (50.0)	
	HER2-enriched	5 (33.3)	10 (66.7)	
	Luminal	6 (26.1)	17 (73.9)	
Histology at positive/close margin(s)**				0.054
	IDC	5 (20)	20 (80)	
	Other	9 (47.4)	10 (52.6)	
Number of positive/close margins				0.006
	1 or 2	6 (19.4)	25 (80.6)	
	≥3	8 (61.5)	5 (38.5)	
Margin width				0.556
	Positive	7 (36.8)	12 (63.2)	
	0.1 mm–1 mm	7 (30.4)	16 (69.6)	
	1.1 mm–1.99 mm	0	2 (100)	
Pathologic pattern of response				0.30
	Uniform	7 (43.8)	9 (56.3)	
	Not uniform	7 (28.0)	18 (72.0)	
Race				0.087
	Caucasian	12 (29.3)	29 (70.7)	
	African -American	0	1 (100)	
	Other	2 (100)	0	

*Triple negative = estrogen/progesterone/HER2-negative, HER2-enriched = estrogen/progesterone negative or positive, HER2-positive luminal = estrogen and/or progesterone-positive, HER2-negative
**Other = invasive lobular carcinoma or DCIS

The Role of Sentinel Lymph Node Biopsy at Completion Mastectomy for DCIS With Positive Margins

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Objective Sentinel lymph node (SLN) biopsy is recommended when mastectomy is performed following a core biopsy diagnosis of ductal carcinoma in situ (DCIS). The role of SLN biopsy for women with DCIS who undergo ≥ 1 attempts at breast-conserving surgery (BCS) prior to mastectomy is uncertain. We examined the rate of upgrade to invasive carcinoma and the yield of SLN biopsy in women who converted to mastectomy for DCIS with positive/close margins.
Methods The breast surgical service database was reviewed to identify all patients who underwent at least 1 wide local excision prior to conversion to mastectomy with SLN biopsy for treatment of DCIS. Margin status as the

indication for mastectomy was confirmed for all patients. Patients with and without upgrade (defined as invasive carcinoma or a positive SLN on final pathology) were compared using *t* tests and chi-square tests (Fisher exact test in the case of small cell frequencies). Patients with only isolated tumor cells in the SLN were considered node-negative.

Results From 2/2006-11/2012, 256 patients with DCIS were converted to mastectomy with SLN biopsy after 1 or more attempts at BCS. Two patients had bilateral mastectomies for bilateral DCIS (total, n = 258). Median patient age was 50 years (range, 26-84 years). Median number of attempts at BCS was 1 (range, 1-4). Overall, 27 (10.5%) patients were upgraded on final pathology; 21 (8%) to stage I disease, and 6 (2%) to stage II disease (3 micrometastasis, 3 macrometastasis). In 3 of 6 cases with a positive SLN, invasive carcinoma was not identified on pathologic review of the mastectomy. Four of 6 cases with a positive SLN underwent completion ALND and no additional disease was identified. Two hundred twenty-eight (89%) cases had mixed DCIS histologies, with cribriform, solid, and micropapillary components being described in 81.3%, 77%, and 54.1% of patients, respectively. The only clinical factor associated with any upgrade was the presence of a micropapillary component on DCIS histology (present in 74.1% of upgraded cases vs 51.7% of cases without an upgrade, p = 0.03) (table). Although not statistically significant, invasive cancer was not identified in any case where conversion to mastectomy occurred after ≥ 3 attempts at excision. Among 177 patients who underwent 1 attempt at BCS, the upgrade rate was 12%; among 68 patients who underwent 2 attempts at BCS, the upgrade rate was 9%.

Characteristic	No Upgrade	Upgrade	P value
N	231	27	
Age, years, median (range)	50 (26-84)	50 (34-78)	0.733
DCIS histology			0.028
Micropapillary component	119 (51.7%)	20 (74.1%)	
Other	111 (48.3%)	7 (25.9%)	
DCIS histology			0.924
Solid component	177 (77.0%)	21 (77.8%)	
Other	53 (23.0%)	6 (22.2%)	
DCIS histology			0.433
Cribriform	185 (80.4%)	24 (88.9%)	
Other	45 (19.6%)	3 (11.1%)	
ER status			1.000
Positive	108 (89.3%)	23 (88.5%)	
Negative	13 (10.7%)	3 (11.5%)	
Missing	110	1	
PR status			0.170
Positive	79 (79.8%)	16 (66.7%)	
Negative	20 (20.2%)	8 (33.3%)	
Missing	132	3	
DCIS nuclear grade			0.080
High	109 (47.6%)	4 (22.2%)	
Intermediate	103 (45.0%)	13 (72.2%)	
Low	17 (7.4%)	1 (5.6%)	
Unknown	2	9	
Number of excisions			0.508
1	156 (67.5%)	21 (77.8%)	
2	62 (26.8%)	6 (22.2%)	
3 or more	13 (5.6%)	0 (0.0%)	

Conclusion In this cohort of patients with DCIS who converted to mastectomy for positive/close margins after 1 or more attempts at BCS, the upgrade rate was 10.5%. While only 6 (2%) cases had a positive SLN, the SLN provided the only evidence of invasion in 3 cases. The substantial rate of upgrade to invasive disease and the potential for the SLN to signal otherwise occult invasive disease support the recommendation for SLN biopsy at the time of completion mastectomy.

Clinical Characteristics of Young Non-Ashkenazi Jewish Women With Breast Cancer in Israel

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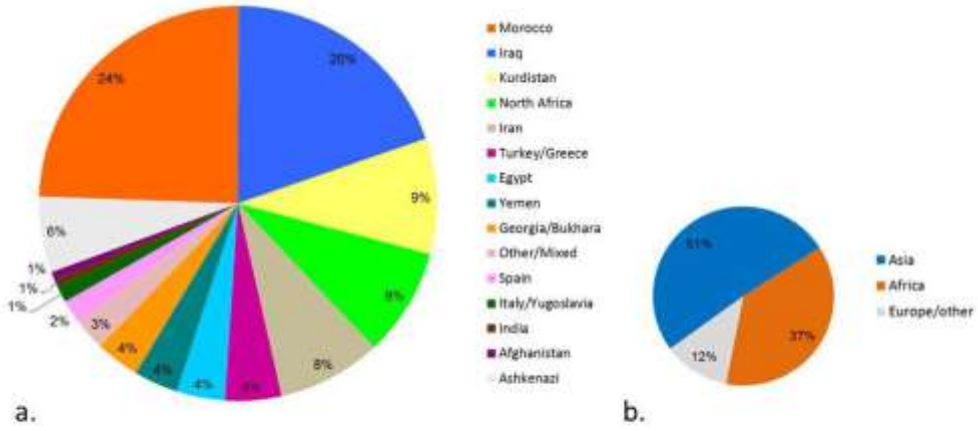
Objective In Israel, 11% of Ashkenazi Jewish (AJ) women with breast cancer (BC) have a BRCA founder mutation, and tend to be diagnosed at an earlier age than sporadic cancers. Non-AJ women form a far more heterogeneous population because of mixed origins from large waves of immigration mostly from Asia and Africa, with little knowledge of specific founder mutations. We reviewed clinical characteristics of young (25- to 40-year-old) non-AJ women diagnosed with BC, including risk factors, tumor characteristics, and treatment.
Methods Retrospective chart review of 25- to 40-year-old women of non-AJ origin who underwent surgery for primary BC in our institution from January 2000 to May 2014. Data regarding geographic origin of both parents was retrieved, risk factors, tumor characteristics, and treatment.
Results Of 229 women, 25 to 40 years old, who underwent surgery for BC, 82 had at least 2 non-AJ grandparents. 58 (71%) had genetic counseling. Forty-one women (50%) were from families of homogeneous geographic origin. Countries of origin were diverse (figure) with 51% originating from Asia and 37% from Africa. Forty-four patients (57%) didn't have family history of BC. Nine (12%) had first-degree and 24 (31%) had more distant relatives diagnosed with the disease. Average number of children at diagnosis was 2.5. Pathology was invasive ductal carcinoma in 88%, 5% were ductal carcinoma in situ only, and 2% were invasive lobular carcinoma. Median tumor size was 20 mm (mean, 22.5 mm ± 13.7; range, 4–65 mm), and 43 patients (52%) had metastatic lymph nodes at diagnosis. Fifty-seven (70%) of tumors were ER-positive, 23 (29%) were HER2-positive, and 12 (15%) were triple-negative. Fifteen (20%) patients were treated with neoadjuvant chemotherapy. Forty-four (54%) patients underwent mastectomy, while 38 (46%) had breast-conserving surgery. Of those having bilateral mastectomy, 1 patient had bilateral synchronous breast cancer and 9 (12%) had prophylactic contralateral mastectomy. Twenty-one (48%) of the mastectomy patients had reconstruction, 17 of them immediate reconstructions.
Conclusion Young non-AJ breast cancer patients in Israel have diverse geographic family origins. Most were referred to genetic counseling, although little is known regarding founder mutations in this population. Interestingly, the majority didn't have a family history of BC. Only 12% had contralateral prophylactic mastectomy, fewer than usually reported for this age group. Further investigation comparing these factors in young AJ, non-AJ, and Palestinian women, including results of genetic testing for mutations in BRCA and other BC-related genes, is to be carried out.



Family origin of young non-Ashkenazi Jewish women with breast cancer. a. Country of family origin. Information regarding patients' parents or grandparents was collected, therefore 6% of patients' origin was Ashkenazi. b. Continent of family origin

The Changing Face of Axillary Lymph Node Dissection

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Objective Sentinel lymph node biopsy (SLNB) is a widely accepted and safe technique that increases the accuracy of axillary staging in breast cancer for patients with clinically node-negative disease. Results from the American College of Surgeons Oncology Group (ACOSOG) Z0011 trial found no benefit for completion axillary lymph node dissection (ALND) in patients with breast cancer involving 1 to 2 positive sentinel nodes. The purpose of our study was to characterize the population of patients who had ALND since the publication of the Z0011 results.
Methods This was an IRB-approved retrospective review of women with newly diagnosed breast cancer between 1/2010 and 6/2013 who were clinically node-negative and had >1 positive sentinel lymph node (SLN). Variables of interest included age, method of presentation, body mass index (BMI), tumor characteristics, surgery type, and pre-op imaging. Patients who received neoadjuvant therapy were excluded. Descriptive statistics and Pearson's chi-square analyses were utilized.
Results Out of a total of 1,513 patients, 191 (12%) patients had >1 positive SLN in their initial surgery. The mean age was 56 years. Of the patients with a positive SLN, 139 (73%) went on to have a completion ALND. The distribution of age and tumor type was similar in patients who had SLNB alone and who underwent completion ALND. However, a higher proportion of patients who underwent completion ALND had later stage disease ($p < 0.0001$), larger tumors ($p = 0.012$), and greater number of positive SLN ($p = 0.004$), and had a higher BMI ($p = 0.05$). Among the 139 patients who went on to have a complete ALND, 127 (91%) patients had frozen section analysis with ≥ 1 positive lymph node. Of these patients, 72 (57%) had 1 lymph node positive for metastasis and 41 (32%) had 2 lymph nodes positive for metastasis on final pathology.
Conclusion Our study showed that women who had a completion ALND presented with later stage disease, larger tumors, and greater number of positive SLN. Frozen section analysis at the time of SLNB led to ALND in 113 patients with 1 or 2 positive SLN on final pathology. These patients would not meet the criteria for axillary dissection based on the results of Z0011. This suggests that patients should either undergo completion axillary dissection if 3 or more lymph nodes are found to have metastatic disease on frozen section or that completion dissection should be deferred until final pathology confirms the presence of 3 or more positive lymph nodes.

Quality of Life for African-American Breast Cancer Survivors: A Population-Based Study of 210 Patients

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Objective Health-related quality of life (HRQOL) for African-American breast cancer survivors is lower than other racial/ethnic groups; however, few studies have evaluated factors associated with lower HRQOL among African-American breast cancer survivors. We sought to identify predictors of poor physical and mental HRQOL among African-American breast cancer survivors.
Methods Using the Surveillance, Epidemiology, and End-Result registry and the Medicare Health Outcome Survey linked database, all African-Americans over 65 who underwent surgery for breast cancer and surveyed after their diagnoses were identified. Patients with a VR12 physical (PCS) or mental (MCS) component score 10 points lower than the median PCS/MCS score were categorized as having poor HRQOL. Univariate and multiple variable analyses were used to identify predictors of poor HRQOL.
Results We identified 210 resected breast cancer patients whose median age was 74. Only 4 (1.9%) patients had distant metastatic disease at time of presentation. Median time from diagnosis to HRQOL survey was 43 months with median follow-up of 112 months. Median PCS was 37.4 (IQR 29.3-44.4) with 42 (20.0%) with poor PCS. Median MCS was 51.5 (IQR 43.1-58.1) with 46 (21.9%) with poor MCS. Predictors of poor PCS included larger tumor size, smoker, >2 comorbidities, inability to perform >2 of 6 activities of daily living (ADLs), and modified or radical mastectomy (all $p < 0.05$). Predictors of poor MCS included no home ownership, income less than $30k per year, and inability to perform >2 of 6 ADLs (all $p < 0.05$). Tumor type and stage at presentation were not associated with lower PCS or MCS. After adjusting for smoking status, radiation therapy, type of operation, tumor size, and time from diagnosis to survey, >2 comorbidities (OR, 3.5; 1.48.8 95% CI; $p < 0.001$) and inability to perform >2 of 6 ADLs (OR, 8.8; 3.3–23.3 95% CI; $p < 0.001$) were independent predictors of poor PCS. After adjusting for income, homeownership, and time from diagnosis to survey, inability to perform >2 of 6 ADLs was independently associated with poor PCS (OR, 8.6; 3.2–23.5 95% CI; $p < 0.001$).
Conclusion This is one of the largest studies examining HRQOL in African-American breast cancer survivors. Poor HRQOL was not associated with socioeconomic status but rather multiple comorbidities and impairment in ADLs.

With the aid of patient navigators, patients' comorbidities and living situations should be addressed by their physicians to improve HRQOL.

Intraoperative Imaging of Final Margins With a Handheld Optical Imaging Probe May Reduce the Breast-Conserving Surgery Re-Intervention Rate: Results of a Multicenter Study

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Objective A multicenter, prospective, blinded study was performed to demonstrate the intraoperative use of a high-resolution handheld optical imaging probe to identify positive margins in breast-conserving surgery (BCS) and to determine the potential impact on patient outcomes.
Methods Patients with early-stage breast cancer undergoing BCS at 2 study sites, the Johns Hopkins Hospital and Anne Arundel Medical Center, were enrolled in this IRB-approved study. During BCS, the final margins of cavity shave specimens were examined ex vivo in the operating room with a handheld optical coherence tomography probe incorporating a physics-based imaging algorithm, interferometric synthetic aperture microscopy. Images were interpreted and scored for the presence of tumor after BCS by surgeon, radiologist, and pathologist reviewers blinded to the pathology-reported margin status. Results were compared to gold standard postoperative histopathology to determine the potential impact on patient outcomes had the results been used during surgery. Finally, image score agreement among the 3 physicians was measured by calculating intraclass correlation coefficients (ICCs) and areas under the receiver operating characteristic curves (AUCs).
Results A total of 2,191 images were collected and interpreted from 46 patients (23 from each site; 1 with bilateral disease; 229 margins). Eight patients (17%) had pathologically positive margins (0 mm; 7 with DCIS alone, 3 with invasive disease alone, and 1 with both), and optical imaging correctly identified all positive margins in 5 of them (63%). Re-intervention could potentially have been avoided in these patients. Among patients with all pathologically negative margins, false positives would have led to unnecessary excision of an average of 1.32 margins of healthy tissue per patient (approximately 11 ml, 1% of overall breast volume). The relatively high ICC for all physicians (0.728) and minimal variation among physician AUCs (delta = 0.08; 12%) demonstrated that the 3 physicians identified the same image features.
Conclusion This study demonstrated that assessment of final BCS margins with a high-resolution handheld optical imaging probe can identify positive margins in a representative clinical environment. This technique is potentially able to eliminate the majority of re-interventions due to postoperative pathology findings while avoiding excessive unnecessary excision of healthy tissue.

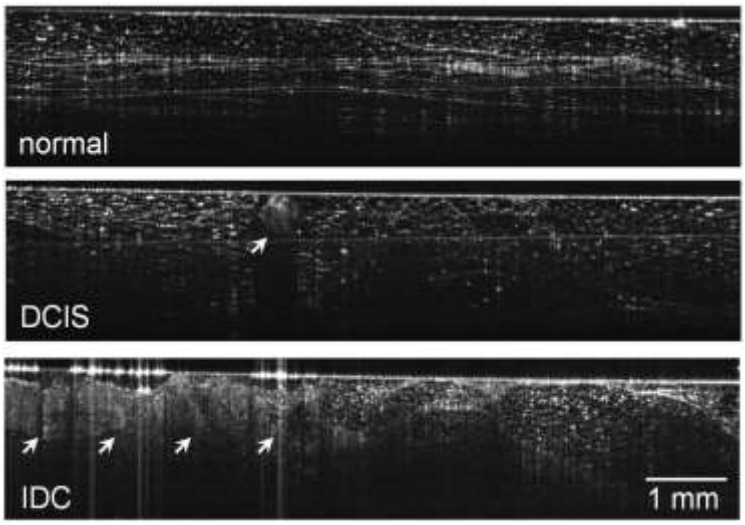

Figure 1. Representative images showing: (top) regions of normal fibrofatty breast tissue with well-defined boundaries, linear structures, and regular texture; (middle) ductal carcinoma in situ (arrow) with irregular texture and significant shadowing; (bottom) invasive ductal carcinoma (arrows) with irregular texture and poorly-defined boundaries.

Bilateral Mastectomy: Identifying Decision Points

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Objective Rates of bilateral mastectomy as treatment for unilateral breast cancer have been rising in the past decade. The purpose of this study was to explore the determinants of a woman's decision making in the choice of bilateral mastectomy as a treatment for early-stage unilateral breast cancer.
Methods A qualitative descriptive design was used. In-depth interviews were conducted by 2 researchers using a semi-structured interview guide to elicit data that were coded and analyzed using thematic analysis.
Results Twenty-three women, age 30 to 68, were interviewed. Five themes were identified that address specific determinants of the decision making process: diagnosis, collecting evidence, perceived level of risk, identifying priorities, and making the decision. The reasons women chose bilateral mastectomy were to avoid a lifetime of follow-up screenings, with the subsequent fear of hearing that the breast cancer had returned, and wanting to stay (alive and well) for their children and families. Aesthetics was not a primary motivator. Of the 23 surgeons, 17 were female. Seven of the women reported that their surgeons initiated the discussion of bilateral mastectomy. Of these 7 physicians, 6 were female. Two oncologists, both female, were also reported to have recommended bilateral surgery. All but 1 woman had a preoperative MRI, and 5 women were told they needed a biopsy in the unaffected breast. Only 1 woman was found postoperatively to have an occult tumor on the contralateral breast. Women who recalled being advised of their risk of recurrence reported overestimates of that risk. Of the 10 women who did not report multifocal disease, only 2 recalled being given the option of lumpectomy. Nineteen of the women had gene testing, 2 of the women were BRCA positive. One was given this result after her bilateral mastectomy.
Conclusion Women who chose to have a bilateral mastectomy were confident in their decision making, and satisfied with their choice. Although bilateral mastectomy is not standard of care for unilateral breast cancer, except in BRCA positive women, it is apparent that some surgeons are overestimating risk of recurrence and offering the option of bilateral mastectomy to their patients with unilateral breast cancer. An ongoing quantitative study will include physician-related variables, such as fellowship training.

continues

Characteristics of the Breast Cancer

Mean Time Since Diagnosis	2.5 years	N/A
Primary Tumor Found: Women herself	17	73.9
Clinical breast exam	2	8.7
Mammogram	3	13.0
Ultrasound	1	4.3
Preoperative MRI	22	95.6
Type of Cancer[1]: Tubular	1	4.3
DCIS	6	27.3
Ductal carcinoma	17	73.9
Lobular carcinoma	2	8.7
Stage: Zero	1	4.3
One	7	30.4
Two	10	43.5
Three	5	21.7
Multicentric/ Multifocal	13	56.5
Positive Postop Finding in Contralateral Breast	1	4.3
Hormone Receptor Status[2]: Estrogen +	15	65.2
HER2+	6	26.1
Triple negative	2	9.1
Positive Lymph Nodes	10	43.5
Positive Family History	14	60.9
BRCA 1/2 Testing	19	82.6
BRCA positive	2	10.5

[1]Data missing
[2]Information on progesterone was incomplete so not included.

Sentinel Lymph Node Biopsy After Neoadjuvant Chemotherapy: A Report From the National Cancer Data Base

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Objective In 2013, the ACOSOG Z1071 trial examined the feasibility of sentinel node biopsy (SNB) in clinically node-positive patients undergoing neoadjuvant chemotherapy (NAC). We examined trends in the utilization of SNB after NAC in the National Cancer Data Base (NCDB) prior to publication of the Z1071 trial results.
Methods The NCDB was used to select 30,128 women with cT1-4N1M0 invasive breast cancer who underwent NAC from 2006-2011. SNB was defined as 1 to 3 lymph nodes and axillary lymph node dissection (ALND) was defined as 10 or greater nodes examined by pathology. Included in the analysis were 19,746 women who met these classifications. Chi-square tests and multivariate logistic regression were used to analyze trends.
Results Overall, 18.6% of women with cN1 disease who underwent NAC received SNB. Over the 6 years of study, a small increase was seen in the rate of SNB from 18.7% in 2004 to 21.5% in 2011 ($p < 0.001$). Variation was seen mainly in facility factors and tumor characteristics. SNB was more common in patients with triple-negative (22.6%)

and HER2-positive (23.3%) tumors vs luminal A tumors (16.7%) [$p < 0.001$] and in tumors of smaller size (21.4%, 19.0%, 17.4%, and 16.7% for cT1, T2, T3, and T4 tumors, respectively; $p < 0.001$). Community centers were more likely to perform SNB than academic centers (22.7% vs 17.4%; $p < 0.001$). Regional variation was seen, with the East South Central region having the highest rate of SNB (21.7%) and the West North Central region having the lowest (14.3%) [$p < 0.001$]. There was little variation related to age, race, histology, grade, or insurance status ($p > 0.05$). Independent predictors of receiving SNB over ALND included triple-negative (OR, 1.43; CI, 1.24–1.64) or HER2-positive (OR, 1.50; CI, 1.32–1.71) tumor subtypes, being treated in New England (OR, 1.34; CI, 1.04–1.74), and having a clinical T1 tumor (OR 1.47; CI, 1.18–1.82). SNB was less common at academic centers (OR, 0.73; CI, 0.59–0.90) and in the West North Central region (OR, 0.67; CI, 0.51-0.89). Of the entire cohort, 35.8% of women had pN0 disease after NAC. Of those who underwent SNB, 50.7% had pN0 disease, compared to 31.9% of those who underwent ALND ($p < 0.001$). Triple-negative (45.6%) and HER2-positive (51.1%) subtypes were much more likely to have pN0 disease than luminal A tumors (20.8%) [$p < 0.001$].
Conclusion The use of SNB for patients with cN1 cancer undergoing NAC increased slightly from 2006 to 2011 and was more common in triple-negative and HER2-positive subtypes, as well as in those having a complete nodal response. Future studies will determine if findings from the Z1071 trial will impact clinical practice.

Pure Mucinous Carcinoma With a Favorable Tumor Biology and Prognosis
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Objective Few studies suggested mucinous carcinoma of breast is a rare breast carcinoma with good prognostic factors. Therefore, biologic features and clinicopathologic characteristics of pure mucinous breast cancer were investigated to determine its clinical outcome.
Methods Between January 2004 and May 2014, 51 patients diagnosed with pure mucinous breast cancer were retrospectively analyzed in terms of their clinicopathological and demographic characteristics and management and outcome.
Results Median age was 63 (33–91). Of 51 patients, 33 (64%) had breast conservation surgery, whereas 18 patients (36%) had mastectomy. Of those, 40 patients (68%) had sentinel lymph node biopsy (SLNB), and 6 of them underwent completion axillary dissection due to a positive SLNB, whereas 8 patients underwent axillary dissection without SLNB due to a positive clinical axilla. Any axillary surgery was omitted in 3 patients because of their old age and comorbidities (>73). Therefore, the axillary involvement in this cohort is 35%. Median tumor size was 2.8 cm (range, 0.1 cm–10 cm). Of all tumors, 10 (20%) had lenfovascular invasion, whereas 22 tumors (43%) were histologic grade (HG) 1, and 26 tumors were HG 2, whereas only few tumors (6%) were HG 3. Almost all of the tumors were ER-positive (96%) and PR-positive (90%), whereas only 4 patients (8%) had HER2-neu–positive tumors. Of patients with a Ki67 index (n = 31), the majority of them (n = 26,84%) had a low Ki67 score (<20%). Adjuvant chemotherapy was given to only 6 patients (12%), whereas almost all patients had hormonotherapy. Median follow-up time was 40 months (range, 6–110). None of the patients had a local or systemic recurrence, and all were alive.
Conclusion Our findings also indicate that pure mucinous carcinoma seems to have a favorable tumor biology as luminal A type with low Ki67 levels. Furthermore, patients show an excellent prognosis despite a considerable high axillary positivity. Considering the high likelihood of axillary involvement, axillary staging with SLNB should be performed in all patients with a negative clinical axilla.

Overall Survival and Patterns of Care in Male In Situ Breast Cancer
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Objective Male invasive breast cancer comprises 1% of all breast cancers, and in situ disease is a rare subtype. Treatment guidelines are unclear and are often extrapolated from female in situ breast cancer data. As female overall survival for in situ disease is excellent when guidelines are followed, we sought to investigate patterns of care for male in situ breast cancer and overall survival.
Methods The California Cancer Registry was used to identify male patients diagnosed with in situ breast cancer from 2000–2011. First primary tumor data were analyzed. Frequencies and rates of clinical characteristics and treatment are reported. Kaplan-Meier curves were used to analyze survival rates.

Results Two hundred seven males were identified with in situ breast cancer. Among these patients, 135 had ductal histology and 48 had lobular histology, and the remaining 26 patients had other histologies, including cribriform and papillary carcinoma. One hundred twenty-six (60.8%) patients were non-Hispanic white, 19 were black, 21 were Hispanic, and the remaining 41 were other races. Four patients had a remote history of invasive breast cancer (IBC), 3 later developed IBC, and 1 had a simultaneous diagnosis with an overall recurrence of 3.3%; 30.9% underwent some form of partial excision of the breast but only 10.1% received adjuvant radiation; 1.9% underwent reconstruction after mastectomy; 11% underwent contralateral prophylactic mastectomy; 10.1% received adjuvant anti-hormonal therapy, which was recommended but refused by another 2.4%. During follow-up, 28 (13.5%) died. Overall survival at 10 years is 77.2%
Conclusion Male in situ breast cancer patients are less likely to receive adjuvant antihormonal and radiation therapy but may receive more aggressive surgical treatment compared to female counterparts. Regardless, local recurrence rates remain low, and overall survival may be more affected by other co-morbidities than the breast cancer.

Intraoperative Specimen Tomosynthesis Comparison With Digital Specimen Mammography

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Objective About 75% of newly diagnosed breast cancers are not palpable and require image localization to remove the target lesion via lumpectomy. It is an American Society of Breast Surgeons quality measure to have image confirmation of an image-localized excision. To facilitate confirmation of lesion excision, digital specimen mammography devices were developed to reside in the operating room so that surgeons might obtain immediate image confirmation. If the intraoperative images demonstrated the lesion was not removed or if the targeted lesion had a close margin, immediate re-excision could be performed, avoiding a repeat operation. Despite the availability of intraoperative digital specimen mammography (IDSM), the re-excision rate for lumpectomy remains significant. Specimen tomosynthesis (ST) has recently been developed to provide a more detailed image than standard specimen mammography. Highly detailed consecutive image slices of the lumpectomy specimen can be immediately reviewed in the operating room, providing the surgeon with an increased level of scrutiny. Orthogonal measurements can be obtained without turning the specimen. Serial scrolled images can follow calcifications and masses through the specimen to define adequacy of excision.
Methods We compared intraoperative imaging of consecutive lumpectomy specimens using both IDSM and ST. A series of 32 consecutive individual lumpectomy specimens for breast cancer were imaged using both devices. Data recorded for each specimen on each device included (1) accuracy of identification of target lesion, (2) time required to produce initial image of target lesion, (3) ease of forwarding images via PACS to radiology for review, (4) predicted closest margin according to each specimen imaging device compared with final pathologic measured margin, (5) ease of use by the surgeon and/or nurse, and (6) comparison cost and maintenance of device.
Results All targeted lesions were accurately identified with both IDSM and ST. After a relatively short learning curve, we were able to visualize details on the tomosynthesis unit not clearly visualized on the standard unit. Faint calcifications could be seen on the tomosynthesis unit that were not well seen on the standard unit. The time taken to obtain the images was similar in both devices, both under 1 minute for a single view. For IDSM, 2 orthogonal images were obtained (2 min). For ST, although it was not always necessary to obtain 2 orthogonal images since the serial stepping through the specimen could obtain the orthogonal "Z" axis information, we continued to obtain 2 orthogonal images for comparisons. The closest margin was recorded for each unit on each specimen and compared with the final pathologic findings to determine the accuracy of each method. Sensitivity and specificity of margin prediction will be presented. Ease-of-use assessment and cost analysis will be presented.
Conclusion Our initial experience with ST of lumpectomy tissue suggests this device will be a valuable addition to the breast surgeon's ability to lessen the re-excision rate for lumpectomy. More extensive research will be necessary to define the exact value of this technical advancement.

Initial Experience With Novel 3D Bioabsorbable Lumpectomy Marker

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Objective Breast-conserving surgery requires adequate excision of the primary tumor (lumpectomy), followed by external radiation to the tumor bed. The surrogate for the tumor bed has been the residual seroma cavity remaining after lumpectomy, as well as surgeon-placed individual clips. Due to the eccentric removal of tumors, the distortion of the target site by oncoplastic procedures, lack of standard locations for clip placement, and variance of the degree of seroma formation, targeting of the tumor bed can be less than optimal and often larger than desired. A novel 3-dimensional bioabsorbable device has been developed to facilitate communication between the surgeon and the radiation oncologist to accurately depict where the original tumor resided, while avoiding targeting of inadvertent tissue that might simply be dissected on the path toward to target tumor. This device is expected to have an impact on cosmesis by maintaining the original lumpectomy cavity open (at the site of the original tumor), preventing the skin from collapsing into the wound.
Methods We have placed 22 marker devices after lumpectomy in breast cancer patients, both invasive and non-invasive, with at least 6 months follow-up. This device consists of a bioabsorbable three-dimensional spiral coil with 6 embedded titanium clips in a fixed pattern. The spiral is sewn in place by the surgeon during the lumpectomy procedure at the exact location where the tumor was removed. Placing this device at the "ghost" site of the tumor allows the radiation oncologist to accurately target the margin tissue at greatest risk for residual disease. At the same time, the device allows the radiation oncologist to avoid breast tissue involved by seroma that was not close to the tumor but was dissected in transit to the tumor site or mobilized during oncoplastic procedures. All patients were evaluated with postoperative imaging, including CT planning, and are candidates for radiation therapy. Cosmesis was evaluated with pre- and post-treatment photographs and patient and physician satisfaction scores for appearance. When the spiral dissolves after a year and an organized cavity has been established, cosmetic evaluation is repeated.
Results The device is well seen on mammogram, ultrasound, and CT planning scans, aiding the targeting of the tissue bed. Radiation treatment planning has been facilitated and total treatment volumes appear decreased in this initial group. The device is particularly valuable for external beam PBI and photon boost treatments. Three patients had initial positive margins requiring re-excision. Two patients had re-excision of a single margin leaving the device in place. The third patient required an extensive re-excision for multifocality and the device was removed with a large circumferential re-excision. There have been no infections or wound complications and no device-related complications to this point. Patient satisfaction has been good to excellent.
Conclusion A three-dimensional bioabsorbable device has been used to accurately depict the original tumor site after lumpectomy. Future studies of the decrease in radiation treatment volume and use of accelerated radiation protocols should follow. A national registry database is being created to assess and report on additional findings.

Extreme Oncoplasty: Breast Conservation for Patients Who Need Mastectomy

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Objective Extreme oncoplasty is a breast-conserving operation, using oncoplastic techniques, in a patient who in most physicians' opinions requires a mastectomy. These are generally large, greater-than-5-cm multifocal or multi-centric tumors. Many will have positive lymph nodes. Most will require radiation therapy, even if treated with mastectomy.
Methods Sixty-six consecutive patients with multifocal, multicentric, or locally advanced tumors that spanned more than 50 mm were studied (extreme cases). All patients were advised to have a mastectomy; all sought a breast-conserving second opinion. Diagnostic work-up included digital mammography, ultrasound, MRI, and PET-CT (if invasive). All patients underwent excision and oncoplastic reconstruction using a standard or splitwise pattern reduction and immediate contralateral surgery for symmetry. All received postexcisional standard whole-breast radiation therapy with a boost to the tumor bed. The extreme cases were compared with 245 consecutive patients with unifocal or multifocal tumors that spanned 50 mm or less (standard cases)
Results Standard cases did extremely well. No ink on tumor was achieved 96% of the time among 245 patients. The median tumor size was 21 mm (mean, 23 mm). Margins equal or greater than 1 mm were achieved in 88.6% of

patients. Seventeen (6.9%) standard patients underwent re-excision to achieve wider margins and only 1 patient (0.4%) was converted to mastectomy. With 24 months of median follow-up, 3 patients (1.2%) experienced local recurrence. For extreme cases, no ink on tumor was achieved 83.3% of the time, which is comparable to published positive margin rates after standard lumpectomy. The median tumor size was 62 mm (mean, 77 mm). Margins equal or greater than 1 mm were achieved in 54.5% of patients. Six (9.1%) extreme patients underwent re-excision to achieve wider margins and 4 patients (6.1%) were converted to mastectomy. With a follow-up of 24 months, 1 patient (1.5%) experienced a local recurrence.
Conclusion Extreme oncoplasty is a promising new concept. It allows successful breast conservation in selected patients with greater than 5-cm multifocal/multicentric tumors. It may be useful in patients with locally advanced tumors following neoadjuvant chemotherapy. From a quality-of-life point of view, it is a better option than the combination of mastectomy, reconstruction, and radiation therapy. Long-term data on recurrence and survival are not available. Based on historical data, it is expected the local recurrence will be somewhat higher but that there will be little or no impact on survival.

	Standard ≤50 mm	Extreme >50 mm	P Value
N	245	66	
Mean weight	142 g	217 g	<0.01
Mean span	23 mm	77 mm	<0.01
No ink on tumor	236/245 (96%)	55/66 (83.3%)	<0.01
Margins close but clear 0.1–0.9 mm	19/245 (7.8%)	19/66 (28.8%)	<0.01
Margins ≥ 1 mm	217/245 (88.6%)	36/66 (54.5%)	<0.01
Re- excision	17/245 (6.9%)	6/66 (9.1%)	NS
Mastectomy	1/245 (0.4%)	4/66 (6.1%)	<0.01
Any local recurrence	3/245(1.2%)	1/66 (1.5%)	NS
Mean follow-up	24 mo	24 mo	NS

Racial Differences in Utilization and Outcome of Neoadjuvant Chemotherapy for Breast Cancer: An Analysis of the National Cancer Database
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Objective Racial disparities in breast cancer treatment have been well documented. However, data regarding differences in the use of and response to neoadjuvant chemotherapy are sparse. In 2010 the National Cancer Database (NCDB) included a new variable, documenting pathologic complete response (pCR), which is an important prognostic indicator. The purpose of this study was to explore racial differences in the use of neoadjuvant chemotherapy and rates of pCR.
Methods The NCDB was queried to identify women diagnosed with invasive stage 1–3 breast cancer in 2010–2011 who received any chemotherapy or neoadjuvant chemotherapy. Bivariate and multivariate logistic regression was performed to determine factors contributing to receipt of chemotherapy and likelihood of pCR.
Results Of 278,815 patients with known race and ethnicity, 127,417 (46%) received chemotherapy, and out of 121,446 where the timing of chemotherapy was known, 27,300 (23%) received neoadjuvant chemotherapy. Of 17,970 where the outcome was known, 5,944 (33%) had a pCR. As seen in the table, non-Hispanic blacks, non-Hispanic Asian/Pacific Islanders, and Hispanics were more likely to receive chemotherapy and neoadjuvant chemotherapy compared to non-Hispanic whites. However, whites were more likely to have earlier stage, lower grade, and ER/PR-positive, HER2-negative tumors ($p < 0.001$ for all comparisons), and this accounted for most of the racial differences in receipt of chemotherapy. After controlling for these factors, blacks but not Asians or Hispanics had a lower likelihood of achieving pCR (OR, 0.83; 95% CI, 0.75–0.92) compared to whites.

Conclusion Chemotherapy, in general, and neoadjuvant chemotherapy, in particular, is given more frequently to black, Hispanic, and Asian women compared to whites. This is mostly explained by more advanced stage, higher grade tumors, and a greater proportion of triple-negative and HER2-positive tumors in these women. Non-Hispanic blacks have a slightly lower likelihood of pCR after neoadjuvant chemotherapy compared to whites.

	Non-Hispanic White	Non-Hispanic Black	Non-Hispanic Asian/ Pacific Islander	Hispanic
Received any chemo	95,585/222,972 **43%**	18,652/31,732 **59%**	4,682/8,894 **53%**	8,498/15,217 **56%**
Unadjusted OR (95% CI)	Reference	1.90 (1.86–1.95)	1.48 (1.42–1.55)	1.69 (1.63–1.74)
Adjusted OR (95% CI) *	Reference	1.04 (1.00–1.08)	0.93 (.87–1.00)	0.99 (.94–1.05)
Received neoadjuvant	19,022/91,534 **21%**	4,874/17,503 **28%**	1,088/4,504 **24%**	2,316/7,905 **29%**
Unadjusted OR (95% CI)	Reference	1.47 (1.42–1.53)	1.21 (1.13–1.30)	1.58 (1.50–1.66)
Adjusted OR (95% CI) *	Reference	1.12 (1.07–1.18)	1.11 (1.01–1.21)	1.21 (1.13–1.30)
Pathological complete response	4,184/12,581 **33%**	987/3,102 **32%**	252/750 **34%**	521/1,537 **34%**
Unadjusted OR (95% CI)	Reference	0.94 (.86–1.02)	1.02 (.87–1.19)	1.03 (.92–1.15)
Adjusted OR (95% CI) *	Reference	0.83 (.75–92)	0.97 (.81–1.16)	1.03 (.90–1.17)

*Adjusted for age, clinical T stage, clinical N stage, histology, grade, and molecular type.

The Significance of Radial Scar at Percutaneous Breast Biopsy

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Objective Radial scar of the breast found at percutaneous biopsy represents a management dilemma because of the reported risk of associated malignancy found at surgical excision. Previous studies often included patients whose needle biopsy contained high-risk lesions, such as atypical ductal hyperplasia, lobular carcinoma in situ, or papilloma, in addition to radial scar. In order to calculate the true risk of malignancy of pure radial scar, we reviewed our experience in which core needle biopsies were followed by surgical excision to determine the rate of pathologic upgrades from radial scar, with and without high-risk lesions, to carcinoma.
Methods The pathology database was searched for the term "radial scar" from 2008 to September 2014. The 740 pathology reports were reviewed and 221 radial scars at percutaneous biopsy were identified. Thirty-one cases were excluded because they did not have surgical excision. Thirty-two radial scars were associated with a high-risk lesion upon excision (13 atypical ductal hyperplasia, 9 lobular carcinoma in situ, 4 atypical lobular hyperplasia, and 6 papillomas). The likelihood of malignancy among patients with radial scar associated with a high-risk lesion was compared to the likelihood of malignancy in patients with radial scar without an associated high-risk lesion.
Results There were 2 cases of ductal carcinoma in situ in the 158 surgical specimens from patients whose percutaneous biopsy was radial scar with no associated high-risk lesion (1.2%). Among the 32 patients with high-risk lesions associated with radial scar, there were no malignant findings on surgical excision. There were no cases of radial scar that were eventually found to have invasive cancer on surgical excision.
Conclusion Radial scar found at core needle biopsy was associated with a very low likelihood of malignancy in the subsequent surgical specimen. Only 2 of 190 patients (1%) with radial scar were upgraded to DCIS. The association of high-risk lesions with radial scar did not affect the likelihood of malignancy. There were no invasive breast cancers on surgical excision following core needle biopsy of radial scar.

Expanded Indications and Improved Outcomes for Nipple-Sparing Mastectomy Over Time

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Objective Modern nipple-sparing mastectomy (NSM) includes resection of all visible breast tissue, including that subjacent to the nipple-areolar complex. Our initial NSM guidelines included risk-reduction and cancers ≤2 cm in size, located >2 cm from the nipple. Relative contraindications included high BMI, large and/or ptotic breasts, prior radiation, and breast surgery. Our aim was to evaluate changes in NSM indications, surgical approach, and early postoperative outcomes over time.

Methods With IRB review, we identified 353 patients scheduled for 587 NSMs, of whom 341 (97%) underwent 566 (96%) NSMs from 1/09–6/14. We reviewed patient, tumor, treatment, and outcome data. Changes across time periods [early (2009–2010), mid (2011–2012), and recent (2013–2014)] were assessed using tests for linear trend.

Results NSM in patients undergoing reconstruction increased significantly, from 24% in the early to 40% in the recent period ($p < 0.0001$). Intraoperative nipple resection was associated with bra cup size ≥ C (6% vs 1%, $p = 0.0003$), cancer diagnosis vs risk-reduction (5% vs 2.5%, $p = 0.09$), and cancers ≤ 2 vs >2 cm from the nipple (10% vs 4%, $p = 0.21$). BMI, bra cup size ≥ C, breast ptosis, prior radiation, and prior WLE for cancer increased significantly over the study period (Table). NSM for clinical stage T2/3 tumors as a percentage of mastectomies with reconstruction increased from 13/292 (4.5%) (early) to 28/190 (14.7%) (recent), $p < 0.0001$. Indications for NSM broadened with T2/T3 tumors comprising 21% of early cases vs 30% of recent cases ($p = 0.13$) and those treated with neoadjuvant therapy tripling from 5% to 15% ($p = 0.004$). NSM for tumors ≤ 2 cm from the nipple increased from 5% to 17% ($p = 0.01$). The use of inframammary, radial, and reduction-type incisions increased over time while periareolar incisions decreased, $p < 0.0001$. Intraoperative laser angiography increased from 0 to 36% (mid) to 72% in recent time periods ($p < 0.0001$). Concomitantly, overall complication rate, complications requiring treatment, and postoperative nipple loss decreased despite increased patient and tumor complexity. Six locoregional recurrences (LRR) were observed with a median follow-up of 19 months, an estimated LRR rate of 0.3%, and 0.9% at 1 and 2 years, respectively.

Conclusion Indications for NSM broadened over time in terms of patient characteristics, tumor stage, and operative approach. Despite this, complication rates decreased. Our excellent short-term outcomes suggest that NSM is a reasonable approach for many patients desiring risk-reducing surgery and many cancer patients without evidence of disease in the nipple-areolar complex. Further study is needed to assess long-term aesthetics, patient satisfaction, and oncologic safety.

continues

	Early 2009-2010 n = 140	Mid 2011-2012 n = 196	Recent 2013-6/2014 n = 230	P Value
NSM as % of all mastectomies with reconstruction	140/590 (23.7%)	196/670 (29.3%)	230/580 (39.7%)	<0.0001
BMI, median (IQR)	23.3 (20.7-26.9)	22.6 (21.0-24.7)	24.5 (22.0-27.3)	0.0003
Bra cup size C or >, n (%)	57/138 (41.3%)	82/196 (41.8%)	129/229 (56.3%)	0.002
Ptosis present, n (%)	83/140 (59.3%)	135/194 (69.6%)	163/228 (71.5%)	0.02
Ptosis grade 3+, n (%)	17/140 (12.1%)	20/194 (10.3%)	38/228 (16.7%)	0.15
Prior breast surgery, n (%), any Augmentation Reduction/mastopexy Excisional biopsy WLE for cancer	37/140 (26.4%) 13 0 15 9	36/196 (18.4%) 13 2 10 11	63/230 (27.4%) 22 3 11 27	0.59 0.04
Prior radiation, n (%)	0	11/196 (5.6%)	18/230 (7.8%)	0.001
Indication, n (%) Risk reduction Cancer Other	 78/140 (55.7%) 62/140 (44.3%) 0	 134/196 (67.3%) 66/196 (32.1%) 1/196 (0.5%)	 133/230 (57.8%) 92/230(40%) 5/230 (2.2%)	0.96
Preoperative breast MRI, n (%)	104/140 (74.3%)	153/196 (78.1%)	181/230 (78.7%)	0.35
Clinical T stage, n (%) Tis T1 T2/3	 20/62 (32.3%) 29/62 (46.8%) 13/62 (21.0%)	 19/64 (29.7%) 30/64 (46.9%) 15/64 (23.4%)	 22/92 (23.9%) 42/92 (45.7%) 28/92 (30.4%)	0.13
T size >2 cm (pathology)	10/40 (25%)	11/43 (25.6%)	10/60 (17%)	0.47
T distance from nipple ≤ 2 cm, n (%)	3/62 (4.8%)	6/64 (9.4%)	17/98 (17.3%)	0.01
Neoadjuvant therapy	7/140 (5%)	12/196 (6.1%)	36/230 (15.7%)	0.004
Incision type Inframammary fold Periareolar Radial Reduction Other	 37/140 (26%) 92/140 (66%) 11/140 (7.9%) 0 0	 74/196 (37.8%) 50/196 (25.5%) 65/196 (33.2%) 2/196 (1%) 5/196 (2.3%)	 98/230 (43%) 36/230 (15.7%) 80/230 (34.8%) 13/230 (6%) 3/230 (1.3%)	<0.0001
Use of acellular dermal matrix	130/140 (92.9%)	178/196 (90.8%)	219/230 (95.2%)	0.28
Use of intraoperative laser angiography	0/140 (0%)	70/196 (35.7%)	166/230 (72.2%)	<0.0001
30-day postop complication (per side)	58/140 (41.3%)	39/196 (19.9%)	43/230 (18.7%)	<0.0001
30-day postop complication requiring treatment (per side)	21/140 (15%)	13/196 (6.3%)	7/230 (3.0%)	<0.0001
Delayed nipple excision	8/140 (5.7%)	6/196 (3.1%)	5/230 (2.2%)	0.08

Use of Multiple Wire Localization for Breast Conservation Therapy

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Objective Mastectomy is often indicated for larger sized breast cancers, breast cancers with extensive calcifications, or patients with higher tumor: breast ratios. Recently there has been a marked increase in the rate of mastectomies vs only a slight increase in breast-conserving therapy (BCT). In 2004, the rate of mastectomies was 35% and by 2006 had jumped to 60%. This has prompted newer studies to evaluate the long-term outcomes of both mastectomies and BCT, which have noted a higher overall survival and a breast cancer–specific survival in patients undergoing BCT.

There is a need to find reliable, accurate breast cancer localizing techniques to allow larger masses to be excised using BCT without affecting re-excision rates or local re-occurrence. One method is to perform wire bracketing of larger, more complex breast cancers to better outline a border for surgical resection, allowing for BCT with clear margins. A recent study states the re-excision rate for positive margins for BCT was 21.6%. For our study, we compared breast cancer tumor size and the rate of re-excision for positive margin in BCT using 3 or more wires to bracket breast lesions vs 2 wires.
Methods A single-institution retrospective review of 71 female subjects with noninvasive or invasive breast cancer who underwent a partial mastectomy with 2 or more localization wires from 2007 to 2013 was performed. Inclusion criteria include patients over the age of 18 who have a diagnosis of breast cancer, either noninvasive or invasive, who underwent a partial mastectomy with multiple wire localization. All patients had biopsy-proven carcinoma in situ or invasive carcinoma. Comparisons were made between partial mastectomies performed with 2 or fewer wires and 3 or more wires and the rate of return to the operating room for re-excision of positive or close margins noted on finalized tissue pathology results. In our study, 16 patients had 3 or more wires and 55 patients had 2 or fewer wires.
Results For the lesions localized with 3 or more wires, the average size of the lesion was 3.8 cm (range, 1.13 cm-6.47 cm) and for the lesions localized with 2 or fewer wires 1.7 cm (range, 0.38 cm–3.0 cm). Two of the 16 patients (12.5%) in the 3-or-more-wire group required additional surgery for re-excision due to positive or close margins on final pathology results vs 5 (11.4%) of the 55 patients (9.1%) in the 2 or fewer wire group, however, was not found to be statistically significant. Overall, our re-excision rate was found to be 9.86%.
Conclusion Our study demonstrates there is no statistically significant increased risk for re-excisions based on the number of wires used. However, it was observed that larger breast lesions were localized with 3 or more wires for excision. We can conclude that localizing larger areas is feasible and can lead to further breast conservation. Further study of long-term outcomes is warranted.

Elevated Risk of Subsequent Endometrial Cancer After First Primary Breast Cancer According to Estrogen and Progesterone Receptor Status: A SEER Analysis

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Objective Elevated risk of a subsequent endometrial cancer after a primary estrogen receptor (ER)-positive breast cancer with tamoxifen treatment has been well-established. However, it is unclear whether such risk is further stratified by different subtypes of the breast cancer. For example, while ER-positive breast cancers are largely driven by hormonal stimulation, progesterone receptor (PR) status has been suggested to be indicative of growth factor sensitivity. The purpose of this population-based study is to evaluate whether patients who originally developed breast cancers of specific molecular subtypes exhibit a differential susceptibility to second malignancies in the endometrium due to potential environmental or inherent factors.
Methods Data were obtained from the Surveillance, Epidemiology, and End Results program (1992 to 2009). Standardized incidence ratios (SIRs) were calculated as the observed numbers of endometrial cancers among survivors of breast cancer compared with the expected numbers in the general population. Data were stratified by age at breast cancer diagnosis, latency periods, race, and calendar year of breast cancer diagnosis.
Results We identified a total of 2,044 patients who developed a second primary endometrial cancer among 289,933 invasive breast cancer survivors. The overall SIRs for subsequent endometrial cancers were significantly increased in all of the 4 subtypes (ER+PR+, ER+PR–, ER-PR+, and ERPR) of breast cancer. The elevated risks after these 4 breast cancer subtypes were shown in almost all of the latency periods except the first 6-11 months after breast cancer diagnosis. Further breakdown of age groups showed that the increased SIRs became significant in patients who were diagnosed for breast cancer after the age 40. Demographically non-Hispanic whites showed increased SIRs in all 4 subtypes of breast cancer, while the SIRs of Hispanic whites were not statistically elevated in any subtypes. The largest SIR was observed among Asian or American Indian women diagnosed with ER+PR– breast cancer (SIR, 3.24; 95% CI, 2.19–4.63).
Conclusion Here we showed that patients with previous history of invasive breast cancer have a higher risk of developing a subsequent endometrial cancer regardless of ER or PR status. This elevated risk was also noted in both premenopausal and postmenopausal patients. The increased risk in patients with hormone receptor-negative breast cancer raises concerns regarding possible shared etiological factors between these cancers, besides tamoxifen

treatment, that increase the susceptibility. Therefore, lower threshold for routine surveillance of endometrial cancer may be warranted in high-risk patients.

Subsequent Endometrial Cancer Among Invasive Female Breast Cancer Survivors According to ER and PR Status

Characteristic	Second Primary Endometrial Cancers in ER+PR+ Breast Cancer Survivors		Second Primary Endometrial Cancers in ER+PR- Breast Cancer Survivors		Second Primary Endometrial Cancers in ER-PR+ Breast Cancer Survivors		Second Primary Endometrial Cancers in ER-PR- Breast Cancer Survivors	
	Observed	SIR (95% CI)	Observed	SIR (95% CI)	Observed	SIR (95% CI)	Observed	SIR (95% CI)
Total no.	1427	1.59* (1.51-1.67)	244	1.45* (1.27-1.64)	63	1.84* (1.41-2.35)	310	1.37* (1.22-1.53)
Age at Breast Cancer Diagnosis, Years								
20-29	0	0 (0-17.19)	0	0 (0-86.14)	0	0 (0-165.95)	0	0 (0-17.19)
30-39	9	0.90 (0.41-1.71)	3	1.90 (0.39-5.54)	2	1.90 (0.23-6.85)	7	1.20 (0.48-2.48)
40-49	187	1.63* (1.41-1.88)	24	1.75* (1.12-2.60)	22	2.75* (1.72-4.16)	54	1.40* (1.05-1.83)
50-59	342	1.35* (1.21-1.50)	53	1.12 (0.84-1.46)	14	1.21 (0.66-2.04)	96	1.25* (1.01-1.53)
60-69	441	1.61* (1.47-1.77)	88	1.60* (1.28-1.97)	12	1.51 (0.78-2.63)	90	1.46* (1.17-1.79)
70+	448	1.81* (1.65-1.99)	76	1.49* (1.18-1.87)	48	2.29* (1.22-3.91)	63	1.46* (1.12-1.87)
Time Since Breast Cancer Diagnosis, Months								
6-11	70	1.14 (0.89-1.45)	16	1.30 (0.75-2.12)	3	1.71 (0.35-4.99)	18	1.13 (0.67-1.78)
12-59	616	1.52* (1.41-1.65)	98	1.25* (1.02-1.52)	21	1.69* (1.05-2.58)	127	1.29* (1.07-1.53)
60-119	508	1.68* (1.54-1.83)	100	1.83* (1.49-2.22)	24	2.01* (1.29-2.99)	103	1.41* (1.15-1.71)
120+	233	1.78* (1.56-2.02)	30	1.30 (0.88-1.85)	15	1.85* (1.41-2.35)	62	1.62* (1.24-2.08)
Race								
Non-Hispanic white	1154	1.55* (1.46-1.64)	194	1.42* (1.22-1.63)	55	2.07* (1.56-2.69)	217	1.28* (1.12-1.47)
Hispanic white	67	1.18 (0.92-1.50)	10	0.84 (0.40-1.55)	4	1.56 (0.42-3.99)	24	1.29 (0.82-1.91)
Black	77	1.80* (1.42-2.25)	10	0.96 (0.46-1.77)	2	0.78 (0.09-2.81)	48	2.04* (1.50-2.70)
Others	129	2.39* (1.99-2.84)	30	3.24* (2.19-4.63)	2	0.80 (0.10-2.88)	21	1.42 (0.88-2.17)
Calendar Year of Breast Cancer Diagnosis								
1992-1994	375	1.74* (1.57-1.92)	55	1.25 (0.94-1.63)	25	1.96* (1.27-2.90)	82	1.38* (1.10-1.72)
1995-1999	620	1.75* (1.61-1.89)	115	1.83* (1.51-2.19)	23	1.55 (0.98-2.32)	122	1.42* (1.18-1.69)
2000-2004	339	1.37* (1.23-1.53)	60	1.29 (0.98-1.65)	12	2.22* (1.15-3.88)	72	1.21 (0.95-1.53)
2005-2009	93	1.15 (0.93-1.41)	14	0.93 (0.51-1.57)	3	2.34 (0.48-6.85)	34	1.60* (1.11-2.23)

SIR, standardized incidence ratios
*P < 0.05; confidence intervals are 95%.

Fibroadenoma of the Breast: Is Serial Imaging or Excision Ever Indicated?

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Objective Current practice patterns endorse serial imaging of biopsy-proven fibroadenomas (FA), and subsequent excision of lesions that demonstrate growth, despite a low likelihood of associated malignancy. We evaluated practice patterns with respect to biopsy-proven FA at our institution to identify patients who would benefit from serial imaging and/or excision.

Methods Following IRB approval, a retrospective chart review identified 128 women with 135 biopsy-proven FA from 2008 to 2013. Patients were diagnosed by either palpation-guided fine needle aspiration (n = 132) or image-guided core biopsy (n = 3). Patients were subsequently recommended for serial imaging, surgical excision, or no further follow-up at the discretion of the treating surgeon. Outcomes were evaluated.

Results Of 128 patients, 51 underwent serial imaging, 35 underwent immediate surgical excision, and 42 had no routine follow-up. Of the 51 serial imaging patients, 37 had serial imaging alone with a median tumor growth of 0.1 cm (range,–1.59 to 0.7 cm). Fourteen of 51 underwent serial imaging followed by delayed surgical excision, with a median tumor growth of 0.3 cm (range, –0.3 to 1.6 cm). Documented reasons for delayed excision included growth (n = 9), pain (n = 2), patient choice (n = 2), and tumor size >2 cm (n = 1). Final pathology demonstrated benign fibroadenoma in all 14 patients. In total, 51 patients underwent 92 follow-up imaging studies for a total cost of $9,010 (excluding surgical costs). Of 35 patients who underwent immediate surgical excision, initial tumor size was larger compared to patients who had serial imaging or no follow-up (median, 2.1 cm vs 1.5 cm vs 1.65 cm, respectively; p = 0.01). Documented reasons for immediate excision included increased cellularity (n = 12), tumor size >2 cm (n = 11), patient choice (n = 7), atypia (n = 2), patient reported growth (n = 2), and pain (n = 1). Final pathology showed benign FA in 34 of 35 patients. One patient was found to have an invasive ductal carcinoma; this patient's biopsy showed a markedly cellular aspirate with dyshesion and cytologic atypia for which additional tissue biopsy was recommended. Of the 42 patients with no follow-up, 22 were not recommended for imaging follow-up by the treating surgeon and 20 were lost to follow-up despite recommendation for serial imaging.

Conclusion Patients with biopsy-proven FA who underwent serial imaging demonstrated little growth in the size of their lesions. All FA patients without atypia who underwent excision had benign pathology. Serial imaging for cytologic or core biopsy-proven FA is not cost-effective. Surgical excision of FA can be reserved for patients with atypia on needle biopsy.

Outcomes of Concurrent Breast and Gynecologic Risk Reduction Surgery

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Objective Women diagnosed with breast carcinoma and/or who have a deleterious cancer gene mutation, such as BRCA 1 or 2, face difficult management decisions, including risk-reduction surgery. The safety of combined breast and gynecologic surgery has not been well studied, especially in the setting of reconstruction. The outcomes for patients who have undergone coordinated multispecialty surgery are evaluated.

Methods A retrospective review of patients undergoing simultaneous breast and gynecologic (GYN) surgery for newly or previously diagnosed breast cancer and/or a BRCA gene mutation during the same anesthetic at a single institution from 1999-2013 was performed.

Results Seventy-three patients were identified with a mean age of 50 years (range, 27-88). The majority were Caucasian (77%) and 28 of 73 (38%) patients had an identified BRCA mutation. Indications for the breast surgery included breast carcinoma/ductal carcinoma in situ (DCIS) with a BRCA mutation, 22%; breast carcinoma/DCIS with a negative/unknown BRCA mutation, 18%; BRCA mutation, 10%; elevated breast cancer risk without mutation, 7%; breast carcinoma/DCIS only, 20%; preinvasive risk factor, 1%; and other (primarily reconstruction related), 22%. Indications for the gynecologic procedures included: BRCA mutation, 37%; risk reduction without mutation, 35%; benign gynecologic condition, 25%; and gynecologic cancer, 3%. Mastectomy was performed in 39 of 73 (53%) patients, the majority of whom (79%) underwent immediate reconstruction with implants (61%) or

autologous tissue (42%), with 1 patient having both. Lumpectomy was performed for 23% of patients and 23% had breast reconstruction–related surgery. Thirty-nine patients (53%) had axillary staging and 48 of 73 (66%) underwent bilateral procedures. The most common GYN procedures included laparoscopic or robotic hysterectomy with bilateral salpingo-oophorectomy (BSO), 29%; laparoscopic BSO, 19%; vaginal hysterectomy with BSO, 18%; dilatation and curettage, 18%; and open hysterectomy with BSO, 11%. Mean operative time was 5.6 ± 3.3 hours and ranged from 47 minutes (implant removal and laparoscopic BSO) to 14.5 hours (bilateral mastectomy with deep inferior epigastric perforator flap reconstruction and open TAH/BSO). Sixteen percent of the operations were outpatient. Mean hospital stay was 3.3 days. Eight patients had intraoperative complications: 7 had no long-term sequelae and 1 patient had total flap failure with subsequent placement of a tissue expander. A total of 29 (40%) patients developed postoperative complications. The most common complications included breast complications (seroma, 4%; hematoma, 3%), noninfectious reconstructive complications, 14%; and postoperative transfusion, 15%. Postoperative complications >30 days included 5 patients requiring seroma aspiration, 1 patient undergoing evacuation of a delayed breast hematoma, and 1 patient having an office I&D of an abdominal wall abscess. Three of 19 patients developed an infection related to a tissue expander/implant resulting in removal. No patients developed a venous thromboembolism.
Conclusion Combined breast and GYN procedures in patients for a breast cancer diagnosis and/or risk reduction can be accomplished with acceptable morbidity and a reasonable length of hospitalization. Concurrent operations including reconstruction, can be offered to patients who desire risk-reduction surgery with or without a diagnosis of cancer without impacting outcome and thereby facilitating their ability to complete their treatment in a timely manner.

A Community Outreach Program for Hereditary Breast and Ovarian Cancer (HBOC) Genetic Counseling: Analysis of Methods and Outcomes

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Objective Our prior cancer registry analysis demonstrated that only 23% of people with breast cancer and 5% of women with ovarian cancer received genetic counseling according to current NCCN criteria. We developed a community outreach program directed at uncounseled individuals identified by our analysis for risk assessment and counseling.
Methods Eight hundred forty-two individuals diagnosed with breast or ovarian cancer from 2001-2011 were identified for our outreach program. The outreach was initially conducted by mailing an explanatory letter, with a prepaid return postcard to the cohort. The postcard provided check boxes to indicate interest and preferred method of contact to schedule a risk assessment appointment. Our oncology project manager contacted individuals via phone who did not respond to the letter using a pre-approved script created by our genetic educators. Contact was attempted a maximum of 3 times per person. Individuals interested in genetic counseling were scheduled for appointments with our educators for hereditary cancer risk assessment. All professional provider staff were informed of the program with a letter describing the outreach program.
Results One hundred sixty-eight (20%) responses were received to our initial mailing and, of those, 89 (53%) were returned as undeliverable, creating an effective yield of only 79 people (9%). Direct contact by phone reached an additional 345 (42%) people. Overall 1,870 phone calls (avg, 2.5/patient) were made and 166 (20%) individuals had nonworking phone numbers. In total, we successfully contacted 424 people (51%). Of the individuals contacted, 233 (55%) refused genetic counseling and 100 (24% of those contacted and 12% overall) were scheduled for risk assessment. Subset analysis of 153 (66%) individuals who refused risk assessment and provided their rationale demonstrated: 47 (31%) had already received HBOC testing and declined further evaluation for panel testing; 47 (31%) were simply not interested; 20 (13%) moved out of state; and 17 (11%) were “too busy.”
Conclusion A retrospective review of cancer registry data identified 842 individuals with a history of breast or ovarian cancer who meet current criteria for HBOC genetic counseling and have not received this potentially lifesaving intervention. We designed an outreach program to inform these people of their need for genetic counseling. An initial mass mailing provided a low 9% yield and was compromised by inaccurate demographic data. Phone calls were more productive, more labor intensive, and limited by inaccuracies in data sources. Our outreach program strategy was labor-intensive and had a relatively low yield of 12% overall. Fifty-five percent of individuals contacted refused testing. Hopefully, lay appreciation of the benefits of genetic testing will evolve, and these individuals will be more inclined to reconsider testing. Alternative strategies employing criteria screening at follow-up with providers, or in the imaging department, need to be investigated. More importantly, we need to develop

strategies utilizing information technologies to capture people meeting criteria for hereditary cancer genetic testing at any intake into our health systems. We have instituted a prospective strategy to identify people for hereditary cancer genetic testing at weekly, prospective multidisciplinary breast cancer conferences and provided CME programs for primary care provider education on HBOC criteria.

The Influence of Radiology Image Consultation in the Surgical Management of Breast Cancer Patients

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Objective Patients referred to comprehensive cancer centers arrive with a range of clinical data requiring review. Additional radiographic studies are often requested, but the impact or value of radiology image consultation on breast cancer management remains unclear. We sought to identify the incidence of additional imaging requests by breast imagers and to evaluate the effect of additional imaging on the management of breast cancer patients.
Methods Between November 2013 and March 2014, 153 consecutive patients with a diagnosis of invasive or in situ carcinoma received formal second-opinion imaging reviews and surgical treatment at our cancer center. Data were prospectively collected on the number of additional imaging requests made, the number of fulfilled requests, the number of biopsies performed, the modality of additional imaging completed, and the number of patients whose management was altered due to additional imaging results. Change in management included conversion to mastectomy, conversion to breast conservation, neoadjuvant therapy, additional wire placement at breast conservation, and need for contralateral surgery.
Results Of 153 patients the mean age was 55; 98.9% were female; 23.5% (36) had in situ carcinoma (35 DCIS/ 1 LCIS); and 76.5% (117) had invasive carcinoma at initial consultation. Additional imaging was suggested for 47.7% (73/153) of patients in this group. After multidisciplinary consultation, 65.8% (48/73) of patients had additional studies performed. Second-opinion review resulted in biopsy in 43.7% (21/48) of patients. The additional imaging performed led to alterations in the preliminary treatment plans in 37.5% (18/48) of patients. (Figure 1)
Conclusion A detailed analysis of breast cancer patients who received second-opinion imaging reviews demonstrates the significant value this service has on clinical care management. Overall, 11.7% (18/153) of patients with breast cancer who underwent surgery at our center had changes in their management as a consequence of radiologic imaging review.

continues

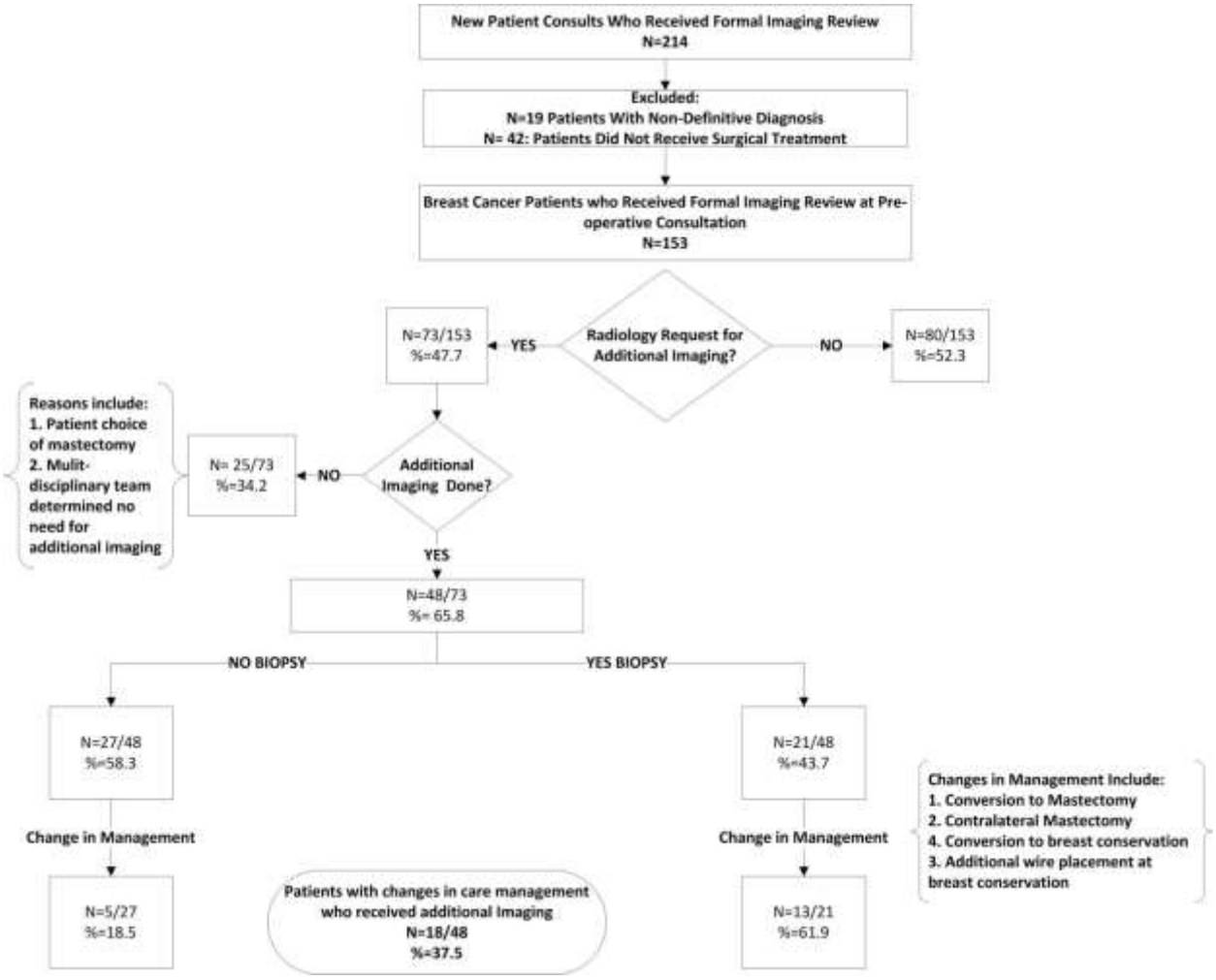

Figure 1. Flow diagram depicting impact of second opinion imaging reviews on management of breast cancer patients.

Factors Associated With Surgeons' Decisions to Refer Early-Stage Breast Cancer Patients to an Oncologist for Consideration of Neoadjuvant Therapy

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Objective Neoadjuvant systemic therapy (NST) is a treatment option for patients with early-stage breast cancer (EBC) and a standard of care for patients with locally advanced disease. The objective of this study was to understand the disease and patient characteristics that may influence a surgeon's decision to refer a patient with EBC to a medical oncologist for consideration of NST.

Methods A survey was developed and administered online to board-certified or board-eligible surgeons who had completed at least 30 mastectomies or lumpectomies to remove the primary breast tumor in EBC patients (stages 1–3) in the year before the survey. Respondents were asked about their practice, perceptions of NST, and how likely they would be to refer hypothetical patients with different individual and disease characteristics for NST. A stated-preference approach for measuring health preferences was used to quantify the relative importance of disease and individual characteristics in surgeons' NST referral decisions.

Results One hundred surgeons with an average of 17 years of experience in breast cancer surgery (median = 15,

standard deviation [SD] = 7) completed the survey in September 2014. The surgeons had completed an average of 144 lumpectomies or mastectomies in the previous year (median = 100, SD = 149). In the 6 months prior to the survey, respondents referred 48% of their early-stage breast cancer patients to a medical oncologist prior to surgery. Of these referrals, 77% were for consideration of NST. Nearly all respondents (97%) were familiar with clinical practice guidelines (unspecified) for breast cancer NST, 85% found the guidelines clear, and 91% believed the guidelines were supported by clinical evidence. Most respondents (87-94%) stated that they would refer patients for NST if their disease exhibited the following characteristics of aggressive disease: inflammatory breast cancer, skin/chest wall involvement, involved axillary lymph nodes by clinical assessment, triple-negative, and large tumor size. Also most respondents stated that a patient's age (74%) and overall health (75%) would be somewhat important or very important in their decision to refer a patient for NST. The percentage of surgeons who would be very likely to refer a case for NST increased with larger tumor size, positive HER2 status, and positive clinical lymph node status (all else being equal). Also most respondents (83%) agreed that NSTs are very effective in achieving pathological complete response (pCR), but only 44% of respondents knew that achievement of pCR is associated with improved patient survival.
Conclusion In a sample of experienced breast cancer surgeons, most were willing to refer patients for consideration of NST. The surgeons had high awareness of NSTs, their appropriate use, and perceived them to be effective. The willingness to refer patients varied with patient and disease characteristics. The awareness of the association between achievement of pCR and longer survival could be improved.

Fibroepithelial Breast Lesions Diagnosed by Core Needle Biopsy Demonstrate a Low Rate of Upstaging to Phyllodes Tumors on Excisional Pathology
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Objective Fibroepithelial lesions (FEL) of the breast require complete excision for accurate pathological diagnosis in order to differentiate between fibroadenoma and phyllodes tumor. The authors of this study have noted an increase of FEL on core needle biopsies (CNB) necessitating subsequent surgical excision and have hypothesized that a relatively small proportion of these lesions actually turn out to be malignant phyllodes tumors. Considering the major differences in natural history, prognosis, and treatment of fibroadenomas vs phyllodes tumors, the uncommon nature of FELs, and the limited amount of literature on this subject, the optimal clinical management of FELs diagnosed by core needle biopsy remains to be elucidated. The purpose of this study was to determine the rate of FELs on CNBs upstaged to phyllodes tumor on final excision pathology, as well as clinical and radiological factors associated with phyllodes tumor, in order to assess if surgical excision of FELs should be done routinely.
Methods A review of clinical, radiologic, surgical, and pathologic information obtained from medical records of patients diagnosed with fibroepithelial lesions on CNB at a single institution between 2010 and 2014 was performed.
Results Of 58 patients diagnosed with FEL on CNB, 34 patients underwent surgical excision (58.6%). From the 34 lesions excised, final pathology revealed 22 fibroadenomas (64.7%), 11 benign phyllodes tumors (32.4%), and 1 borderline phyllodes tumor (2.9%). No malignant phyllodes tumor was identified. Mammographic findings, including calcifications ($p = 0.50$) and mass size ($p = 0.89$), were not significantly associated with a final diagnosis of fibroadenoma or phyllodes tumor on excisional pathology. Breast ultrasound findings including lesion size ($p = 0.96$), shape ($p = 0.34$), and vascularity ($p = 0.13$) were not significantly associated with final diagnosis of fibroadenoma or phyllodes tumor on excisional pathology.
Conclusion The results of this study indicate that surgical excision of FELs diagnosed on CNB yield a pathological diagnosis of borderline phyllodes tumor <3% of the time. Given the small size of this study, additional studies would be required to confirm that the routine recommendation of excision of FELs should be reconsidered.

Is Post-Treatment Mammography Beneficial in Elderly Breast Cancer Patients?
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Objective Rates of local recurrence and contralateral breast cancer are declining among breast cancer survivors. The risk of death from other causes is high in elderly breast cancer survivors, raising questions about the benefit of routine mammography in this population. We sought to determine the rate of nonpalpable cancer detection and benign biopsy rates for follow-up mammograms in patients age 80 or older at diagnosis.
Methods Women aged 80 and older who underwent surgery for ductal carcinoma in situ or invasive breast cancer between 2005 and 2010 and who had at least 6 months of follow-up were identified from a single institution,

prospectively maintained HIPAA-compliant database. Patients undergoing bilateral mastectomies were excluded. Patients with mammographic, other imaging exam, or palpable abnormalities were identified and the results of their subsequent imaging studies and biopsies were reviewed. Number of patients with locoregional recurrence, contralateral cancer and benign biopsies was determined. Status at last follow-up and survival data were recorded.
Results Four hundred twenty-nine women with 440 breast cancers met our inclusion criteria. Average age at operation was 83.4 years. Mean follow-up was 50.0 months (range, 6-113). Three hundred seventy-nine (86.1%) cancers were invasive: 59.9%, stage I; 31.4%, stage II; 8.7%, stage III. Three hundred twenty-seven (74.3%) tumors were estrogen receptor positive (ER+). Patients had a median of 4 follow-up mammograms (range, 0-11). The 1,466 follow-up mammograms detected 17 biopsy-proven cancers and generated 18 benign biopsies, 2 of which led to surgical excision. In 313 women who underwent breast-conserving surgery, 21 (6.7%) experienced local recurrence (LR). Eighteen (5.8%) women had an isolated LR, 16 of which were invasive. Nine LRs were detected by mammography alone, and the other 9 were palpable. Mammographically detected LRs were a mean of 1.2 cm vs palpable abnormalities which were 2.0 cm. Of the 18 patients with isolated LR, 3 underwent completion mastectomy, 8 underwent repeat lumpectomy, 4 had no additional surgical treatment, mainly due to patient refusal, and 1 was lost to follow-up. Among 429 patients, 4 (0.9%) developed a contralateral breast cancer, all detected on screening mammogram alone. One hundred twenty women (27.9%) died during the follow-up period, 19 (4.4%) of breast cancer, 14 (3.3%) from other cancers, 3 (0.7%) from cardiovascular disease, and 83 (19.3%) of unknown causes. All 4 patients who developed contralateral breast cancers were alive at last follow-up.
Conclusion Local recurrences and contralateral breast cancers are uncommon in elderly breast cancer survivors and many are palpable. Thirteen nonpalpable cancers were detected in 1,466 mammograms (0.9%), and 1.2% of mammograms led to benign biopsies. While these figures are acceptable for screening programs in healthy populations, further study of the need for routine follow-up imaging in the elderly and the appropriate imaging interval is needed to maximize resource utilization.

A Comparison of the DUNE MarginProbe With Intraoperative Clinical and Radiographic Evaluation in Assessing Margin Status During Breast Conservation Surgery
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Objective Approximately 20%–30% of patients undergoing breast conservation surgery require re-excision for positive margins. The DUNE MarginProbe was developed to assist surgeons in the intraoperative assessment of surgical margins. The probe is designed to detect tumor cells within 1 mm of the surgical margin by measuring the differences in electrical properties of benign and malignant cells. Because it is expensive technology, we compared the DUNE MarginProbe to intraoperative clinical and radiographic evaluation to determine the device's accuracy and usefulness in reducing re-excision rates.
Methods A prospective, IRB-approved study consisted of 29 women with either ductal carcinoma in situ or invasive breast cancer undergoing breast conservation from 5/2014-10/2014. Upon completion of the segmental resection, the specimens were oriented and assessed clinically and radiographically in the operating room. The surgeon made his assessment of the margins, considering a positive margin as tumor on ink. Each margin was then marked and assessed with the DUNE MarginProbe, where a positive margin was any tumor cell within 1 mm. Any margin deemed to be positive by the surgeon or probe was excised unless the anterior margin was skin or the posterior margin was the pectoral muscle. Final margin status was assessed by pathology. Re-excision was determined to be necessary for margins with tumor on ink. Fisher exact test was used for statistical analysis.
Results Of the 174 margins evaluated, the surgeon made a correct assessment on 148 (85%), while the probe was correct in 97 (56%). The false-positive rate for the surgeon was 19 (11%) and 69 (40%) for the probe ($p < 0.001$). The false-negative rate for the surgeon was 8 (5%), while the false-negative rate for the probe was 8 (5%; $p = 0.08$). The surgeon's sensitivity was 33%, and his specificity was 88%. The sensitivity and specificity of the probe was 68% and 54%, respectively. The average tumor size was 1.3 cm (range, no tumor identified and 2.9 cm). Seven patients in the surgeon group had false-negative margins. Three margins were at the pectoral muscle and did not require re-excision. Three margins were anterior. One inferior margin was positive for lobular carcinoma in situ. One patient with a lateral positive margin had an ABLATE procedure, but would have otherwise required a re-excision. One patient had multiple positive margins and needed a mastectomy. The probe detected 1 anterior margin that prevented a re-excision, but missed 1 positive margin, making the re-excision rate equivalent at 17% between both groups.

Conclusion The DUNE MarginProbe was not able to reduce the re-excision rate in our study. Additionally, it had a significantly higher false-positive rate, resulting in a greater volume of tissue being excised, and it had an equivalent false-negative rate. In this study, the probe increased cost with little if any benefit over an intraoperative clinical and radiographic assessment by an experienced breast surgeon.

Breast Cancer Risk and Follow-Up Recommendations for Young Women Diagnosed With Atypical Hyperplasia and Lobular Carcinoma In Situ

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Objective The risk of breast cancer in young women diagnosed with atypical ductal hyperplasia (DH), atypical lobular hyperplasia (ALH), and lobular carcinoma in situ (LCIS) is not well defined, and screening and follow-up recommendations have not been established. The objectives of this study were to evaluate outcomes for young women with atypical breast lesions and to help determine guidelines for appropriate follow-up.
Methods A retrospective review of women under age 35 diagnosed with ADH, ALH, LCIS, and severe ADH from 1987–2009 at 3 institutions within 1 healthcare system was performed. Patient characteristics, pathology, and follow-up were determined from chart review
Results We identified 66 young women with atypical breast lesions. Three were excluded due to prior history of mantle radiation. Median age at diagnosis was 31 years (range, 19-34). Thirty-seven patients had ADH, 11 had ALH, 10 had LCIS, and 5 had severe ADH (aka borderline DCIS). Forty-four patients presented with a palpable mass, 8 had an abnormal screening mammogram, 9 had atypical breast lesions incidentally found at the time of reduction mammoplasty, and 2 presented with nipple discharge. Atypical breast lesions were diagnosed by core biopsy in 24 patients, excisional biopsy in 29, at the time of reduction mammoplasty in 9, and unknown in 1. Twenty-one of 63 (33%) young women had atypical within a fibroadenoma. Seven (11%) patients developed breast cancer at a median follow-up of 86 months (range, 1-298). Compared to the literature, this would be a relative risk of 9.05. Median time to cancer diagnosis was 90 months (range, 37–231). Four cancers were on the same side as the atypical lesion and 3 were on the contralateral side. Of these 7 cancers, 4 were IDC, 1 was ILC, and 2 were DCIS. Six of 7 cancers were ER+. Two of 7 cancers developed in patients with atypical lesion within a fibroadenoma. Of note, only 1 patient in the entire cohort took tamoxifen. (She did not develop cancer.) Two of 7 who developed cancer had BRCA testing that was negative. Four patients were treated with mastectomy and 3 patients had breast conservation. Cancer was detected by screening mammogram in 4 patients, by clinical exam in 2 patients, and detection method was unknown in 1 patient. In the entire cohort, 26 (41%) patients had screening mammograms as part of their follow-up. Thirteen patients had only clinical follow-up, and 20 had no additional follow-up at the breast center. Thirteen patients have had subsequent biopsies (the 7 cancers and 6 benign biopsies). Five patients underwent prophylactic mastectomy after their diagnosis of atypical breast lesion, 4 of whom had a positive family history.
Conclusion Young women with atypical breast lesions are at a markedly increased risk for developing breast cancer and should be followed closely. Based on our findings, we recommend annual screening mammography, close clinical follow-up, and consideration of MRI in this high-risk group of patients. The role of tamoxifen should also be reassessed, being cognizant of its teratogenic potential.

The Value of a Breast Cancer Screening Program at a Single Institution

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Objective We examined the true value of a breast screening program at our institution to determine its value in terms of diagnosing by different age groups. We wish to identify differences in recommendations in screening programs such as the United States Preventive Task Force (USPSTF) recommendations vs current screening guidelines by the American Cancer Society and comparing it to our institution. We investigated the issues of overdiagnosis and overtreatment in each category in order to develop a guideline that fits our institution.
Methods Using our mammography information system, we reviewed 58,488 patients who underwent their annual screening mammography from 2002 to 2014 at our institution's breast center. From this population, 13,848 patients had screening mammograms with BI-RADS 0, 4 or 5. We identified 1,753 patients who were biopsied, calculating sensitivity, specificity, positive-predictive value, (PPV1 = percentage of all screening examinations with abnormal findings), and accuracy.

Results A total of 58,488 patients underwent screening mammography. Of those, 13,848 patients who had a BI-RADS 0, 4, or 5 resulted, with 1,753 undergoing a biopsy. There were 145 (31.5%) patients in the 40- to 49-year age group that were biopsy-proven cancers. There were 859 false positives (FP 49%), 695 true positives (TP 39.6%), 81 false negatives (FN 4.6%), 118 true negatives (TN 6.7%). Sensitivity was 89.6%, specificity was 99.2%, and the PPV1 was 5.0 % (Table 1). These findings were compared with the National Performance Benchmark report from 2004 to 2009, showing a sensitivity of 84.9% (Benchmark goal, >85%), specificity of 90.3% (Benchmark goal, >90%), and PPV1 4.4 % (Benchmark goal, 5-10%).
Conclusion Despite current controversies of screening mammography, our data strongly support current screening guidelines, which resulted in diagnosing breast cancer in 145 (31.5%) patients within the 40–49 age group. These patients would not have been identified otherwise according to recommendations of the USPSTF guidelines. Further analysis is needed to determine downstream costs generated by the number of false positives.

Table 1. Screening Mammogram Totals for 2002 to September 2014, Advocate Christ Medical Center for Breast Care

Description	39 or Under	%	40-49	%	50-59	%	60-69	%	70-up	%	Total	%
Mammograms - Data based on screening exams												
MAMMOGRAPHY EXAMS = Exam type for age group / total exam types for age group												
Total Mammograms BI-RADS 1,2	4246	81.0	35011	86.3	37315	90.3	26511	91.1	24054	92.3	127137	89.3
Total Mammograms BI-RADS 3	169	3.2	461	1.1	275	0.7	233	0.8	158	0.6	1296	1
Total Mammograms BI-RADS 0,4's,5	829	15.8	5106	12.6	3727	9.0	2364	8.1	1851	7.1	13877	9.8
TOTAL MAMMOGRAPHY EXAMS	**5244**		**40568**		**41317**		**29108**		**26063**		**142300**	
TOTAL PATIENTS EXAMINED	**4166**		**17886**		**16392**		**11201**		**8843**		**58488**	
Findings & Analysis - Statistics reflect pathology radiologist 1												
BIOPSY FINDINGS = finding type for age group / total finding types for age group												
Benign	91	84.3	305	66.2	254	56.1	168	43.1	103	30.2	921	52.5
Malignant	15	13.9	145	31.5	182	40.2	212	54.4	232	68.0	786	44.8
High Risk Benign	2	1.9	11	2.4	17	3.8	10	2.6	6	1.8	46	2.6
TOTAL BIOPSY FINDINGS	**108**		**461**		**453**		**390**		**341**		**1753**	
REPORTED STATISTICAL ACCURACY OUTCOME = accuracy type for age group / total of all accuracy types for ALL age groups												
False Positive	83	4.7	277	15.8	241	13.7	160	9.1	98	5.6	859	49.0
True Positive	12	.7	120	6.8	162	9.2	189	10.8	212	12.1	695	39.6
False Negative	3	.2	22	1.3	18	1.0	20	1.1	18	1.0	81	4.6
True Negative	10	.6	42	2.4	32	1.8	21	1.2	13	.7	118	6.7
TOTAL	**108**	**6.2**	**461**	**26.3**	**453**	**25.8**	**390**	**22.2**	**341**	**19.5**	**1753**	**100.0**
SENSITIVITY = true positives for age group / (true positives + actual false negatives) for age group												
ADJUSTED SENSITIVITY = true positives for age group / (true positives + (2 x actual false negatives)) for age group												
True Positive	12		120		162		189		212		695	
False Negatives	3		22		18		20		18		81	
SENSITIVITY		**80.0**		**84.5**		**90.0**		**90.4**		**92.2**		**89.6**
ADJUSTED SENSITIVITY		**66.7**		**73.2**		**81.8**		**82.5**		**85.5**		**81.1**
SPECIFICITY = # of mammos for age group / (# of mammos + true negatives + false positives) for age group												
# of mammos (BI-RADS 1,2)	4246		35011		37315		26511		24054		127137	
True Negatives	10		42		32		21		13		118	
False Positives	83		277		241		160		98		859	
SPECIFICITY		**97.9**		**99.1**		**99.3**		**99.3**		**99.0**		**99.2**
POSITIVE PREDICTIVE VALUE = true positives: for age group / (# of mammos BI-RADS 0,4's,5) for age group (PPV1)												
True Positives	12		120		162		189		212		695	
# Of Mammos BI-RADS 0,4's,5	829		5106		3727		2364		1851		13877	
POSITIVE PREDICTIVE VALUE		**1.4**		**2.4**		**4.3**		**8.0**		**11.5**		**5.0**

Should New "No Tumor on Ink" Lumpectomy Margin Guidelines Be Applied to Ductal Carcinoma In Situ (DCIS)? A Retrospective Review Using Shaved Cavity Margins

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Objective The 2014 guidelines endorsed by the SSO, ASBrS, and ASTRO advocate "no tumor on ink" as the new margin standard for breast-conserving therapy (BCT) for invasive cancer. However, no clear consensus exists for margins in lumpectomies for pure DCIS and concerns have been raised that the growth pattern of DCIS might require wider clear margins. To address the implications of applying the new margin guidelines in DCIS patients, we reviewed lumpectomies for DCIS in our shaved cavity margins database. We correlated margin width on the main lumpectomy specimen with rates of residual DCIS seen in the shaved cavity margins taken at the time of lumpectomy.
Methods We retrospectively reviewed lumpectomies with complete shaved cavity margins for pure DCIS at our institution from 2004-2007. We excluded patients with microinvasive cancer, multifocal disease requiring multiple wires, and incomplete margin data. We determined rates of residual disease in shaved margins based on margin status of the main lumpectomy specimen using margin widths of "tumor on ink", ≤ 1 mm, 1–<2 mm, and ≥ 2 mm.
Results One hundred eighty-three women undergoing lumpectomy for pure DCIS met eligibility criteria. Median age was 54 years (range, 37-92). Twenty-five percent were grade 1, 34% were grade 2, 38% were grade 3, and 3% did not have grade status recorded. 79% received radiation therapy and 37% received endocrine therapy. 17% of the

main lumpectomy specimens had "tumor on ink," 43% had margins ≤ 1mm but with no tumor on ink, 9% had 1–<2 mm margins and the remaining 31% had margins ≥ 2 mm. In patients with "tumor on ink" in the main lumpectomy specimen, 88% had residual disease in the shaved cavity margins compared to 49% for margins <1 mm (but not on ink) and 63% for margins 1–<2 mm. Rates of residual disease in shaved cavity margins for all main lumpectomy margins of <2 mm (but not on ink) were 50%, compared with 14% for main lumpectomy margins ≥ 2 mm (p value < 0.0001 using Fisher exact test). With respect to volume of residual disease, lumpectomy specimens with narrower margins were more likely to have residual disease in 2 or more shaved cavity margins. Forty percent of patients with "tumor on ink," 25% of patients with margins <2 mm, and only 7% of patients with margins ≥ 2 mm had residual disease in 2 or more shaved cavity margins (p value < 0.0001 using Fisher exact test).
Conclusion Application of new "no tumor on ink" lumpectomy margin guidelines to patients with pure DCIS results in a significant increase in rates of residual disease left in cavity margins compared with use of a ≥ 2 mm margin standard. Although our data do not allow us to determine the impact of this additional residual disease on local recurrence rates, they suggest that caution should be used in extrapolating the new margin guidelines to patients with pure DCIS.

Long-Term Psychosocial Functioning and Perceived Breast Cancer Risk in Women With Bilateral Prophylactic Mastectomy: Does Type of Prophylactic Mastectomy Make a Difference?
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Objective Bilateral prophylactic mastectomy (PM) is the most effective way to prevent breast cancer in women with a BRCA mutation. Various types of PM are available, including skin-sparing, nipple-sparing, and areola-sparing. There is concern that there may be residual breast cancer risk remaining if the nipple and areolar complex are not removed. However, it is unclear if this has any impact on long-term psychosocial functioning. In the current study, we evaluate if type of PM impacts on long-term psychosocial functioning, quality of life, and subjective personal breast cancer risk estimates in women with bilateral prophylactic mastectomy.
Methods Women who had undergone a bilateral prophylactic mastectomy in North America between January 1, 2002, and June 30, 2014, were identified through hospital procedure billing codes and cancer genetics research databases. Participants completed validated psychosocial questionnaires that included the Impact of Event Scale, Hospital Anxiety and Depression Scale, Decision Regret Scale, Satisfaction with Decision Scale, and BREAST-Q.
Results One hundred and twenty-six women completed the study; 43 (34%) had nipple-sparing PM, 6 (5%) had areola-sparing PM, and 77 (61%) had skin-sparing PM. The mean age at time of surgery was 41.6 years (range, 24-69 years), and questionnaires were completed a mean of 51 months (range, 3-148 months) after PM. There were no differences between the 3 groups in age at PM (p = 0.19), marital status (p = 0.32), or education (p = 0.20). Women with skin-sparing PM had significantly longer times between PM and questionnaire completion (mean, 59 months) than those with nipple-sparing PM (mean, 41.1 months) and areola-sparing PM (mean, 26.2 months). In univariate analyses, there were no differences between the 3 groups in mean scores for total cancer-related distress (IES) (p = 0.87), anxiety (p = 0.83), depression (p=0.10), or perceived risk of developing breast cancer after PM (p = 0.90). Women with skin-sparing PM reported significantly lower levels of satisfaction with breasts (p = 0.005), satisfaction with outcome (p = 0.001), psychosocial well-being (p = 0.05), and sexual well-being (p < 0.001) than those with nipple-sparing PM or areola-sparing PM. Overall, the mean level of decision satisfaction was 92.1 (range, 0-100) and the mean level of decision regret was 8.49 (range, 0-65). There were no significant differences in decision regret (p = 0.24) or satisfaction with decision (p = 0.44) between the 3 groups.
Conclusion Women with PM have high levels of satisfaction with decision to have PM and low levels of decision regret. There are no differences in cancer-related distress, anxiety, depression, or perceived risk of breast cancer after PM when comparing women with nipple-sparing, areola-sparing, or skin-sparing PM. However, women with skin-sparing PM have lower levels of satisfaction with breasts, satisfaction with outcomes, psychosocial well-being, and sexual well-being than women with nipple-sparing or areola-sparing PM. Long-term outcomes of various types of PM should be discussed with women considering PM so that women can make an informed decision regarding the type of PM.

Clinicopathologic Analysis of Encapsulated Papillary Carcinomas of the Breast Confirms a Favorable Prognosis

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Objective Encapsulated papillary carcinomas are a subtype of breast cancer that is not well represented in the literature. Subtle histologic characteristics and variations in nomenclature can result in confusion regarding diagnosis and treatment. As a result, the optimal treatment approach and clinical outcome for this diagnosis has not been well delineated. We sought to describe the clinical and pathologic features of solid papillary breast cancer and determine their influence on patient outcomes.
Methods A prospectively maintained institutional database containing 18,087 surgical cases performed between 2000 and 2013 was used to identify patients diagnosed with encapsulated papillary breast carcinoma with and without stromal invasion. Forty-eight cases of encapsulated papillary carcinoma with either a solid papillary or conventional papillary features were identified. Clinical and pathologic features were reviewed and statistically analyzed.
Results The mean age at diagnosis was 60 years. Of these patients, 46% had clinical T1 tumors and 33% had T2 tumors, with only 6% having evidence of nodal involvement at presentation. The vast majority of cases were ER-positive (75%) and low to intermediate nuclear grade (75%), while only 4% were triple negative and 19% had lymphovascular invasion present. Surgical management included total mastectomy in 58% and sentinel lymph node (SLN) dissection in 88%, of whom 10% had a positive SLN. Thirty-one percent were treated with systemic chemotherapy. With an average follow up of 79 months, 5 patients experienced disease recurrence with an average time to recurrence of 30 months. Of those, 2 had distant recurrence and 3 had local-regional recurrence. Five-year overall survival was 94% and disease-specific survival was 98%. One patient death was due to breast cancer.
Conclusion The current study represents the largest single-institution series of patients with encapsulated papillary carcinomas. This histology is a distinct form of breast cancer with favorable clinical and histopathologic features and excellent treatment outcomes. As a result, a more selective use of chemotherapy may be considered by integrating contemporary molecular prognostic factor analysis.

Utility of a 21-Gene Assay in the Management of Synchronous Bilateral Breast Cancer

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Objective Synchronous bilateral breast cancer has been shown to portend a poor prognosis compared to similar stage metachronous disease. Adjuvant chemotherapy is used to mitigate this risk and the 21-gene assay (ODX) Recurrence score (RS) has been used in unilateral breast cancer to guide recommendations. Synchronous bilateral breast cancer can demonstrate different phenotypic lesions in the same patient. To date there have been no reports that describe the use of ODX in these patients (pts). This study analyzed the use of the RS result to guide adjuvant treatment decisions in pts presenting with synchronous bilateral breast cancer.
Methods This is an IRB-approved review of a prospective database of pts receiving ODX on initial primary breast cancers, including pts with synchronous, bilateral disease. Data collected included demographics, primary operation, margin status, receptor status, RS, adjuvant treatment, recurrence, and survival. Pts were stratified as low risk (RS < 18), intermediate risk, or high risk (RS > 30). The primary focus was to compare pts in whom ODX was used for both lesions to those in whom ODX was used for only 1 cancer.
Results From 2003 to 2009, an RS result was obtained on 614 pts, 21 of whom presented with synchronous bilateral breast cancer. The median follow-up was 2.9 yr (range, 0.1-9.7), the median age was 58 yr (range, 27–84), and the median tumor size was 1.5 cm (range, 0-9) in this cohort. A single ODX was performed in 13 pts with a mean RS of 18 with 6 (46%) low-risk pts, 6 (46%) intermediate-risk pts, and 1 high-risk pt. ODX was performed on both lesions in 8 pts with a mean RS of 14.9, with 5 (63%) concordant (same RS category for both lesions) low-risk pts and 3 (37%) pts with discordant (low and intermediate) disease by RS. Only 1 of 3 discordant pts received chemotherapy.
Conclusion The RS result is known to predict distant recurrence at 10 yrs in historical datasets but has not been described in pts with synchronous bilateral breast cancer. In this prospective series using ODX to guide adjuvant chemotherapy recommendations, the discordant RS altered recommendations in just 1 patient with bilateral,

synchronous disease, but was not statistically significant. Therefore, the utility of performing ODX on both lesions to guide adjuvant treatment recommendations is not supported by this experience. Rather, ODX can safely be used on a single lesion to guide treatment decisions.

Variable	Unilateral	Bilateral w/1 ODX Score	Bilateral w/2 ODX Score	p-value
Recurrence score	n = 593; 16 [0,63]	n = 13; 18 [6,37]	n = 8; 14 [6,23]	0.7663
Age (yr)	n = 584; 58 [27,84]	n = 13; 66 [43,77]	n = 8; 63.5 [44,70]	0.1728
Size (cm)	n = 556; 1.5 [0,9]	n = 13; 1.5 [1.1,2.1]	n = 8; 2.05 [1.1,2.6]	0.3857
Follow-up (yr)	n = 592; 2.88 [0.1,9.7]	n = 13; 3.84 [1.3,6.8]	n = 8; 3.1 [1.3,5.8]	0.2196
n; median [range]				

Radiotherapy Does Not Increase Implant/Expander Loss in Breast Cancer Patients Who Underwent Immediate Breast Reconstruction

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Objective The introduction of techniques, including skin-sparing mastectomy and nipple-areola sparing mastectomy, has improved the aesthetic outcome of oncological breast surgery and immediate reconstruction. The aim of this study is to analyze our experience regarding the effect of adjuvant radiotherapy on complication rates among patients who underwent mastectomy with immediate reconstruction.

Methods From January 2007 to October 2014, 96 mastectomies of 84 patients who referred to our clinic with the diagnosis of breast cancer and those who underwent immediate breast reconstruction with implant/expander were analyzed retrospectively. Patient's demographic data, complications, and implant/expander loss rates were examined.

Results Median age of the patients was 40 (20–74). Fourteen patients were >50 (17%), 70 were ≤ 50 (83%). The median follow-up period was 30 (3-100) months. Thirty-one patients have family history of breast cancer (37%). Of 84 patients, 12 (14%) underwent bilateral mastectomies and, therefore, 96 mastectomies with immediate breast reconstruction were performed. Four of 12 patients with bilateral breast reconstruction had contralateral breast cancer and the remaining 8 patients underwent prophylactic contralateral breast reconstruction. Of the 96 mastectomies, 49 were skin-sparing (SSM) (51%), 46 were nipple-areola sparing (NSM) (48%), and 1 was areola sparing (ASM) (1%) by video endoscopic assistance in 13 mastectomies. Expander was placed in 74 (77%) mastectomies and implant was placed in 22 (23%) mastectomies in the immediate breast reconstruction. Early-stage breast cancer was determined in 71 of 84 patients (85%) (DCIS, n = 6; Stage 1, n = 18, Stage 2, n = 47). Thirty-two patients were luminal A (38%) and 37 patients were luminal B (44%), whereas there were 6 patients with triple-negative (7%) breast cancer; and 8 patients with nonluminal HER2 positivity (8%). Fifty-five patients had adjuvant chemotherapy (65%), 40 patients had adjuvant radiotherapy (48%), and 62 patients had adjuvant hormonotherapie (74%). Expander was most likely preferred in patients undergoing radiotherapy (n = 36; %90). Complications occurred due to immediate breast reconstruction in 21 of 96 mastectomies (22%). No significant difference could be found in implant/expander loss rates and minor and major complication rates between mastectomies with or without radiotherapy (implant/TE loss rates: RT(-), 14.3%, vs RT(+), 15%, p = 0.92, and complication rates: (RT(-), 21.4%, vs RT(+), 22.5%, p = 0.90, respectively). Complications included implant/expander complications (11%), wound infection (4%), incision necrosis (2%), and partial incision dehiscence (1%). Of 43 patients who underwent NSM, partial nipple-areola complex necrosis occurred in 4 patients (9%). Implant/expander was removed in 14 patients (16%) due to implant/expander complications (n = 9), or secondary to wound infection (n = 3), or secondary to partial dehiscence (n = 1), or secondary to expander extrusion due to mastectomy flap necrosis (n = 1).

Conclusion Complication and implant/expander loss may occur in patients who underwent mastectomy with immediate breast reconstruction. In terms of complications and prosthesis removal, adjuvant radiotherapy does not constitute a significant difference compared to those not receiving radiotherapy. Implant/expander infection secondary to wound infection affects implant/expander removal. Considering the complications and implant/expander losses, immediate reconstruction can be safely applied for selected patients with cosmetic satisfaction.

Promising Oncological and Clinical Outcome in Breast Cancer Patients Undergoing Nipple- or Skin-Sparing Mastectomy With Immediate Reconstruction

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Objective Recent studies reported favorable oncological outcome along with acceptable complication rates in patients who underwent immediate breast reconstruction following mastectomy. The aim of this study is to analyze and share our experience among patients who underwent immediate breast reconstruction with tissue expander (TE) or implant placement following nipple- or skin-sparing mastectomy.

Methods From January 2007 to January 2013, 57 mastectomies of 51 patients who referred to our clinic with the diagnosis of breast cancer and those underwent immediate breast reconstruction with implant/expander were analyzed retrospectively. Patient's demographic data, molecular tumor subtypes, complications, and TE/permanent implant loss rates were examined.

Results Median age of the patients was 42 (20–74). The majority of patients were younger than 50 (n = 39, 76%). The median follow-up period was 48 (25–98) months. Of the 57 mastectomies, 41 were skin-sparing (SSM) (72%) and 16 were nipple-areola-sparing (NSM) (28%), including 2 cases with videoendoscopic assistance. TE was used in 45 (79%) mastectomies and implant was placed in 12 (21%) mastectomies. Early-stage breast cancer was determined in 47 of 51 patients (82%) (DCIS, n = 5; stage 1, n = 13; stage 2, n = 29). Of 46 patients with invasive breast cancer, 22 were luminal A (48%) and 17 were luminal B (37%), 6 patients were nonluminal HER2 (13%) and 3 patients were triple-negative breast cancer (7%). Six patients received neoadjuvant chemotherapy, whereas the remaining 34 patients had adjuvant chemotherapy (74%) and 22 patients (48%) received postmastectomy radiation. As a policy, the majority of the patients who will be treated with chest wall irradiation (n = 19; 86%) received TE placement after neoadjuvant chemotherapy or before adjuvant chemotherapy to be replaced with permanent implants followed by RT. Complications occurred due to immediate breast reconstruction in 10 of 57 mastectomies (17%). Median time of onset of complications is 8th (1–156) week. Five patients had implant/expander complications (9%), 2 patients had partial nipple-areola necrosis (4%), 1 patient had wound infection (2%), 1 had incision necrosis (2%), and 1 had partial incision dehiscence (2%). Partial nipple-areola complex necrosis was seen in 2 of 16 NSM (12%). Implant/expander was removed in 6 patients due to various reasons (12%). Four were due to implant/expander complications, 1 was secondary to wound infection, and 1 was secondary to partial dehiscence. Median removal time of the implants/expanders was 32nd week (2–156). Systemic disease was determined in 4 patients during their follow-up (7%) and 1 of them also had local recurrence. Overall 5-year survival of 51 patients was 93%. Disease-specific survival and disease-free survival of patients were 95.5% and 90%, respectively.

Conclusion Considering the long-term complication and TE/implant loss rates, immediate breast reconstruction can be safely applied in patients undergoing SSM or NSM. Furthermore, our results demonstrate that patients, especially with luminal type breast cancer undergoing SSM/NSM with immediate breast reconstruction, show a favorable survival outcome when treated by contemporary multidisciplinary oncological management.

Access to BRCA Testing Among a Population-Based Sample of Young Black Women

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Objective Concerns about the potential for genomic advances to increase health disparities have been raised. We sought to assess factors associated with access to BRCA testing in a population-based sample of young Black women with invasive breast cancer recruited through the Florida state cancer registry.

Methods Black women diagnosed with invasive breast cancer (BC) < age 50 in 2009–2012 were recruited through the Florida State Cancer Registry 6–18 months following diagnosis and completed a baseline questionnaire. Summary statistics and logistic and probit regression were used to examine associations between demographic variables and access to GC and testing at enrollment.

Results All 440 participants met national criteria for referral for genetic counseling, yet 216 (49%) were never offered genetic counseling or BRCA testing. Variables positively associated with receiving testing included private health insurance, younger age, higher household income, and genetic counseling appointment attendance (all $p < .01$). Although there was no significant direct effect of referral for genetic counseling on testing, there was a significant indirect effect which was mediated by genetic counseling ($p < .001$).

Conclusion The population-based study design provides a more accurate estimate of genetic services access compared to other designs and results suggest efforts are needed to improve access to genetic services among high-risk black women. Furthermore, referrals by healthcare providers were a key determinant in genetic counseling attendance. Even among an ethnic minority population, disparities in access to genetic testing exist and they appear to be due, at least in part, to socioeconomic factors and referral patterns of physicians.

Results of Z1071: Impact of Results on Patient Care and Surgical Decision-Making

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Objective Axillary management in the surgical treatment of breast cancer continues to evolve. The ACOSOG Z1071 (Z1071) trial assessed the feasibility of performing a sentinel lymph node biopsy (SLNB) in node-positive patients who had completed neoadjuvant chemotherapy (NACT). Z1071 demonstrated that with attention to technique and patient selection, an SLNB was feasible and could be performed with a similar false-negative rate in node-positive patients as in node-negative patients. Historically, adoption of clinical research into practice takes on average 17 years.[1] However, findings from the ACOSOG Z0011 trial were adopted within 2 years of publication.[2,3] We sought to determine whether the results of Z1071 influenced our practice.
Methods This is a retrospective review of a single institution's practice as influenced by the results of Z1071. Patients with biopsy-proven involvement of axillary lymph nodes prior to NACT were eligible for the study. After completion of NACT, patients with nodal response by imaging and exam were felt to be candidates for SLNB. SLNB was performed using both blue dye and radiotracer. Two patient cohorts were stratified by diagnosis date before or after Z1071 results were presented on December 5, 2012, at the San Antonio Breast Cancer Symposium. Patients diagnosed between January 11, 2008, and December 4, 2012, were considered pre-Z1071 and those diagnosed between December 5, 2012, and May 30, 2014, were considered post-Z1071. Patients diagnosed between December 1, 2009, and July 7, 2011, were accrued for the trial and were excluded. Fisher exact tests and ANOVA tests were used to compare our practice behaviors prior to the Z1071 study and after presentation.
Results The overall analysis included 129 patients. Seventy-three patients were in the pre-Z1071 cohort and 56 patients in the post-Z1071 cohort. The average age was 52 years for the pre-Z1071 group and 54 years for the post-Z1071 group ($p = 0.29$). Median follow-up time was 29 months for pre-Z1071 and 7 months for post-Z1071. No patient underwent SLNB in the pre-Z1071 group. Of the patients in the post-Z1071 cohort, 73.2% underwent an SLNB with an average of 4.1 nodes removed per patient. Axillary pCR in the pre-Z1071 (ALND) cohort was 37% and in the post-Z1071(SLN) cohort was 29% ($p = 0.19$). In-breast, regional, and distant recurrence rates in the pre-Z1071 group were 5.5%, 2.7%, and 21.9%, respectively (median follow-up, 29 months). In-breast, regional, and distant recurrence rates in the post-Z1071 group were 1.8%, 0%, and 3.6% (median follow-up, 7 months).
Conclusion Our data demonstrates the rapid change in practice generated by the ACOSOG Z1071 trial, which potentially spares many women the morbidity of complete axillary dissection in the setting of N1 disease. While promising, rapid adoption of clinical trial data should be accompanied by careful patient selection and monitoring of institutional outcomes.

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Low Locoregional Recurrence Rates After Neoadjuvant Therapy Followed by Small Surgical Resection Volume and Intraoperative Radiotherapy

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Objective Biological features and tumor response may influence local control in patients treated with neoadjuvant therapy (NAT). Aim of the study was to evaluate the effect of surgical resection volume and intraoperative radiotherapy (IORT) on locoregional recurrence (LR) in patients treated with breast conservation.
Methods We analyzed data from 208 consecutive patients treated with breast-conserving surgery and radiotherapy after NAT for locally advanced breast cancer. Of those, 108 patients received IORT followed by whole-breast irradiation and 50 patients had conventional radiotherapy (whole-breast irradiation and boost). Surgical resection volumes (RV) were calculated and categorized as small or large RV. Locoregional recurrence rates (LRR) were calculated in association with resection volume and type of radiotherapy.
Results After a median follow-up of 6.4 years locoregional recurrence (LR) was observed in a total of 19 patients (9%) and in-breast recurrence in 6 patients (2.9%). The median RV was 110 cm^3. Overall, recurrence rates were not statistically significant after small- (<110 cm^3) vs large- (>110 cm^3) resection-volume surgery ($p = 0.47$). LRR was significantly higher in patients <50 years old ($p = 0.009$) and in triple-negative breast cancer subtype ($p = 0.001$). The 5-year outcome after pathological complete response (pCR) was excellent irrespective of the extent of surgery. In patients with considerable residual disease, higher recurrence rates were observed but this was not associated to the extent of surgical resection (1% LRR for small RV vs 3% LRR for large RV). LRR after breast-conserving surgery followed by IORT was only 8%, not significantly different compared to patients treated with conventional radiotherapy (12%) ($p = 0.29$). For patients with considerable residual disease treated with IORT, there was no significant difference in LRR in comparison to patients receiving conventional radiotherapy (2.4% vs 1.4%).
Conclusion Less aggressive surgery and the use of intraoperative radiotherapy are associated with a low locoregional recurrence rate and may be considered as an option for local treatment after NAT.

Preoperative Antibiotics Do Not Reduce Postoperative Infections Following Needle-Localized Lumpectomy

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Objective The American Society of Breast Surgeons position statement on antibiotics and surgical site infection recommends a preoperative prophylactic dose of an antibiotic prior to needle-localized lumpectomy for cancer or prior to any excisional biopsy if risk factors are present, but it is unclear if this practice reduces the rate of infection. The aim of this study is to determine if antibiotic administration reduces wound infection for needle-localized lumpectomy.
Methods A retrospective chart review of patients who underwent needle-localized lumpectomy from 2010–2012 was conducted. Data regarding patient demographics, co-morbid conditions, medical history, operative details, and pathology were collected. Surgical infections requiring opening of the wound or treatment with antibiotics were documented if occurred during the first 3 months following surgery. Fisher exact tests were used for statistical analyses.
Results Two hundred twenty patients were identified. Eighty of 220 (36%) received preoperative prophylactic antibiotics. The antibiotic and the nonantibiotic group were similar in age, body mass index, tobacco use, history of radiation, history of neoadjuvant chemotherapy, duration of surgery, duration needle in place, and pathology. Four of 220 patients (1.8%) had wound infections. Three of 140 (2.1%) of patients in the nonantibiotic group had infections vs 1 of 80 (1.3%) in the antibiotic group ($p = 0.54$). In an analysis of patients who developed infections ($n = 4$) and patients that did not ($n = 216$), there was no statistically significant difference in patient demographic, duration of surgery, duration of time needle in place, or pathology (see Table 1).
Conclusion The above data show a low rate of postoperative infection (1.8%) for needle-localized lumpectomy, and antibiotic administration does not significantly reduce this low rate of infection. To the authors' knowledge, no data are available to answer the question of whether the infection rate is influenced by the time that the needle spends in the breast prior to excision. Our analysis showed no significant difference in infection rate, leading to the conclusion that it is safe to discontinue the use of antibiotics prior to needle-localized lumpectomy and avoid the cost of the medication, patient adverse reactions, and increase in resistant organisms. The fears that longer wait times for

surgery and more exposure to the needle lead to higher infection rates have not been justified by the data reviewed in this paper.

Table 1. Analysis of Risk Factors Between Patients Who Had Postoperative Infections and Those Who Did Not Following Needle-Localized Lumpectomy

Characteristic	No infection (n = 216)	Infection (n = 4)	P value
Age >65 years old	71% (154/216)	75% (3/4)	0.68
Body mass index >30 kg/m^2	51% (110/216)	50% (2/4)	0.68
Tobacco use	14% (30/210)	0% (0/3)	0.63
Diabetes mellitus	20% (42/215)	50% (2/4)	0.18
Radiation	2% (4/214)	0% (0/4)	0.93
Neoadjuvant chemotherapy	2% (5/214)	0% (0/4)	0.91
Re-excision	13% (27/214)	25% (1/4)	0.43
Duration surgery >45 min	98% (208/213)	0% (0/4)	0.91
Needle in place >90 min	100% (215/216)	0% (0/4)	0.98
Malignant pathology	38% (81/216)	50% (2/4)	0.49
Received antibiotics	37% (79/216)	25% (1/4)	0.54

Does a Positive Axillary Lymph Node Needle Biopsy Predict High Nodal Disease Burden and the Need for an Axillary Lymph Node Dissection in Clinically Node-Negative Breast Cancer Patients in the ACOSOG Z0011 Era?

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Objective ACOSOG Z0011, which established the safety of sentinel lymph node biopsy (SLNB) alone for women with 1-2 positive sentinel lymph nodes undergoing breast conservation, defined clinical node negativity by physical exam alone. However, some studies suggest that axillary ultrasound (US) and needle biopsy can appropriately allocate node-positive women to axillary lymph node dissection (ALND), avoiding an SLNB. Although axillary US with biopsy has a positive predictive value for lymph node (LN) metastases approaching 100%, it may not appropriately identify clinically node-negative women with high nodal disease burden who require ALND. We sought to identify the total number of positive LNs at the time of axillary surgery in women presenting with cT1-2N0 invasive breast carcinoma with a positive preoperative LN biopsy to evaluate the potential for overtreatment when ALND is performed on the basis of a positive needle biopsy in patients who otherwise meet ACOSOG Z011 eligibility criteria.

Methods Patients with cT1-2N0 breast cancer by physical exam with a positive preoperative axillary LN biopsy were identified from a prospective institutional database. Patients undergoing neoadjuvant chemotherapy were excluded. Clinical nodal status was confirmed by chart review. Patient characteristics, type of axillary surgery, and the total number of positive LNs in women with metastases on a preoperative LN biopsy were determined. Clinicopathologic characteristics were compared between women with 1–2 total positive nodes and ≥ 3 total positive nodes.

Results Between 5/2006 and 12/2013, 152 women with cT1-2N0 breast cancer by physical exam had abnormal axillary imaging and a positive preoperative axillary LN biopsy (median patient age: 51 yr, median tumor size: 2.4 cm, 86% ductal histology, 79% estrogen receptor positive). Seventy-four (49%) women had 1–2 total positive LNs, 78 (51%) had ≥ 3 total positive LNs. Table 1 compares the clinicopathologic features between these 2 groups. Women with >3 total positive LNs had larger tumor size (2.4 vs 2.2 cm, p = 0.04), fewer tumors with ductal histology (79% vs 93%, p = 0.03), and more lymphovascular invasion present (78% vs 59%, p = 0.01).

Conclusion Among clinically node-negative breast cancer patients with a positive preoperative axillary LN biopsy, half had only 1–2 total positive axillary LNs and therefore would not require ALND if treated according to Z0011 criteria. Axillary imaging with preoperative LN biopsy does not accurately discriminate low- vs high-volume nodal disease in clinically node-negative patients. Furthermore, because the Z0011 trial safely omitted ALND in women

with 1–2 positive sentinel LNs, not total positive LNs, these results may be an underestimate of the proportion of women who are overtreated if a positive needle biopsy is considered an indication for ALND.

Table 1

	1-2 positive LNs	≥ 3 positive LNs	P value
Total (n = 153)	74 (49%)	78 (51%)	--
Age, years, median (range)	52 (31-80)	51 (25-91)	0.887
BMI, median (range)	27.2 (17.7-41.4)	29.1 (18.4-48.6)	0.116
BMI			0.111
<30	51 (69%)	44 (56%)	
≥ 30	23 (31%)	34 (44%)	
Tumor size, cm, median (range)	2.2 (0.8-4.5)	2.4 (0.8-9.5)	0.039
Tumor histology			0.026
Ductal	69 (93%)	62 (79%)	
Lobular	2 (3%)	11 (14%)	
Other	3 (4%)	5 (6%)	
Nuclear grade			0.928
Low/intermediate	26 (39%)	22 (39%)	
High	40 (61%)	35 (61%)	
Missing	8	21	
Lymphovascular invasion present	45 (60%)	61 (78%)	0.012
Multifocal	28 (38%)	37 (47%)	0.232
ER positive	59 (80%)	61 (78%)	0.818
PR positive	55 (74%)	54 (69%)	0.486
HER2/neu overexpressing	19 (26%)	17 (22%)	0.574
Total positive nodes	Median: 1 Range (1-2)	Median: 6 Range (3-53)	NA
SLNB performed	8 (11%)	8 (10%)	0.911

Do All Elderly Patients Need a Mammogram? Evaluation of National Practice Patterns

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Objective There are limited data regarding the efficacy of mammography in patients ≥ 75 years of age; and those with comorbidities (regardless of age) may be less likely to act on the results of abnormal screening mammography. There are limited data regarding national practice patterns regarding mammography in the elderly, particularly in those who are frail. We sought to determine the usage of screening mammography in this population using a national sample.

Methods The 2010 National Health Interview Survey (NHIS) cancer supplement was used to evaluate the use of mammography in elderly patients. The NHIS is a face-to-face survey conducted annually by the CDC and is designed to be representative of the U.S. population. Data regarding health and screening practices are collected. We compared women who were 50-74 (where data regarding screening mammography are robust) to those ≥ 75 years of age. We used difficulty walking without special equipment as a surrogate for frailty; those who reported that they either couldn't walk one-quarter of a mile (~3 city blocks) or that this was "very difficult" were classified as frail. Statistical analyses were performed using SAS-callable SUDAAN software.

Results There were 5,875 women ≥ age 50 who were surveyed, representing 43,726,426 women in the population; Of these, 19.25% were ≥ 75. The elderly were significantly less likely to have had a mammogram in the previous 2 years than their younger counterparts; however, more than two-thirds had the test (67.66% vs 80.45%, $p < 0.001$). Similarly, fewer elderly patients had a clinical breast exam in the past 2 years (75.36% vs 83.99%, $p < 0.001$). Overall, 12.43% of patients met our criteria of frailty. Patients who were frail (regardless of age) were less likely to

have a mammogram (69.56% vs 86.89%, $p < 0.001$) or a clinical breast exam (76.61% vs 88.77%, $p < 0.001$) than their healthier colleagues. Frailty and older age were correlated, such that 34.40% of older patients were frail vs 13.15% of younger patients ($p < 0.001$). In a multivariate model incorporating both age and frailty, it was found that both were independent predictors of mammography rates. Younger patients (OR = 1.71; 95% CI: 1.46-2.00, $p < 0.001$) and those who were less frail (OR = 1.80; 95% CI: 1.52-2.13, $p < 0.001$) were significantly more likely to report having had a mammogram within the past 2 years.
Conclusion A significant proportion of patients who are ≥ age 75 and those who cannot walk one-quarter of a mile without difficulty continue to have mammograms at least every 2 years. While younger patients and those in better health are significantly more likely to have mammograms, these data call into question whether all patients (regardless of age or state of health) should continue to get screening mammography. A critical evaluation of the goals of care in the elderly and implementation of frailty assessment models may help to better tailor screening efforts in this population.

Hospital Selection and Breast Cancer Patients: Who Goes Where
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Objective Factors affecting patients' selections in health care delivery increasingly include accreditation status, such as the NAPBC. The aim of this study was to determine other factors that may potentially influence where patients seek treatment for their breast cancer.
Methods A direct database linkage methodology using discrete variables was used to connect the Florida Healthcare Cost and Utilization Project State Inpatient Database (HCUP SID), American Hospital Association Annual Survey database, Federal ZIP Code Database, and NAPBC listing of centers. From this dataset of 10,212,482 unique inpatient encounters, a study population was created of all patients with a breast malignancy from 2007-2011 in Florida who underwent mastectomy or lumpectomy. Patient characteristics, including payor source, were compared to hospital factors.
Results Our query identified 20,395 patients with a median age of 61 years. Of the 171 hospitals, 28 were NAPBC accredited, 149 were teaching hospitals, and 128 were high-volume hospitals. Most patients underwent mastectomy (88%), and the most common races included Caucasians (70.9%), Blacks (12.6%), and Hispanics (12.3%) with the majority of patients living within 15 miles of their hospital (71%). The most common payor sources were Medicare (43%) and private insurance (43.4%). On univariate analysis, NAPBC-accredited hospitals had a higher proportion of Black patients (15.0% vs 12.6%, $p = 0.0001$), private insurance patients (45.1% vs. 40.5%, $p<0.0001$), and patients from the top-tier income ZIP codes (18.2% vs 11%, $p < 0.0001$). High-volume centers performed more mastectomy surgeries (88.4% vs 86.1%, $p < 0.0001$), and treated a higher proportion of Hispanic (13% vs 7.2%, $p < 0.0001$) and privately insured patients (44.0% vs 38.9%, $p < 0.0001$). At teaching hospitals, the patients were older (63 vs 57 years, $p < 0.0001$), and they had a lower proportion of Blacks (11% vs 16.1%, $p < 0.0001$), Hispanics (11.2% vs 15%, $p < 0.0001$), private insurance (41.3% vs 48.2%, $p < 0.0001$), and patients from top-tier income ZIP codes (12.6% vs 16.6%, $p < 0.0001$). Hospitals closer to patients (in distance) performed more lumpectomy surgeries (13.9% vs 11.5%, $p < 0.0001$), treated older patients (age 63 vs 58 years, $p < 0.0001$), and proportionately more Black (13.7% vs 9.7%, $p < 0.0001$), Hispanic (13.8% vs 9.3%, $p < 0.0001$), and Medicare (46.9% vs 33.5%, $p < 0.0001$) patients. Significant patient factors related to hospital selection identified in multivariate modeling are summarized in Table 1.
Conclusion Despite accreditation and standardized care, certain populations are still at risk for not having access to these options. In particular, patient age, race, payor source, and income are all associated with certain challenges in overcoming these healthcare disparities.

continues

Table 1. Significant Patient Factors Related to Hospital Selection in Multivariate Modeling

NAPBC Center	Odds Ratio	Confidence Interval	P Value
Race: Hispanic	0.74	0.66-0.84	<0.0001
Payor: Medicaid	1.70	1.43-2.02	<0.0001
Income by ZIP $64,000+	1.77	1.55-2.01	<0.0001
Distance 15+ Miles From Home			
Increased age (years)	0.98	0.97-0.98	<0.0001
Race: Black	0.45	0.40-0.50	<0.0001
Race: Hispanic	0.52	0.46-0.58	<0.0001
Payor: Medicaid	1.40	1.21-1.63	<0.0001
Payor: Private	1.34	1.21-1.48	<0.0001
Income by Zip $39,000 - $47,999	0.77	0.71-0.84	<0.0001
Income by Zip $48,000 - $63,999	0.69	0.64-0.76	<0.0001
Income by ZIP $64,000+	0.72	0.65-0.80	<0.0001
High-Volume Center			
Race: Hispanic	1.79	1.64-1.94	<0.0001
Teaching Hospital			
Race: Black	0.71	0.64-0.78	<0.0001
Race: Hispanic	0.82	0.75-0.91	<0.0001
Payor: Medicaid	0.51	0.44-0.59	<0.0001
Payor: Private	0.71	0.65-0.79	<0.0001
Income by ZIP $64,000+	0.81	0.73-0.90	<0.0001

Can Protocols Reduce Racial Disparities in Breast Cancer and Breast Surgery Quality Measures?

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Objective Since 2009, an academic, inner city, safety-net hospital has made significant changes in the breast cancer (BC) Program. These changes spanned across multiple specialties and have focused on creating protocols, guidelines, checklists, and policies for the management of BC. This study evaluated the effect of standardized institutional protocols on BC quality measures as they relate to race.

Methods Tumor registry was used to identify 350 patients who were diagnosed and treated at our institution for BC from 2006-2012 (Stage 0-III, excluding LCIS). A retrospective review of electronic health records was performed to compare the achievement of quality measures 2 years before program development (6/2006–6/2008) to that of 2 years after program development (6/2010–6/2012).

Results The post-protocol years had a larger population of non-white patients as compared to the pre-protocol years (57% vs 41%, $p = 0.004$), but there was no difference in age or stage at diagnosis between the 2 eras. There were significant improvements in BC diagnosis and surgical treatment quality measures in non-white populations after establishment of standardized protocols in several areas. The rate at which breast cancer was diagnosed via needle biopsy improved in non-white population (78% pre-protocol vs 89 %, post-protocol, $p = 0.05$) and exceeded that of white population (81% pre-protocol vs. 86% post-protocol, $p = 0.39$). More non-white patients had a needle biopsy to evaluate the targeted lesion prior to the first operation (89% vs 98%, $p = 0.018$), which exceeded the rate for white patients (91% vs 93%, $p = 0.46$). There was significant improvement in performance of specimen radiograph to confirm removal of nonpalpable lesions in non-white patients (81.5% vs 98.2%, $p = 0.01$), which equalized with the white population (90% vs 96%, $p = 0.25$) after establishment of protocols. Both white and non-white groups had significant improvements in having sentinel lymph node biopsies performed (43% vs 68%, $p < 0.001$), having the surgical specimen oriented after removal from the body (58% vs 88%, $p < 0.001$), and a reduction in additional surgical interventions after initial lumpectomy (44% vs 26%, $p = 0.004$). There was no improvement in patient adherence to the recommended adjuvant therapy based on protocol implementation. In fact, non-white patients were less likely to initiate hormone therapy after protocols were implemented (95% vs 83%, $p = 0.07$).

Conclusion Implementation of standardized institutional protocols can significantly reduce racial disparities in breast cancer and surgery quality measures in non-white populations.

Does Offering Free Breast Cancer Screening Make a Difference? A 3-Year Review of a West Texas Free Breast Screening Program

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Objective Free breast cancer screening clinics that provide mammograms exist throughout the United States funded through various grants and philanthropic organizations. From 2010 to 2013, our breast center performed free breast cancer screenings on 548 women ages 40–65. Our study aimed to evaluate whether free breast cancer screenings influenced the rate of subsequent screenings in women who were noncompliant, to determine the number of breast cancers detected, and to obtain data on the percentage of diagnostic imaging done as a first test on a previously unscreened population of women.
Methods A retrospective chart review of 548 free breast cancer screenings was performed at a West Texas cancer center from 2010 to 2013. Baseline demographics, including employment status, insurance availability, race, total household income, language spoken, highest level of education, and months since previous mammogram, were assessed. Information was collected on number of breast cancers detected, stage of cancer, time since last mammogram screening, whether this was patient's first screening, and time to second screening. If cancer was diagnosed, we investigated whether National Comprehensive Cancer Network (NCCN) guidelines were followed for treatment. We considered a p value < 0.05 to be statistically significant.
Results The median age of women screened was 50.6. Caucasian women comprised 40.6% of the population, Hispanic women 40%, African-American women 8.4%, and 11% were classified as other. Of the 285 women who disclosed their financial information, only 60 (21.1%) had an income at or above the 200% poverty line ($44,700). Of the 548 free breast cancer screenings, 116 (22.1%) did not have a previous mammogram. Of these 116, 18 (15.5%) were compliant and returned for a follow-up mammogram within 14 months. Of 317 previously noncompliant women screened in our study, 76 had a follow-up mammogram in the next 14 months (24%). Eleven (9.5%) women returned for a subsequent mammogram outside the 12 ± 2 months recommended window, for a total of 29 patients who returned for a follow-up mammogram (25%). Breast cancer was detected in 11 of the 548 patients (2%), of which 5 (45.5%) were early stage (<2A) and 6 (54.5%) were late stage (>2B). In the 116 women never previously screened, breast cancer was detected in 6 (5.17%). Two women were diagnosed at stage 4. A strong, positive relationship was found between increasing length of time since last mammogram and detection of late-stage cancer (r 0.58, $P < 0.002$). Of the 548 women receiving free breast cancer screenings, 22.4% had a diagnostic mammogram as their first imaging evaluation.
Conclusion Of the 116 women who had never received a mammogram, 25% returned for a follow-up mammogram at some point. Cancer detection rate was 2% overall and 5.17% for the group with no previous breast imaging, significantly higher than the 0.1% national average. This shows that free mammogram screening is an asset to the community. We hypothesize that more women will return for a subsequent breast cancer screening after a free screening due to increased knowledge about available funding and elimination of fear of an initial mammogram.

A Novel Technique for the Accurate Evaluation of Margin Status of Excised Breast Cancer Specimens

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Objective Tumor margin evaluation is an integral step to the successful surgical treatment of breast cancer during conservation surgery. Involved margins can lead to additional surgeries, increased morbidity, and delay in adjuvant treatment. Our hypothesis is to develop an improved method of intraoperative evaluation of margin status using real-time CT specimen imaging.
Methods Our design evaluated 30 phantom specimens for technique and accuracy of margin evaluation. A bioequivalent phantom specimen was created and then, using various support mediums, was evaluated for margin status accuracy based on CT imaging. Each background substrate was also analyzed for availability and ease of use. The study was conducted with Clinical Review Board approval in a University-affiliated, tertiary care hospital. The breast excision phantoms, with contained abnormalities mimicking tumors, were prepared in the radiologic workroom. The specimens suspended in the substrate were then CT imaged at times during the day when the CT

scanner was not scheduled for patient use. There was no clinical participation during this preliminary phase of our study.
Results All 30 breast phantoms were correctly evaluated for margin status using CT imaging.
Conclusion CT imaging evaluation of breast margins is potentially an accurate and valuable tool for the clinical use. It also confirms capture of the targeted tumor. Our accuracy of 100% is well above the 20%–60% failure of current published techniques, necessitating additional surgery. As this is a pilot study for the technique, we are now designing an IRB-approved study to evaluate excised breast specimens. This study will prospectively compare our CT-guided technique with current margin control technologies. Our proposed technique is accurate, easy to perform, and reproducible. We suspect this could be the standard of care for breast specimen imaging in the near future.

Do Positive Margins at the Original Breast Cancer Excision Compromise Survival?
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Objective Recent professional society guidelines have stated that a negative breast microscopic margin is adequate for potential cure. Has this relaxed guideline allowed us to aim for "closer" margins and will this have an impact on take-back rates for failed margin clearance? Our objective is to determine if second excisions have any effect on cure rates on ultimately "successfully" excised breast cancer.
Methods After Institutional Review Board (IRB) approval, a review of breast cancer ACS-approved registry data was designed. This includes all breast cancer excisions with intent to cure. A 7-year period (2007-2013) was reviewed. All information was retrieved from the Commission on Cancer–approved tumor registry. Demographics, including age, tumor type, tumor stage, loco-regional recurrence and survival, were analyzed. All patient data were de-identified to the investigators. All patients were treated in a University-affiliated community hospital. American Board of Surgery–certified surgeons performed all excisions. A total of 1,902 consecutive patients receiving breast conservation therapy (BCT) were eligible for study over a 7-year period (2007-2013). This included all breast cancer excisions with intent to cure. Patients receiving neoadjuvant chemotherapy, metastatic disease, male breast cancer, contraindications to adjuvant treatment, mucinous carcinomas, and initial mastectomy were excluded.
Results A total of 1,902 patients were eligible for analysis. These patients were consecutively treated over a 7-year period. There was a mean follow-up of approx 3.5 years. Seventy (3.7%) of the total cohort of patients with invasive disease died with evidence of cancer during the study period. Six hundred fifty-three (34%) patients had 1 or more re-excisions to achieve a negative margin. Of the re-excision group a total of 32 (4.9%) patients died during the study period with evidence of disease. Of the patients with originally clear margins, 1,249 patients, 38 (3.0%) died during the study period with evidence of disease. Analysis of these figures by Fisher exact test comparison indicates that there is a strong statistical significant benefit (p = . 0337) to an originally clear margin for the survival of breast cancer.
Conclusion Clear margins at time of original excision are recommended for patient satisfaction, fiduciary stewardship, and now favorable outcomes. With this isolated finding of decreased survival in the re-excision group, continuation of this study is warranted. This would allow additional time for the natural history of the disease process and other adjuvant therapies to potentially present. In spite of the current consensus of simply a histologic negative margin, we as surgeons should be even more aggressive in our quest for a negative histologic margin at the initial surgery. It seems few things are better "the second time around."

No Re-excision of Margins in Stage I and II Breast Cancer With <1-mm Margins After a Lumpectomy—Are We Leaving Cancer Behind?
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Objective The SSO/ASTRO guidelines for margins on breast conservation therapy (BCT) were recently published, recommending re-excision for positive margins only defined as ink on invasive cancer. In our previous 3-year retrospective study, we revealed that within our institution, the rates of residual cancer in early-stage invasive breast cancer were similar in the positive and <1-mm margin group. The aim of this current study is to re-analyze our institution's re-excision rate, and the rate of finding residual cancer in the re-excision specimen for <1-mm margins in early-stage invasive breast cancer undergoing BCT expanding the review to 5 years. A secondary aim is to assess if there are patient or tumor characteristics within this <1-mm subgroup that may portend to a higher risk of finding residual cancer in the re-excision specimen.

Methods A 5-year (2009-2013) retrospective review of data from our institution's prospectively collected breast cancer database was performed for all stage I and II invasive breast cancer patients who underwent BCT with subsequent re-excision or completion mastectomy for close margins. Close margins were defined as <1 mm from tumor to cut edge of specimen. Fisher exact test was used for univariate analysis.
Results A total of 1169 patients were analyzed. Our population was found to consist mostly of Caucasian females who were postmenopausal and married. Seventy-three percent (849/1169) of patients were found to have stage I and II invasive breast cancer, of whom 18.4% (156/849) underwent re-excision for close and/or positive margins. Of these patients who underwent re-excision, 33.3% (52/156) were for <1-mm margins. Rates of finding residual cancer in this <1-mm margin group were 36.5% (19/52). Univariate analysis based on patient demographics and tumor characteristics of this subgroup were not statistically significant.
Conclusion From this expanded 5-year analysis, our results reveal that in our institution re-excision rates remain comparable to published data. Moreover, consistent with our previous study, in patients with <1-mm margins, the rates of finding residual cancer in the re-excision specimen were statistically similar to the group with positive margins. On univariate analysis, we were unable to identify any significant patient or tumor characteristics within this subgroup of <1-mm margins that may point to a higher risk of finding residual cancer in the re-excision specimen.

Targeted Intraoperative Radiotherapy for the Management of Ductal Carcinoma In Situ of the Breast
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Objective Multiple long-term studies have demonstrated a propensity for breast cancer recurrences to develop near the site of the original breast cancer. Recognition of this local recurrence pattern laid the foundation for the development of accelerated partial breast irradiation (APBI) approaches designed to limit the radiation treatment field to the site of the malignancy. However, there is a paucity of data regarding the efficacy of APBI, in general, and intraoperative radiotherapy (IORT), in particular, for the management of DCIS. As a result, use of APBI remains controversial. A prospective nonrandomized trial was designed to determine if patients with pure DCIS considered eligible for concurrent IORT based on preoperative mammography and CE-MRI could be successfully treated using IORT with minimal need for additional therapy due to inadequate surgical margins or excessive tumor size.
Methods Between November 2007 and June 2014, 35 women underwent bilateral digital mammography and bilateral breast CE-MRI prior to selection for IORT. Patients were deemed eligible for IORT if their lesion was ≤4 cm in maximal diameter on both digital mammography and CE-MRI, pure DCIS on minimally invasive breast biopsy or wide local excision, and considered resectable with clear surgical margins using BCS. Postoperatively the DCIS lesion size determined by imaging was compared with lesion size and surgical margin status obtained from the surgical pathology specimen.
Results Thirty-five (35) patients completed IORT. Median patient age was 57 (range, 42–79) and median histological lesion size was 15.6 mm (2 mm–40 mm). No invasive cancer was identified. In more than half of the patients in our study (57.1%), MRI failed to detect a corresponding lesion. Nonetheless, 30 patients met criteria for negative margins (ie, margins ≥ 2 mm), whereas 5 patients had positive margins (<2 mm). Two of the 5 patients with positive margins underwent mastectomy due to extensive imaging-occult DCIS. Three of the 5 patients with positive margins underwent successful re-excision at a subsequent operation prior to subsequent WBI. A total of 5.7% (5/35) of patients required some form of additional therapy. At 36 months' median follow-up (range of 2–83 months; average, 42 months), only 2 patients experienced local recurrences of cancer (DCIS only), yielding a 5.7% local recurrence rate. No deaths or distant recurrences were observed.
Conclusion Imaging-occult DCIS is a challenge for IORT, as it is for all forms of breast-conserving therapy. Nonetheless, 91.4% of patients with DCIS were successfully managed with BCS and IORT alone, with relatively few patients requiring additional therapy.

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Pathology and Treatment Data

DCIS Size and Final Pathology Mean: 18.4 mm; Range, 2–66 mm		
1–10 mm	14	40.0%
11–20 mm	7	20.0%
21–30 mm	10	28.6%
31–40 mm	1	2.9%
40–50 mm	2	5.6%
>50	1	2.9%
Final Margin Status		
Negative	31	88.6%
Positive	4	11.4%
Local Recurrence		
No	33	94.3%
Yes	2	5.7%
Regional Recurrence		
No	35	100%
Yes	0	0%
Distant Recurrence		
No	35	100%
Yes	0	0%
Additional Therapy		
No	30	85.7%
Yes	5	14.3%
Successful BCT		
Yes	32	91.4%
No	3	8.6%

An Assessment to Explain the Challenges of Accruing Patients to NSABP B-43

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Objective The National Surgical Adjuvant Breast and Bowel Project (NSABP) launched the B-43 trial to evaluate trastuzumab plus radiotherapy compared to radiotherapy alone in the treatment of women with Her2-positive ductal carcinoma in situ (DCIS) excised with negative margins. Recruitment for this trial has been slow; therefore, we performed this study to better understand the characteristics of Her2-positive DCIS to potentially explain our poor recruitment efforts.

Methods All patients with DCIS and an assessment for the Her2 receptor were identified. A Her2 receptor assessment was considered positive by either intense immunohistochemical membrane staining or equivocal membrane staining but positive gene amplification by flourescence in situ hybridization. Records were reviewed to determine age, estrogen and progesterone status, nuclear grade, presence of necrosis, surgical procedure (lumpectomy vs mastectomy), size of DCIS, and extent of margins. Her2 positive and negative tumors were compared and quantitative variables were analyzed by Student *t* test and nominal variables were assessed by chi-square analysis.

Results A total of 177 patients were identified with 44 patients (24.9%) Her2 positive and 133 (75.1%) Her2 negative. The 2 groups are summarized in the following table . In multivariate analysis, size of DCIS remained significantly associated with Her2 receptor status ($p = 0.03$).

Conclusion Based on the results of our study, Her2-positive DCIS is more likely to be larger, leading more patients and surgeons to choose mastectomy. This would explain the slow recruitment of patients to a breast conservation trial for DCIS like NSABP B-43.

	Her2+	Her2–	P value
Age (years)	60.3	61.2	0.61
Size (mm)	23.6	13.8	0.001
Closest margin (mm)	11.0	9.4	0.34
Estrogen receptor positive	22 (50%)	122 (91.7%)	0.0001
Progesterone receptor positive	19 (43.2%)	114 (85.7%)	0.0001
Low grade	0	36 (27.1%)	0.0001
Intermediate grade	12 (27.3%)	64 (48.1%)	0.0001
High grade	32 (72.7%)	33 (24.8%)	0.0001
Necrosis	36 (81.8%)	60 (45.1%)	0.0001
Mastectomy	27 (61.4%)	49 (36.8%)	0.01

The Importance of Applying ACOSOG Z0011 Criteria in the Axillary Management of Invasive Lobular Carcinoma: A Multi-Institutional Cohort Study

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Objective The publication of the American College of Surgeons Oncology Group (ACOSOG) Z0011 trial led to a significant change in the management of patients with early-stage breast cancer and limited sentinel lymph node (SLN) metastases. The majority of the patients in this trial had small invasive ductal carcinomas, while invasive lobular carcinomas (ILC) were somewhat underrepresented. Furthermore, only 27 patients with ILC were randomized to the completion axillary lymph node dissection (cALND) arm. The primary aim of this study was to determine the risk of residual nodal burden (RNB) for patients with ILCs.

Methods A multi-institutional cohort study was completed after research ethics board approval. Women of any age with an ILC and at least 1 positive SLN who underwent a primary breast procedure (lumpectomy or mastectomy) and both a sentinel lymph node biopsy (SLNB) followed by a cALND, between July 1,1999 and June 30, 2009, at 2 large academic centers were included. Positive SLNs were defined as N1 or above, as assessed by immunohistochemistry and multiple levels of hematoxylin and eosin stain. Statistical analysis was completed using STATA software.

Results A total of 60 patients met the inclusion criteria to comprise the final patient population. Patient, tumor, and procedure characteristics, as well as overall RNB for the total patient population, are outlined in Table 1. While the overall RNB was 40%, it was significantly greater in the T3+ group (87% vs 24% for T1/T2 tumors, $p < 0.05$). When examining only patients who met all of the inclusion criteria for ACOSOG Z0011 (T1 or T2, <3 LNs positive, no SLN extranodal extension, and lumpectomy) compared to those patients who did not, the RNB was significantly greater in the latter (56% vs 17%; $p < 0.05$).

Conclusion Overall, these data suggest that the clinical practice changes that have occurred after publication of the ACOSOG Z0011 trial appear to be generalizable to ILCs within the inclusion criteria of the study. The RNB for patients with ILC who meet the inclusion criteria for the ACOSOG Z0011 trial is lower than that identified in the trial. However, caution should be taken in any patients who do not meet these criteria, particularly those with tumor size >5 cm. The clinical significance of this additional nodal burden remains to be determined. Future analysis will compare the nodal burden and outcomes in a matched cohort of ductal and lobular breast cancer.

continues

Table 1. Total Patient Population and Lymph Node Characteristics

Characteristics		No. (n = 60)
Age, Mean (range), yr		60 (34–81)
Primary Breast Procedure		
	Lumpectomy	38 (63%)
	Mastectomy	22 (37%)
Tumor Size, Mean (range), cm		3.8 (1.2–16.1)
Nottingham Tumor Grade		
	1	9 (15%)
	2	47 (78%)
	3	4 (7%)
Receptor Status		
	ER+	54 (90%)
	ER-	3 (5%)
	ER/PR missing	3 (5%)
	Her2-	50 (83%)
	Her2 missing	10 (17%)
Lymph Node Retrieval		
	# SLNs removed, mean (range)	3 (1–8)
	# SLNs involved, mean (range)	2 (1–4)
	# Lymph nodes removed in cALND, mean (range)	17 (6–46)
	# Lymph nodes involved in cALND, mean (range)	3 (0–26)
Total Lymph Node Metastases		
	N1	40 (67%)
	N2	10 (17%)
	N3	10 (17%)
SLNs With Extranodal Extension		
	Yes	16 (27%)
	No	42 (70%)
	Missing	2 (3%)
Residual Nodal Burden		40%

Intraoperative Radiation Therapy (IORT): An Analysis by ASTRO Brachytherapy Criteria and Histology

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Objective Following breast conservation, most local recurrences occur at or near the primary cancer. This finding has led to increasing popularity of single-quadrant brachytherapy. ASTRO has issued guidelines dividing breast conservation patients into 3 subgroups regarding their appropriateness for partial breast irradiation: suitable, cautionary, and unsuitable. We analyzed a group of IORT patients by ASTRO guidelines and histology.
Methods A prospective, IRB-approved, clinical trial of IORT using the Xoft Axxent System was designed. Inclusion requirements were invasive carcinoma (ductal or lobular) or DCIS, extent 30 mm or less with negative lymph nodes and final margin width at least 2 mm. Patients who failed 1 or more criteria were advised to undergo additional whole-breast external beam radiation therapy and IORT became the boost dose. All patients had preoperative digital mammography, contrast-enhanced MRI, and ultrasonography of the involved breast and axilla.
Results From April 2010 through September 2013, 213 patients were enrolled (216 breasts). Sixty-eight of 216

(31.5%) breasts failed 1 or more pathologic criteria: 20 (9.3%) patients failed due to tumor size, 28 patients had positive nodes (13%), and 35 patients (17%) had margin widths less than 2 mm. One hundred forty-eight breasts (68.5%) were successfully treated and required no additional whole-breast radiotherapy or re-excision. Thirty-three patients underwent whole-breast radiation therapy in addition to IORT; 6 patients chose mastectomy rather than re-excision. There have been no recurrences (0%) after 24 months of median follow-up. Protocol failures are analyzed by ASTRO Brachytherapy Guidelines and by histology in the table.
Conclusion There were no protocol failures among 61 ASTRO suitable patients. As expected, 81% of ASTRO unsuitable patients failed 1 or more criteria. Four of 5 patients with invasive lobular carcinoma also failed 1 or more criteria. Preoperative imaging with digital mammography, ultrasonography, and contrast-enhanced MRI was accurate 69% of the time in selecting patients who met our criteria for IORT. When selecting patients based on tumor size alone, imaging was accurate 91% of the time. IORT is particularly attractive for older patients, patients living in rural communities with poor access to radiation treatment centers, and those with busy lifestyles who find it difficult to attend daily treatments for 6 to 7 weeks. As more practices incorporate IORT, the steps in developing institutional protocols, incorporation of society guidelines, and analysis of outcomes become increasingly important.

	Failed 1 or More Hoag Criteria
ASTRO Guidelines	
Suitable	0% (0/61)
Cautionary	22% (19/88)
Unsuitable	81% (43/53)
Histology	
DCIS	19% (6/32)
Invasive ductal	29% (44/154)
Invasive lobular	69% (11/16)

A Shift From Breast Conservation Therapy Toward Bilateral Mastectomies in Patients With Unilateral Breast Cancer
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Objective There continues to be a dramatic shift away from breast conservation therapy (BCT) toward mastectomy (UM) and bilateral mastectomy (BM). While prior studies have identified factors associated with contralateral prophylactic mastectomy (CPM), that decision is markedly different for women requiring mastectomy vs BCT-eligible patients. We sought to document trends among all women with operable breast cancer and identify factors associated with both these situations.
Methods We queried our IRB-approved breast cancer database for patients undergoing surgery for a unilateral, primary breast cancer at the University of Michigan between 2000 and 2012. Women with bilateral cancer or a prior history of breast cancer were excluded. For select time-periods, a detailed medical record review was conducted to determine the reason the patient underwent mastectomy. The distribution of categories was compared using the chi-square test with values at or below 0.05 considered significant.
Results Of 3,892 women, 2,325 (60%) underwent breast conservation, 1,092 (28%) had a unilateral mastectomy, and 475 (12%) underwent a bilateral mastectomy. Younger age was a highly significant predictor of both UM and BM ($p < 0.0001$ for both). Race was not a factor significantly associated with BCT ($p = 0.09$) but was strongly associated with BM vs UM ($p < 0.0001$). Tumor size and nodal status were significantly associated with a higher use of mastectomy, but a lower use of BM. Reconstruction rates remained relatively constant during this time period, remaining more common among BM than UM. BMI and smoking, which might impact reconstruction choices, were not associated with UM or BM. From 2000 through 2012, the BCT rate dropped from a high of 68% to a low of 54%, while UM remained relatively constant and BM increased, from a low of 4% to a high of 19%. The rise in bilateral mastectomies was most significant among women younger than age 40 starting in 2002, as well as among women in their forties and fifties, starting around 2007. Comparing women in 2002–2003 to women in 2011, there were slight increases in women recommended to undergo mastectomy for tumor size (despite no change in

pathologic tumor size) and diffuse microcalcifications. However, the number of BCT-eligible patients choosing mastectomy rose 250%.
Conclusion Despite a strong institutional bias toward breast conservation and consistent availability of genetic testing and reconstruction, we witnessed a sharp rise in BM, particularly among young women. A substantial component of women undergoing BM today were patients who 10 years ago would have undergone BCT. Our results demonstrate a difference between those factors associated with BM among all patients and those associated with opting for CPM when committed to a UM. Decreases in BCT use is being driven to a small degree by changes in breast imaging and genetic testing, but to a larger degree by patient choice. Additional studies addressing the reasons why BCT-eligible women choose BM are needed. A more nuanced approach to identifying and addressing patient fears and other motivating factors may be needed to counter the preconceived notions and mixed messages originating from outside sources.

Upgrade Rate of Papilloma and Atypia Diagnosed on Core Needle Biopsy: A Closer Look
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Objective The surgical management of papilloma, atypical ductal hyperplasia (ADH), and atypical lobular hyperplasia (ALH) diagnosed on core-needle biopsy (CNB) of the breast is traditionally surgical excision. The rationale is that some patients will have a more serious lesion, either ductal carcinoma in situ (DCIS) or invasive cancer, on surgical biopsy. However, recent arguments have been made for observation alone, without excision, in selected patients. For each specific pathologic diagnosis on CNB, we determined the rate of upgrade of these lesions to DCIS or cancer.
Methods We retrospectively reviewed all surgical excisional biopsies done at our academic medical center since 2009 in which the preoperative diagnosis on CNB was papilloma, ADH, or ALH. For each case, the pathologic diagnosis on core-needle biopsy and the final pathology at surgery was determined from the pathology report. Only papillomas without atypia on CNB were included in the papilloma category. Cases were excluded in which there was a borderline pathology result on CNB (eg, atypia bordering on DCIS). For each pathologic diagnosis, the number of cases that proved to be DCIS or invasive cancer was used to calculate the rate of upgrade. Fisher exact test was used for statistical comparisons.
Results Three hundred sixteen cases were included. Pathology on CNB was papilloma in 112 patients, ADH in 126 patients, ALH in 64 patients. Both ADH and ALH were seen on CNB in 14 patients. Rate of upgrade is shown in Table 1. Upgrade rate to either DCIS or cancer was significantly higher when the diagnosis on CNB was ADH compared to papilloma (15.1% vs 5.4%, $p = 0.02$) or ADH/ALH compared to papilloma (28.6% vs 5.4%, $p = 0.01$). Upgrade rate was not significantly different between the groups for any other comparisons.
Conclusion While the rate of upgrade was significantly higher when ADH was present on CNB compared to ALH alone or papilloma, there still was a substantial proportion of patients with papilloma or ALH on CNB with unanticipated DCIS on surgical biopsy. Interestingly, upgrade rate to DCIS was particularly high when ADH and ALH were both present in the core-needle biopsy specimen. Based on these data, we would recommend that surgical excision should be performed when any of these lesions are seen on CNB, especially in the case of ADH. We plan to analyze a larger dataset to confirm these findings.

Table 1. Rate of Upgrade

Pathology on CNB	Percent Upgraded to DCIS	Percent Upgraded to Invasive Cancer	Total Upgrade Rate
Papilloma	4.5%	0.9%	5.4%
ADH	9.5%	5.6%	15.1%
ALH	7.8%	1.6%	9.4%
Both ADH and ALH	28.6%	0%	28.6%

Harmonic Scalpel Used During Sentinel Lymph Node Biopsy for Breast Cancer Does Not Reduce Seroma Formation

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Objective Seroma formation occurs in approximately 10% of patients following sentinel lymph node biopsy (SLNB) for breast cancer. Axillary seromas can lead to discomfort, need for additional procedures, and secondary infections, and can delay initiation of radiation or chemotherapy. We sought to determine if use of the harmonic scalpel during SLNB leads to reduced seroma formation compared to use of traditional cautery and clips.
Methods We retrospectively reviewed patients who received SLNB during a partial mastectomy procedure for breast cancer. All surgeries were performed by a single surgeon between September 2009 and June 2014. In January 2012, this surgeon began almost exclusively using the harmonic scalpel to divide lymphatic channels during SLNB. Patients were excluded if they received a total mastectomy, axillary node dissection after sentinel lymph node biopsy, or if their sentinel nodes were accessed through an upper outer quadrant partial mastectomy incision. Operative reports were reviewed to determine whether the harmonic scalpel or cautery with clips were used during SLNB. We recorded demographic, operative, pathologic, and complications data for each patient, and comparisons were analyzed using Student *t* test or chi-square test.
Results Of the 233 SLNB procedures performed in 226 patients, 97 procedures included cautery and clips (CC), and 136 procedures included use of the harmonic scalpel (HS). There were no differences between the CC and HS groups regarding mean age (57.9 vs 59.2, $p = 0.42$), BMI (29.1 vs 33.9, $p = 0.32$), number of lymph nodes harvested (2.7 vs 3.0, $p = 0.10$), rate of LN positivity (14.7% vs 20.8%, $p = 0.13$), number of positive nodes (1.55 vs 1.85, $p = 0.86$), or size of lymph node metastasis (0.59 cm vs 0.80 cm, $p = 0.51$). There were 4 axillary seromas in the CC group (4.1%); 1 was treated with aspiration and 1 was treated with catheter drainage. There were 5 axillary seromas in the HS group (3.8%) and 2 were treated with aspiration. Untreated seromas resolved spontaneously. One patient in the HS group developed an axillary abscess that was treated by incision and drainage. No other axillary complications occurred in either group.
Conclusion Seroma rates following sentinel lymph node biopsy remain low despite use of harmonic scalpel or cautery and clips. We observed no benefit to using the harmonic scalpel during axillary sentinel lymph node biopsy for breast cancer.

Pregnancy-Associated Breast Cancer (PABC) in a Contemporary Cohort of Women With Newly Diagnosed Breast Cancer

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Objective Pregnancy-associated breast cancer (PABC) refers to breast cancer diagnosed during pregnancy or within 1 or 2 years following delivery. PABC usually presents at a more advanced stage with larger primaries. Some of these tumor characteristics are frequently found in patients <40 years and are thought to be more correlated with age than pregnancy. The purpose of our study was to examine the clinical and tumor characteristics of patients with PABC compared to non-PABC in a cohort of women with newly diagnosed breast cancers.
Methods The Breast Cancer Database at our institution was queried for women with newly diagnosed breast cancer from 2010–2014. Variables included demographics, risk factors, method of presentation, and tumor characteristics. Statistical analyses included Pearson's chi-square tests.
Results Of a total of 1,829 women, 25 (1%) had PABC and only 15 (60%) were <40 years of age at time of PABC. Breast cancer risk factors, including strong family history ($p = 0.47$), BRCA1,2 mutations ($p = 0.16$), and atypical hyperplasias ($p = 1.00$), were not statistically different between the PABC and non-PABC groups. Majority of women with PABC had invasive ductal carcinoma (72%), stage 0, I (64%), ER+ (76%), PR+ (72%), and Her2-neu negative (76%). High Ki-67 ($p = 0.003$) and palpable masses ($0 < 0.001$) were significantly associated with PABC. Majority of women (68%) with PABC had prior uneventful pregnancies and were significantly older at the time of first birth ($p < 0.0001$). There was also a higher proportion of women with a history of infertility treatments compared to the non-PABC cohort ($p = 0.02$).
Conclusion We found that typical breast cancer risk factors were not associated with PABC. This supports a different pathophysiological basis for this disease. Further research is needed to elucidate the underlying biological mechanisms and associated risks in developing pregnancy associated breast cancer.

Imaging Characteristics in a Contemporary Cohort of Younger Women With Newly Diagnosed Breast Cancer

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Objective Younger women tend to have dense breasts and early detection of breast cancer in this population remains challenging. Compared to mammography, MRI is a more sensitive diagnostic tool but associated with a greater false-positive rate. The purpose of this study is to evaluate the relationship of MR imaging and clinical characteristics in a population of young women with breast cancer.

Methods The breast cancer database at our medical center was queried for all women who had a mammogram and MRI from 2010-2014. Variables included demographics, risk factors, tumor characteristics, mammographic breast density (MBD), background parenchymal enhancement (BPE), and assessment of fibroglandular tissue with contiguous MR images (FGT). Statistical analyses included Pearson's chi-square tests.

Results Of a total of 1829 women, 111 (6%) were <40 years at the time of breast cancer diagnosis. When compared to women ≥40 years, younger women presented with more palpable masses ($p < 0.0001$), a higher proportion of BRCA1 mutations ($p = 0.02$), stage II-III tumors ($p < 0.0001$), invasive ductal carcinomas ($p = 0.002$), Her2 neu-positive tumors ($p = 0.005$) and higher Ki-67 scores ($p = 0.02$). Younger women had increased mammographic BD ($p < 0.0001$) and increased FGT ($p < 0.0001$) when compared to older women. However, BPE was not significantly different between the younger and older age groups. Forty-one percent of our patients had MRIs during week 2 of their menstrual cycle.

Conclusion Younger women had increased MBD and FGT when compared to older women. However, BPE was not significantly different between both age groups. These results suggest that BPE may not contribute to the increase in false positives that is usually associated with MRI in premenopausal women. Further studies are warranted to describe the possible benefit of MRI in this age group and to identify imaging biomarkers.

Do We Need a Specialized Family History Form to Identify Women at Risk for Breast and Ovarian Cancer?

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Objective To evaluate a specialized family history questionnaire for its accuracy in identifying high-risk women for breast and ovarian cancer.

Methods From September 1, 2012, to August 31, 2013, a Specialized Family History Form was given to 355 patients that presented to the Comprehensive Breast Program. Patients were categorized into 4 groups: Benign Disease, Suspicious Diagnostic Imaging, Breast Cancer, and High-Risk Family History. All forms were evaluated for accuracy. Every patient was asked 3 questions upon completion of the form: (1) Is there anyone else in your family with cancer on your mother or father's side? (2) Besides mother, father, brothers, and sisters, are there any other relatives, including aunts, uncles, nieces, nephews, cousins, grandparents and great grandparents? (3) Besides breast cancer, are there any ovarian, prostate, melanoma, or pancreatic cancers and the ages they occurred? We identified patients appropriate for BRCA testing and those at high risk (>20% lifetime risk), using the Tyrer Cuzick model.

Results Three hundred fifty-five patients completed a Specialized Family History Form. Initial consultation was for benign disease (BD), 33%; suspicious diagnostic imaging (SDI), 29%; breast cancer (BC), 9%; and high-risk family history (FH), 29%. The average age of all patients was 53.5; BD, 48.5; SDI, 59; BC, 60; and FH, 52. Overall accuracy regarding 3 generations was 93%; for BD, 95.7%; SDI, 91.1%; BC, 93.5%; and FH, 90%. The accuracy of ages given was 86%; BD, 90%; SDI, 86%; BC, 84%; and FH, 81%. Patients appropriate for BRCA testing was 41.4%; BD, 21%; SDI, 25%; BC, 55%; and FH, 84%. Of those patients who were BRCA negative or did not qualify for BRCA testing, 15% were identified for high-risk screening; BD, 5.8%; SDI, 10%; and FH, 37%.

Conclusion To identify women who may be at risk for hereditary breast and ovarian cancer syndrome (HBOC), or those with an increased lifetime risk of 20% or higher, an accurate family history is required. Unfortunately the majority of family history questionnaires do not address the specific information required. Patients must be identified for cancer risk prior to its occurrence, rather than after its occurrence. Our high-risk screening form allows the ability to identify all the risk factors associated with HBOC immediately, as well as indicating appropriate family history. We had 90%–95% success rate identifying all family members with risk factors. We had a success rate between 81% and 90% for obtaining ages of patients at time of cancer diagnosis. If done correctly, we had 41% of our patients appropriate for BRCA testing and 15% of all patients were identified as high risk and were entered

into our high-risk screening program. As physicians, we need to do more regarding the identification of these high-risk individuals. It can be as simple as 1 sheet of paper that is filled out in a waiting room or online prior to being seen.

Routine Use of the MarginProbe in Partial Mastectomy Patients: Three Centers' Experience, Including Comparison to Historical Re-Excision Rates

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Objective Positive surgical margins adversely influence local tumor control in breast conservation therapy. MarginProbe is a tool for intraoperative margin assessment, which has been FDA approved since early 2013. The continuous cumulative experience of routine use of the device in lumpectomy procedures by 4 breast surgeons in 3 centers is presented.
Methods Lesions were localized by standard methods. Specimens were excised and oriented per routine lumpectomy procedure. MarginProbe was used on all aspects (margins) of the main specimen, but not on additional shavings. Additional shavings of the corresponding cavity face were performed when device reading was positive. Intraoperative imaging of the specimens by X-ray was performed. If needed, additional shavings were taken based on clinical assessment. Historical re-excision rates for each surgeon were established from a consecutive set of patients in a period just before MarginProbe was put into use.
Results Altogether 290 patients were treated in 3 institutions up until October 2014. Thirty-one patients (10.7%, 31/290) required a re-excision procedure. Historical re-excision rates, based on periods of use proximal to when MarginProbe was put into use, were 25.8% (48/186). The re-excision reduction rate was 59% ($P < 0.0001$). There were 18 (6.2%, 18/290) re-excision procedures resulting from positive margins on the main specimen. The other re-excisions were due to positive shavings, which were not assessed with the MarginProbe. Comparing to the initially reported set in which the re-excision rate was 9.7%, re-excision rates are maintained. Using the recently updated SSO guidelines of negative margin defined as no tumor on ink, in 19% (56/290) of the cases the primary (main) lumpectomy specimen prior to intraoperative assessment had positive margins. In 75% (42/56) of these cases, use of the device led to identification of the positive margins. Of all the cases, in 6.6% (19/290) follow-up re-excision procedures were performed due to tumor on ink. Of these, only 3.5% (10/290) were due to failed detection of positive margins on the main specimen where the device was used.
Conclusion Use of the MarginProbe contributes to achieving clear margins and results in the reduction of re-excision procedures. Results are consistent over time. In some cases, re-excision procedures were performed due to positive margins found on shavings. Future studies of interest may include analysis of the effect of device use on the shavings intraoperatively.

The Effect of Socioeconomic Status, Race, and Tumor Biology on Breast Cancer Outcomes

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Objective Although breast cancer deaths have been declining, not all racial groups have benefited equally. African-American women have a lower breast cancer incidence rate but a higher mortality rate. Racial disparities in breast cancer treatment and outcomes likely have multiple causes. We evaluated the association of race, insurance type, tumor biology, and age with time from diagnosis to treatment and breast cancer recurrence within an urban inner city safety net hospital.
Methods We performed a retrospective review of 535 women with breast cancer at UF Health Jacksonville from January 2009 to March 2013. Age, race, insurance status, and tumor biology were used as covariates for defining disparities in stage at diagnosis, time from diagnosis to treatment, and rate of recurrent disease. Insurance categories were defined as Commercial, Medicare, or Medicaid/Charity. Tumor profile/biology was defined as luminal A (ER+, PR+, HER-2 neg), luminal B (ER+, PR-, HER-2 neg), HER-2 positive, and triple negative. Treatment was defined as the first modality initiated, which included surgery, chemotherapy, radiation, or hormone therapy.
Results There was an equal racial distribution between African American (47.3%) and Caucasian women (47.5%) in our study population. More than one-third of patients had Medicaid/Charity insurance coverage (37.1%), followed by Medicare (32.7%) and Commercial (30.3%). Mean age was 58.8 years. There was no significant association between race and stage at diagnosis within our patient population ($p = 0.869$). However, women with Medicaid/Charity coverage were diagnosed at more advanced stage compared to women with Medicare (adjusted

p value <.001) or Commercial insurance (adjusted p value = 0.011). Time from diagnosis to treatment was significantly longer for patients with Medicaid/Charity insurance (52 ± 45 days) vs Medicare (44 ± 37 days) or Commercial insurance (41 ± 39 days), irrespective of race. The difference between Medicaid/Charity and Commercial insurance was statistically significant, adjusted p = 0.0006. Although breast cancer recurrence was slightly higher in patients with Medicaid/Charity insurance (16.4%) and with triple-negative disease (18.4%) as compared to luminal A (12.2 %), and Medicare patients (11.6 %), there were no statistically significant differences in breast cancer recurrence by race, insurance type, age, or tumor biology.
Conclusion Women with lower socioeconomic status (based on insurance type) present with more advanced stage breast cancer and have a longer time from diagnosis to initiation of treatment regardless of race. However, there was no difference in short-term recurrence rates based on race, insurance type, or tumor biology. Longer follow-up is required to evaluate the effect of insurance type on disparities in breast cancer outcomes.

Maintaining Standards of Timeliness in Breast Cancer Management in a Public Hospital: A Quality Indicator Study

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Objective In compliance with NAPBC Standard 6.1, we devised a study to examine timeliness from needle biopsy to first surgical appointment, with a goal of 90% of newly diagnosed breast cancer (BC) patients (pts) scheduled ≤ 14 days. We also tracked timeliness to intervention in order to identify areas of system improvement.
Methods Pts who underwent breast needle biopsy from Jan 1, 2014, through Oct 24, 2014, within the Avon Comprehensive Breast Center (AFCBC) were identified through the breast imaging database. We then retrospectively reviewed patient charts, collecting appointment times and reasons appointments were delayed. Data were analyzed using SPSS Statistics 21.0 software, comparing both benign and malignant diagnoses, using both independent *t* tests and chi-square analysis.
Results A total of 305 pts who underwent breast biopsy were included in the study. Two hundred eighty-nine pts were seen in the surgery clinic post biopsy. Sixteen pts failed to follow-up in the clinic; however, all had benign pathology and were excluded from analyses. Pts who were biopsied were initially scheduled at a mean of 10.51 days (n = 289; range, 1-28; median = 10; SD, 4.17) post biopsy; however, they were actually seen at a mean of 13.21 days (range, 2-124; median = 11; SD 10.47). 73.4% (n = 212) of pts were seen ≤ 14 days, although 84.8% (n = 245) of pts had an initial appointment ≤ 14 days. The reasons for delay in date of actual appointment >14 days from biopsy date affected 26.5% of patients (n = 77) and included system delays (49.4%, n = 38), no shows (16.9%, n = 13), patient cancellation (22.1%, n = 17), provider cancellation (9.1%, n = 7), pathology delays (1.3%, n = 1), and other causes (1.3%, n = 1). 91.5% of pts with a BC diagnosis (n = 106) had an initial surgical consultation scheduled ≤ 14 days vs 80.9% of patients with a benign diagnosis (n = 183), a difference that was statistically significant (97 vs 148, p = 0.024). However, due to the delays previously listed, only 74.5% of patients with BC were seen ≤ 14 days compared to 72.7% of patients with benign breast disease (79 vs 133, p = 0.838). For timing of intervention following surgical evaluation in pts with BC, we found that pts were being scheduled for surgery within an average of 33.4 days (n = 59), compared to a mean within 41.2 days to neoadjuvant chemotherapy (n = 24) from first surgical evaluation.
Conclusion Within the AFCBC, we met our pre-established quality indicator goal of 90% of newly diagnosed BC pts getting scheduled for an initial surgical appointment ≤ 14 days. However, there is need for improvement given that only 75% of patients were actually seen ≤ 14 days. No BC pts in this public hospital were lost to follow-up after biopsy, a testament to current hospital processes in place. However, we are in the process of identifying barriers to timeliness of follow-up within the system. The use of navigators in the future may impact pt compliance and availability. Re-educating the nurses, schedulers, and patient navigators regarding the policy of scheduling postprocedure patients <14 days may also further improve on this quality metric.

Is Breast Magnetic Resonance Imaging in Women With Newly Diagnosed Lobular Carcinoma In Situ Beneficial?

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Objective Lobular carcinoma in-situ (LCIS) is associated with an 8- to 10-fold increased risk of developing breast cancer (BC). Magnetic resonance imaging (MRI) is a proven screening tool for women at increased risk of BC. However, the routine use of screening breast MRI for patients with LCIS has not been shown to be effective. The purpose of this study is to retrospectively evaluate if breast MRI is beneficial in women at the time of newly diagnosed LCIS on core needle biopsy (CNB).

Methods IRB-HIPAA–approved retrospective study of women aged 18–89 years diagnosed with LCIS on CNB identified from our pathology database from Jan 1, 2005–June 30, 2014. Patients with a synchronous malignancy or who did not ultimately undergo surgical excision were excluded. Patient information collected included age, breast density, Tyrer-Cuzik score, imaging finding of the index lesion, method for biopsy, CNB histology regarding presence of other high-risk lesions, and radiology-pathology concordance of CNB. Records were then reviewed to determine if patients had breast MRI within 1 year of CNB (cMRI) or did not (sMRI) and whether additional CNB or surgery was performed due to the breast MRI results, if done.

Results Our cohort included 105 women with a diagnosis of LCIS. Sixty-nine women with synchronous malignancy at initial work-up were excluded, leaving 36 (all underwent surgical excision for LCIS). There were 16 (44%) in the cMRI group and 20 (56%) in the sMRI group. The average age (+/-SE) at diagnosis was 55 ± 2 years in cMRI as compared to 59 ± 3 years in sMRI ($p = 0.369$). Breast density was heterogeneous (44%) in cMRI, compared to scattered (55%) in sMRI. An additional high-risk lesion was present at diagnosis in 31% women in cMRI, as compared to 10% in sMRI ($p = 0.204$). The calculated median lifetime risk of breast cancer was similar in the 2 groups (cMRI median risk = 62.0 vs sMRI median risk = 59.2, $p = 0.285$). Five (14%) women were subsequently found to have cancer. Two (6%) were upgraded to DCIS at the time of LCIS excision and 3 (8%) had cancer detected on breast MRI, 2 before LCIS excision and 1 after LCIS excision.

Conclusion In this study, 8% of the women benefited from MRI. Therefore, we advocate for the one-time use of MRI for patients with newly diagnosed LCIS as it can diagnose concurrent breast cancer and therefore positively affect surgical decision-making and patient care.

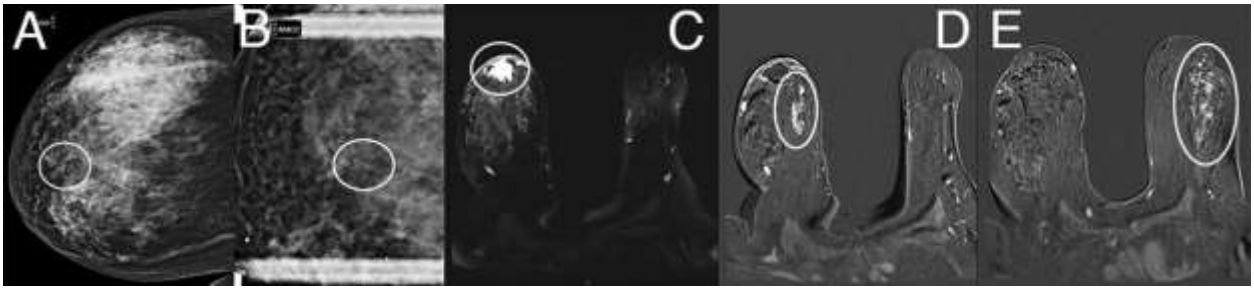

Figure 1. Sixty-eight-year-old female with no personal history of breast cancer and mother with breast cancer at 70. A. Right CC view with new grouped heterogeneous calcifications (circle); B, Magnification view confirms calcifications (circle), biopsy-proven pleomorphic LCIS on stereotactic biopsy; C, Postsurgical axial T2-weighted MRI shows lumpectomy bed from excision (circle); D, Axial post–gadolinium MRI shows ipsilateral clumped segmental NME with rapid and washout kinetics (circle) found to be ILC on excision; E, Axial post–gadolinium MRI shows contralateral clumped segmental NME with rapid and washout kinetics (circle) found to be DCIS/LCIS on excision.

Breast Cancer Following Augmentation Mammaplasty: A Case-Control Study

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Objective The purpose of this study was to determine whether augmentation mammaplasty affects breast cancer detection, staging, and treatment.

Methods Following IRB approval, from January 2000 to January 2013 cases were identified as patients with previous breast augmentation who developed breast cancer. A randomized control group of 5–10 age- and race-matched breast cancer controls were identified per case (from the affiliated institutional cancer center). All data were retrospectively reviewed for implant details (age, anatomic location, and fill type), histology, staging, method of detection, and treatment. Pearson chi-square analysis, one-way ANOVA, and Wilcoxon rank-sum (Mann-Whitney) test were applied for statistical analysis.

Results A total of 48 cases and 302 controls were included in the study. Breast cancer histology, receptor status, and BRCA1/2 status were comparable in both groups (Table 1). All palpable lesions were detected at a smaller size in augmented patients (1.6 ± 0.8 cm vs 2.3 ± 1.6 cm, $p < 0.001$). Augmented patients presented with a physical finding in 54.2% vs 50.4% in controls and were found on breast imaging in 45.8% of case vs 49.6% of controls ($p = 0.738$). Lesions in augmented patients were detectable in 77.8% of cases on screening mammography vs 90.7% in controls ($p = 0.010$) with comparable BI-RADS findings (3.96 vs 3.96, respectively). Patient with breast implants were more likely to undergo an excisional biopsy (20.5% vs 4.4%, $p < 0.001$) and less likely to undergo core needle biopsy (77.3% vs 95.3%, $p < 0.001$). Earlier staging in augmented patients approached but did not reach statistical significance (Table 1, $p = 0.073$). Augmented patients had a higher mastectomy rate and a lower rate of breast conservation therapy (74.5% vs. 57.0% and 25.5% vs 43%, respectively, $p = 0.023$). Mean duration of implants was 14.1 ± 9.7 years. Subgroup analysis revealed implant fill type and anatomic location did not significantly differ in their effect on outcomes (Table 1).

continues

Table 1. Case-Control Study Demographics, Breast Cancer Characteristics, TNM Classification, Staging, Intervention, and Implant Subgroup Analysis

	Cases (Breast Cancer Patients With Prior Augmentation Mammaplasty)	**Controls (Nonaugmented Breast Cancer Patients)**		
N	48	302		
Mean age (range)	47.4 ± 8.7 years (33-71 years)	48.1 ± 8.1 years (33-72 years)		
Race: Caucasian	85.4%	84.1%		
Race: Not Caucasian	14.6% Black: 4.2% Asian: 4.2% Latina: 4.2% Other: 2.1%	15.9% Black: 6.6% Asian: 6.6% Latina: 0.7% Other: 2.0%		
BRCA 1 or 2	8.7%	5.9%		
BRCA negative	39.1%	33.5%		
BRCA not tested	52.2%	60.7%		
Histology: EIDC	76.6%	88.4%		
Histology: DCIS	21.3%	10.9%		
Histology: ILC	2.1%	0.7%		
Mean size of primary lesion (cm)*	1.4 ± 0.8	2.0 ± 1.4		
T*				
Is*	20.5%	12.1%		
1*	70.5%	54.6%		
2*	9.1%	26.1%		
3*	0%	3.9%		
4*	0%	3.3.%		
N				
0	79.6%	67.9%		
1	18.2%	25.2%		
2	2.3%	5.3%		
3	0%	1.7%		
M				
0	100%	98.3%		
1	0%	1.7%		
Staging				
0	20.5%	10.9%		
1	52.3%	42.1%		
2	25%	34.1%		
3	0%	1.6%		
4	0%	0%		
		continues		

Implant Subgroup Analysis	*Fill Type: Silicone*	*Fill Type: Saline*	*Anatomic Location: Subglandular*	*Anatomic Location: Subpectoral*
N	27	17	14	31
Mean size of primary lesion (cm)	1.52 ± 0.96	1.30 ± 0.43	1.32 ± 0.67	1.49 ± 0.92
Presentation: Palpable mass	55.6%	41.2%	57.1%	54.8%
Presentation: Mammogram	33.3%	58.8%	28.6%	41.9%
Presentation: MRI	11.1%	0%	14.3%	3.2%
False negative mammography	23.1%	18.8%	14.2%	25.8%
Tissue diagnosis: core needle biopsy	80.7%	73.3%	61.5%	82.8%
Tissue diagnosis: excisional biopsy	15.4%	15.4%	38.5%	13.8%
BI-RADS, mean	4.00 ± 0.69	3.89 ± 0.60	4.00 ± 0.67	3.95 ± 0.62
Neoadjuvant therapy	18.5%	17.7%	21.4%	16.1%
Surgical intervention: Mastecomy	66.7%	82.4%	64.3%	77.4%
Surgical intervention: Breast-conserving therapy	29.6%	17.7%	35.7%	22.6%
Mean implant duration (yr)	*17.1 ± 10.3	*9.4 ± 7.4	16.6 ± 10.1	13.2 ± 9.6

*Denotes a p value < 0.05.

Conclusion This is a larger, contemporary study of breast cancer following augmentation mammaplasty demonstrating that breast implants can lead to earlier detection of breast cancer but is susceptible to being missed on screening mammography despite modern mammographic techniques. Patients with implants are more likely to undergo more aggressive measures, such as an excisional biopsy rather than core needle biopsy, and are more likely to receive a mastectomy rather than breast conservation therapy. Implant fill type (silicone vs saline) and anatomic location (subglandular vs subpectoral) have comparable effects on breast imaging, biopsy, and surgery.

Implications of Oncoplastic Surgery and Immediate Reconstruction in Multidisciplinary Treatment of Breast Cancer

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Objective Oncoplastic procedures (OP) in breast-conserving surgery (CS) and immediate reconstruction (IR) after mastectomy (TM) are surgical options to achieve better cosmetic results, besides oncological purpose. Their oncological safety has been focused in recurrence after surgery. The increased surgical complexity and eventual complications that can lead to delay in starting adjuvant therapy (AT) has been less considered, despite this interval may have influence on survival. The aim of this study was to determine if the addition of OP and IR to BC surgery had impact on multidisciplinary treatment, namely late onset of AT.

Methods Observational comparative study of BC patients treated at the IPOLFG Breast Unit (Jan–Dec 2013) with surgery followed by AT (radiotherapy/chemotherapy). The study groups were patients undergoing exclusive CS vs CS + OP (unilateral/bilateral) or exclusive TM vs TM + IR (unilateral/bilateral) (Figure 1). The groups were compared for distribution by age, ASA, BMI, subtype, stage, and axillary surgery (SLNB/ALND). The main outcome was time interval from surgery to AT initiation and secondary outcomes were length of hospital stay, surgical margins, and Clavien III complications. Parametric and nonparametric tests for variables with normal or nonnormal distribution, respectively. Chi-square test for categorical variables. $P < 0.05$.

Results Of 817 patients operated during the study period, 474 had surgery followed by AT: 303 underwent CS (232 OP [unilateral/bilateral] simultaneously) and 171 TM, (76 IR with myocutaneous latissimus dorsi flap and prosthesis).The average age was 59.09 (SD ± 12.7) years, being CC and TM groups older ($p < 0.001$). In the group treated with CS ± OP no differences were found in ASA ($p = 0.064$) or BMI ($p = 0.260$) status. The group of TM had higher ASA ($P < 0.0001$) and BMI ($p = 0.011$) status compared to TM ± IR. All study groups were equivalent in the distribution by stage ($p = 0.207$) and subtype ($p = 0453$). CS ± OP were equivalent considering axillary surgery

(p = 0.250); while TM group had more frequently ALND compared with TM + IR group (p = 0.013). The median time interval between the day of surgery and the first day of AT was: CS 48 (41-59) days; CS + OP unilateral 50 (41-60) days; CS + OP bilateral 49 (42.5-55) days; TM 48 (40-62) days, TM + IR unilateral 50 (43-60) days, and TM + IR bilateral 51.5 (40-60) days without statistical difference between groups (p = 0.696). The median hospital stay was 1 (1-1) day CS ± OP (p = 0.429), 2 (1-2) days TM, 2 (2-2) days TM + IR unilateral, and 3.5 (3-4) days TM + IR bilateral (p = 0.030). No differences in margins status were registered after CS ± OP (p = 0.258). The Clavien III complications in different groups did not differ (p = 0.696), although TM ± IR had a greater number of dressings (p = 0.232).

Conclusion Results suggest that the association of OP to CS or IR after TM does not interfere with the multidisciplinary treatment, particularly the start of AT, helping to demonstrate the oncological safety of these surgical strategies.

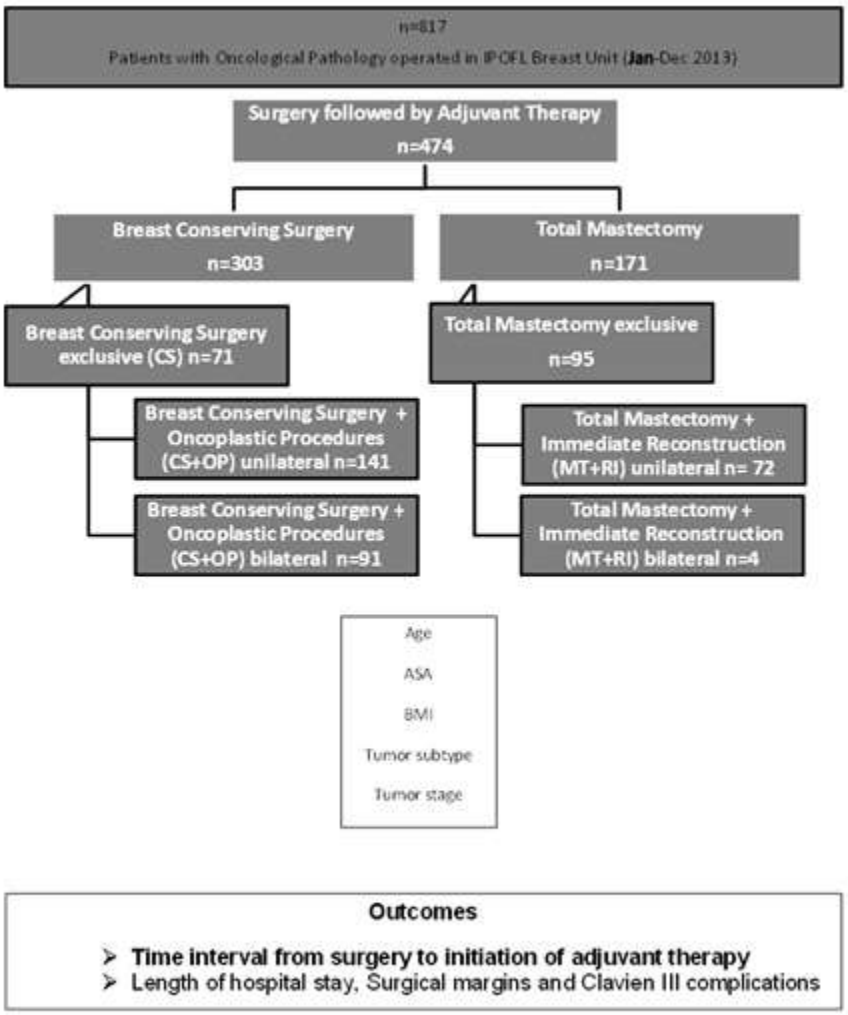

Figure 1: Study Fluxogram

Prior Breast Irradiation and Post-Mastectomy Irradiation Are Not Contraindications to Nipple-Sparing Mastectomy With Immediate Reconstruction

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Objective Nipple-sparing mastectomies (NSM) are increasingly common because of the improved cosmetic outcomes achieved. Radiation therapy (RT) has been a relative contraindication to immediate reconstruction due to concerns about increased complications and negative cosmetic outcomes. There are no large studies specifically evaluating outcomes of reconstruction performed after NSM in irradiated breasts.
Methods We retrospectively reviewed NSM with immediate reconstruction from 1/1/2007 to 12/31/2013 at our institution. Breasts were divided into 3 cohorts: unirradiated controls, prior radiation, and postmastectomy radiotherapy (PMRT). Patient characteristics, operative details, and clinical outcomes were reviewed. Measured outcomes included reconstruction failure, nipple/areola necrosis, early complications needing surgical revision (infection, hematoma, or necrosis), late complications needing surgical revision (capsular contraction, implant rupture, implant exposure), etc, and cosmetic revisions and overall unplanned surgery.
Results We identified 982 breasts in 565 patients: 816 had no RT, 69 had prior RT, and 97 had PMRT. Mean age was 47 years (range, 23–78 years). Median follow-up was 23 months. Complications occurred significantly more frequently in breasts with prior RT (21.7%) or PMRT (17.5%) than those with no RT (10.2%). Compared to no RT, breasts with prior RT had more nipple/areola necrosis (7.2% vs 2.2%, P = 0.03), early complications (18.8% vs 7.1%, p < 0.001), and unplanned surgeries (33.3% vs 22.5%, p = 0.04). Compared to breasts with no RT, those undergoing PMRT had a significantly increased rate of reconstruction failure (8.2% vs 2.2%, p = 0.003) [Table 1]. On multivariate regression analysis, prior RT (OR = 2.53, p = 0.006) and PMRT (OR = 2.29, p = 0.015) were independent risk factors for complications needing surgical revision. Four additional independent risk factors were identified: age >55 years (OR = 2.03, p = 0.04), breast volume ≥ 800 cm^3 (OR = 1.96, p = 0.04), smoking (OR = 2.62, p = 0.001), and a peri-areolar incision (OR = 1.74, P = 0.03). In irradiated breasts, without additional risk factors, complication rate was 8.1%. With 1, 2, 3, or 4 additional independent risk factors, complication rates were 14%, 26%, 40%, 50%, respectively (p < 0.001).
Conclusion Although complication rates are higher in irradiated breasts, reconstruction failure is rare and nipple/areola necrosis is infrequent. Neither prior irradiation nor postmastectomy radiotherapy should be a contraindication to nipple-sparing mastectomy.

Table 1. Surgical Complications of NSM With and Without Radiation

	Cohort 1 None RT (n = 816)	Cohort 2 Prior RT (n = 69)	Cohort 3 PMRT (n = 97)	P values		
				1:2	1:3	2:3
Reconstruction failure	18 (2.2%)	2 (2.9%)	8 (8.2%)	0.47	0.003	0.19
Overall skin necrosis *	37 (4.5%)	8 (11.6%)	10 (10.3%)	0.02	0.02	0.79
Necrosis at nipple/areola**	18 (2.2%)	5 (7.2%)	4 (4.1%)	0.03	0.29	0.49
-Nipple loss	7 (0.9%)	3 (4.3%)	4 (4.1%)	0.04	0.02	1.00
-Nipple retain	11 (1.3%)	2 (2.9%)	0 (0%)	0.60	0.39	0.17
Overall complications	83 (10.2%)	15 (21.7%)	17 (17.5%)	0.003	0.03	0.50
-Early complication***	58 (7.1%)	13 (18.8%)	10 (10.3%)	<0.001	0.26	0.12
-Late complication****	28 (3.4%)	2 (2.9%)	7 (7.2%)	1.00	0.06	0.31
Cosmetic revisions	112 (13.7%)	12 (17.4%)	8 (8.2%)	0.40	0.13	0.07
Overall unplanned surgery	184 (22.5%)	23 (33.3%)	22 (22.7%)	0.04	1.00	0.13

RT, radiation therapy, PMRT, postmastectomy radiotherapy.
*Any skin necrosis, includes nipple and areola necrosis.
**Includes partial or total nipple/areola necrosis.
***Early complications requiring surgery, including: infection, necrosis, and hematoma.
****Late complications needing surgical revision: capsular contraction revision, implant/TE rupture, and implant/TE exposure.

Return to Work After Breast Cancer

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Objective With more than 2 million breast cancer survivors, the impact of cancer treatment on the U.S. workforce may be significant. Most literature regarding return to work after cancer is from Canada or Europe. This study aims to examine the return-to-work rate after breast cancer, factors affecting return, and number of hours worked upon return.

Methods An IRB-approved prospective cohort study was performed at a large academic center. Women ages 24-60 and employed >/= 35 hours/week were enrolled prior to their breast surgery. Patients were given baseline, 3-month, and 18-month surveys. Baseline surveys asked about education, insurance, and employment. At 3 and 18 months, surveys asked about additional treatment, side effects, and return to work. Charts were reviewed for cancer staging, operation, and anesthesia. Wilcoxon signed rank tests were used to compare hours worked between time points within group, and Wilcoxon rank sum tests were used to examine differences between groups.

Results One hundred nine patients (80 cancer, 29 benign disease) were enrolled and completed at least 1 survey. Eighty-four women had hours worked reported at all 3 time points; 94.4% of those patients returned to work by 18 months after surgery. Six breast cancer patients did not return to work; 5 had heavy labor jobs. Patients in both groups were similar in baseline number of work hours, flexibility of work options, union members, plans to return to work, marital status, insurance status, importance of mental activity or physical appearance at work, number of children, and education level. Receptor status, lymph node positivity, chemotherapy, radiation, and reconstruction status were similar between cancer patients who did and did not return to work. Cancer patients saw a significant reduction in hours worked between baseline and 3 months ($p < 0.0001$), with 58% working fewer hours at 3 months compared to baseline. The change in hours worked between baseline and 3 months was significantly larger in cancer patients than patients without cancer (Table 1, $p = 0.04$). By 18 months, cancer patients no longer differed from patients without cancer with respect to hours worked relative to baseline ($p = 0.59$).

Conclusion Breast cancer patients had a significant reduction in hours worked at 3 months but rebounded by 18 months. Women with heavy labor jobs were less likely to return to work. Additional studies should be done to confirm these results in other populations.

Table 1. Comparing Change in Hours Worked at 3 Months and 18 Months Relative to Baseline Between the Cancer and No Cancer Groups

	Cancer	No Cancer	P value*
3 months vs baseline	N = 72	N = 21	0.04
Working fewer hours/week	42 (58%)	8 (38%)	
Working same hours/week	26 (36%)	8 (38%)	
Working more hours/week	4 (6%)	5 (24%)	
18 months vs baseline	N = 67	N = 16	0.59
Working fewer hours/week	23 (34%)	6 (38%)	
Working same hours/week	34 (51%)	5 (31%)	
Working more hours/week	10 (15%)	5 (31%)	

Note: Patients “not currently working” were treated as 0 hours/week.
*P value from Wilcoxon rank sum test.

Factors Leading to Lower Rates of Immediate Breast Reconstruction in a Public Safety-Net Hospital

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Objective Immediate breast reconstruction (IBR) rates have increased in the United States over time. In our 2 institutions, the same faculty treat patients in a multidisciplinary manner at a public safety-net hospital and a private comprehensive cancer center. We hypothesized that there was a significantly lower rate of IBR at a public safety-net hospital vs a private academic cancer center after controlling for relevant covariates. A secondary aim was to elucidate which factors were associated with higher likelihood of IBR.

Methods We retrospectively reviewed the records of women with stage 0-III breast cancer who underwent mastectomy with or without IBR between January 1, 2006, and December 31, 2013, at our 2 institutions. We performed the Wald chi-square test to evaluate correlations between patient, tumor and treatment variables, and institutional cohorts. We performed logistic regression to evaluate for predictors of IBR after controlling for covariates.

Results Our study cohort (n = 453) included 327 patients from our safety-net hospital and 126 patients from our cancer center. A discussion was documented regarding IBR for 78% of patients overall (no difference between institutions, $p = 0.82$). In our safety-net hospital, 38.2% of mastectomy patients had IBR vs 57.1% at our cancer center ($p = 0.0012$). Factors associated with treatment at our safety-net hospital included Hispanic race, age < 65, overweight/obese, Medicare/Medicaid insurance, patient declining reconstruction, higher pathologic stage, unilateral mastectomy, wound infection, HER2-positive disease, receipt of genetic testing, receipt of neoadjuvant chemotherapy, adjuvant chemotherapy, or radiotherapy ($p < 0.01$). Factors associated with treatment at our cancer center included private insurance, being employed, higher age-adjusted Charlson co-morbidity index, family history of breast cancer, contralateral prophylactic mastectomy (CPM), and receipt of skin- or nipple-sparing mastectomy ($p < 0.02$). On multivariate analysis of all significant covariates, patients who did not receive radiotherapy had an odds ratio (OR) of 151 of receiving IBR ($p = 0.23$). Patients with an age-adjusted Charlson comorbidity index of 2 had an OR of 0.047 of IBR vs an index of ≥ 3 ($p = 0.0082$). Patients receiving treatment at a safety-net hospital had an OR of <0.001 of IBR vs those treated at a cancer center ($p = 0.02$). In a bivariate analysis of insurance status as a predictor of IBR, patients with private insurance had an OR of 7.2 of IBR ($p < 0.001$). In a separate multivariate analysis of insurance status as a predictor of IBR with adjustment for institution, only treating institution retained significance with an OR of 29.2-fold higher likelihood of IBR at a cancer center ($p < 0.001$), regardless of insurance status ($p = 0.55$).

Conclusion Although the treating physicians were quite similar at the 2 institutions, the likelihood of IBR was not similar at 2 adjacent institutions. Although patients treated in our public safety-net hospital had more advanced disease stage, patients treated at our cancer center had more comorbidities. After controlling for patient, tumor, and treatment covariates, only the treating institution, receipt of radiation therapy, and Charlson comorbidity index predicted for receipt of IBR. Insurance status did not independently predict for receipt of IBR, suggesting that our public safety-net hospital provides access to IBR for uninsured and Medicare/Medicaid patients.

Staging the Axilla With Ultrasound and Core Biopsy for Breast Cancer Patients Receiving Neoadjuvant Chemotherapy

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Objective Axillary staging is an important prognostic factor in the management of breast cancer patients. Given associated morbidities of axillary lymph node dissection (ALND), recent trials including ACOSOG Z0011 and Z1071 advocated for less aggressive axillary staging techniques for early-stage breast cancer and in patients status post neo-adjuvant chemotherapy (NAC). In 2009, our institution began using axillary ultrasound (AUS) and lymph node core biopsy (CB) in NAC breast cancer patients. Our aim was to investigate predictive value of AUS CB for patients in need of axillary staging and to determine accuracy of these biopsies for NAC patients.

Methods An IRB-approved retrospective review of the institutional 2009–2013 breast cancer records was used to

identify patients with AUS CB prior to sentinel lymph node biopsy (SLNB) and/or axillary lymph node dissection (ALND). Patients were stratified to those receiving NAC or not. This report focuses on NAC patients. Clinical, sonographic, and histological variables were analyzed to identify predictors of nodal invasion at time of surgery. Post NAC AUS images were reviewed to evaluate the predictive value of follow-up AUS for nodal metastasis.
Results Seventy-two patients underwent AUS CB and were treated with NAC. Dedicated breast radiologists performed CB and averaged 2.95 cores per patient. Abnormal nodes were described as "prominent," "enlarged," "hypoechoic," or "thickened cortex." Fifteen patients had negative CB, with 12 having negative SLNB and 3 with positive SLNB after NAC. For patients with negative CB, the positive predictive value (PPV) of having negative nodes was 80%. Of the 57 patients with positive CB, 49 patients received interval and/or post-NAC AUS to evaluate treatment progress. Eight patients showed no AUS improvement, with 2 patients having negative nodes and 6 patients having positive nodes on their surgical pathology. The PPV for persistent nodal disease in patients with no improvement on post-NAC AUS was 75%. The remaining 41 patients showed AUS improvement on post-NAC AUS. In this cohort, 14 patients had negative nodes removed at surgery and 27 patients had positive nodes. Thus for CB-positive patients who showed improved post-NAC AUS, the PPV of AUS results indicating eradication of nodal metastasis was 34.14%.
Conclusion While the utility of AUS CB is helpful, preoperative negative AUS CB does not replace the SLNB but does predict for negative SLNs and should allow for the use of SLNB in this population of patients receiving NAC, with ALND as a secondary procedure. Correct nodal status after NAC for those patients with initial positive CB cannot be determined with AUS and must rely on definitive surgery in the post NAC setting. In the future, more definitive imaging may be available. In the meantime, ALND would be indicated or SLND may be offered, optimizing the false-negative rate with aid of dual tracers, retrieval of >2 sentinel nodes, and utilization of nodal clip placement as found in ACOSOG Z1071 trial.

Practice Changes After the Consensus Guidelines on Margins for Breast-Conserving Therapy – A 6-Month Review

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Objective The Society of Surgical Oncology and the American Society for Radiation Oncology published Consensus Guidelines on Margins for Breast-Conserving Surgery with Whole-Breast Irradiation in Stages I and II Breast Cancer in February 2014. The panel concluded that "no ink on tumor" is an adequate margin when excising invasive breast cancer. The guideline was reviewed and adopted by our institution's multidisciplinary breast team. We hypothesized there would be a decrease in re-excision rates and tissue volume removed since adopting the guidelines in February 2014.
Methods A retrospective chart review was performed at our 2 institutions. In keeping with the inclusion/exclusion criteria utilized by the Margins Panel in their meta-analysis, we reviewed all the patients diagnosed with stage I and II invasive breast cancer who underwent breast-conserving therapy and whole-breast radiation therapy from February 26, 2014, to August 26, 2014. These data were compared to a cohort of patients from the prior 6-month period. We assessed rates of re-excision and changes in surgical practice.
Results We reviewed 119 cases contributed by 6 surgeons, including 39 from the county hospital and 80 from the university hospital. Pre-consensus group was comprised of 53 patients vs 66 patients in the post-consensus group. Mean tumor size in the pre-consensus group was 1.65 cm and 1.59 cm in the post-consensus group ($p = 0.8$). The mean specimen volume in the pre-consensus group was 68.4 cm^3 and 99.2 cm^3 in the post-consensus group ($p = 0.8$). Twenty-one percent (25/119) of the lumpectomies were performed with cavity shave margins, 27% (32/119) with directed margin excision, and 52% (62/119) were traditional lumpectomies. Cavity shaves decreased from 32.1% pre-consensus to 12.1% post-consensus ($p = 0.09$). Directed margin excisions increased from 18.9% pre-consensus to 33.3% post-consensus ($p = 1$). In the pre-consensus group, 13.2% ($n = 7$) underwent re-excision, 6 for transected margin and 1 for close margin, whereas in the post-consensus group 15% ($n = 12$) underwent re-excision for transected margin ($p = 0.4$). 34.7% ($n = 16$) of the patients with "close" margins (</= 3mm) didn't undergo re-excision in the pre-consensus group, vs 40.7% ($n = 22$) in the post-consensus group ($p = 0.5$). Re-excisions were performed in 8% (2/25) cavity shaves,15.6% (5/32) directed margins, and 19.4% (12/62) lumpectomies ($p = 0.5$) .
Conclusion Following implementation of the margin consensus guidelines, there was a decrease in re-excisions for patients with close margins. While not yet statistically significant, there is a trend to decreased re-excisions post consensus. The number of "no re-excisions" in the pre-consensus group may reflect a bias of the surgeons who were

implementing the guidelines before they were officially adopted. Specimen volume did not statistically differ between the 2 groups; however, surgeons began modifying their practice of re-excision for "close" margins. One surgeon reduced the number of cavity shaves performed post consensus, without an increased re-excision rate. Potential benefits to patients of adopting the guidelines include avoidance of a second surgery and delay in radiation therapy/chemotherapy, and improved cosmesis with fewer re-excisions. We plan to prospectively monitor adherence to guidelines and re-excision rates as quality measures and to confirm these trends.

Increasing Contralateral Prophylactic Mastectomy Associated With Increased Genetic Testing and Greater Risk of Postoperative Complications

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Objective Prior studies have demonstrated increasing trends in contralateral prophylactic mastectomy (CPM) over the past decade. Total skin-sparing mastectomy (TSSM), with complete preservation of the breast and nipple-areolar complex (NAC) skin and excision of nipple tissue, has been a standard mastectomy procedure at our institution since 2005. We aimed to evaluate trends in treatment of unilateral breast cancer with unilateral TSSM or bilateral TSSM (with CPM) and to determine differences in risk of postoperative complications.
Methods We reviewed all patients with unilateral breast cancer who underwent unilateral TSSM or bilateral TSSM (with CPM) and immediate breast reconstruction from 2005 to 2013. We excluded bilateral prophylactic mastectomies. Patient demographics, histories, genetic testing, postoperative complications, and outcomes were gathered via retrospective review.
Results We identified 303 unilateral TSSM patients and 282 bilateral TSSM patients with median follow-up of 25 (IQR, 13-52) months. The percentage of bilateral TSSM patients increased from 43% in 2005 to 59% in 2013 ($p = 0.012$). During this time period, the percentage of patients who underwent genetic testing rose from 0% to 60% ($p < 0.001$). This resulted in an increasing trend in patients diagnosed with deleterious BRCA mutations who all underwent bilateral TSSM. Additionally, 107 of 189 (57%) patients who tested negative for known genetic mutations had bilateral TSSM. The mean age of 46 ± 9 years in bilateral TSSM patients was 4 years younger than the mean age of 50 ± 10 in unilateral TSSM patients ($p < 0.001$). A greater percentage of bilateral TSSM patients had a first-degree relative with breast cancer or underwent genetic testing ($p < 0.001$). When comparing the breasts being treated for cancer, there were no statistically significant differences with regard to prior surgical history or exposure to radiation therapy. There were no significant differences in the presenting clinical stage of the breast cancers being treated, but the pathologic stages were lower in the bilateral TSSM patients ($p = 0.006$) because more patients received neoadjuvant chemotherapy. Bilateral TSSM increased the risk of superficial nipple necrosis by 5% (RR, 2.1; 95% CI, 1.1–3.8), wound breakdown by 6% (RR, 1.7; 95% CI, 1.1–2.6), infections requiring oral antibiotics by 11% (RR, 1.6; 95% CI, 1.2–2.2), infections requiring IV antibiotics by 5% (RR, 1.4; 95% CI, 0.96–2.0), and infections requiring procedures by 4% (RR, 1.4; 95% CI, 0.9–2.3). For those who underwent tissue expander-based reconstruction, bilateral TSSM increased the risk of implant exposure by 5% (RR, 2.1; 95% CI, 1.1–4.0). The risk of losing an implant-based reconstruction was similar between the groups.
Conclusion The increasing use of genetic testing in patients who have personal or family histories of breast cancer with possible genetic predispositions has spurred an increase in patients choosing bilateral TSSM over time. A large percentage of these patients who test negative still undergo bilateral TSSM. As previously reported and expected, bilateral TSSM patients are younger in age and have a greater risk of experiencing long-term postoperative complications (infections, wound breakdown, implant exposure), compared to unilateral TSSM patients.

Outcomes of Skin-Sparing and Nipple-Sparing Mastectomies Following Neoadjuvant Chemotherapy

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Objective Traditionally skin-sparing mastectomy (SSM) and nipple-sparing mastectomy (NSM) have been utilized for patients undergoing prophylactic mastectomy or for early-stage breast cancer (BC). Patients with advanced disease historically were not offered immediate reconstruction (IR) due to degree of local tumor burden at time of presentation and high risk of recurrence. With successful rates of pathologic response following neoadjuvant chemotherapy (NAC), IR is increasingly being offered to this subset of patients. We hypothesize that SSM/NSM with IR following NAC for advanced BC has safe oncological and technical outcomes.
Methods A retrospective review of all patients ($n = 1747$) who underwent SSM or NSM at our institution from 2006–2014 identified 182 patients who underwent NAC followed by SSM or NSM and IR. Patient demographics,

tumor characteristics, surgery type, complications, and recurrence were analyzed. Univariable analyses of recurrences were made using the Cox proportional hazards model.
Results One hundred eighty-two patients with 189 BC underwent NAC followed by SSM (94%) or NSM (6%) with IR. Mean age was 51 ± 10.2 years. Mean pre-NAC tumor size was 4.7 ± 2.4 cm with a post-NAC tumor size of 1.5 ± 1.8 cm. Clinical lymph node (LN) status was positive in 62% and pathologically positive in 45% patients following NAC. NAC resulted in 32 patients (17.6%) with a pathologic complete response. One hundred fifty-nine patients had tissue expander placed (88%), 3 patients had direct implant (1%), and 20 patients underwent autologous reconstruction (11%). At median follow-up of 30 months, recurrence was 10.4%, (locoregional, 1.6%; distant, 9.3%). The 3 locoregional recurrences (LRR) were: chest wall, mastectomy incision, and axillary LN. Variables that significantly predicted recurrence were pre-NAC size and residual tumor size (HR = 2.93 and 1.91, p value < 0.001 and 0.002, for pre-NAC and residual measurements, respectively). Overall wound complication rate was 17.6%. Complications by reconstruction type and radiation (XRT) received are reported in Table 1. Complication and recurrence rates did not differ significantly between SSM and NSM groups.
Conclusion Our data suggest that SSM and NSM with IR following NAC have low LRR rates. In this patient population, distant failure remains the primary oncological challenge. Larger tumor size both before and after NAC is significantly related to recurrence. This series suggests that positive oncologic and technical outcomes can be achieved using SSM or NSM for locally advanced BC following NAC, thus extending the indications for these procedures.

Table 1

	Total N = 182	Total With XRT N = 129	Total Without XRT N = 53	Implant N=162		Autologous N = 20	
				XRT N = 122	No XRT N =40	XRT N = 7	No XRT N = 13
Wound Complications	17.6%	18.6%	15.1%	18.9%	17.5%	14%	7.7%
Infection	11.5%	**13.2%**	**7.5%**	13.1%	10%	14%	0%
Dehiscence	6%	6.2%	5.7%	6.6%	7.5%	0%	0%
Hematoma	2%	1.6%	3.8%	1.6%	2.5%	0%	7.7%
Skin Necrosis	4%	3.9%	3.8%	3.3%	5%	14%	0%
Nipple Necrosis	0%	0%	0%	0%	0%	0%	0%
Implant Removal				19.7%	17.5%		
Contracture	11%	14.7%	1.9%	**15.6%**	**2.5%**	0%	0%

Rate of Pathological Upgrade in Patients With Lobular Neoplasia on Initial Core Needle Biopsy
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Objective The dilemma about whether to excise breast lesions that are categorized as lobular neoplasia (LN) [lobular carcinoma in situ (LCIS) or atypical lobular hyperplasia (ALH)] on initial core needle biopsy has become more prevalent as the frequency and sensitivity of breast cancer screening has increased. Pre-malignant lesions, such as atypical ductal hyperplasia (ADH), warrant excisional biopsy due to the risk of pathological upgrade and the subsequent need for further medical and surgical intervention. While not pre-malignant, some have promoted excision of lesions containing LN because of an unclear possibility of upgrade.
Methods A retrospective analysis was conducted of a pathological database from January 2005 to August 2014. Women who underwent core needle biopsy and whose specimen included LCIS or ALH as the highest risk lesion were identified. Patients with a known ipsilateral cancer were excluded. For the patients who ultimately went on to excision of the lesion, the radiologic targets for biopsy were identified and categorized as mammographic calcifications, mammographic density, MRI enhancement, or palpable lesion. The pathology of the excisional biopsy was reviewed and considered to be an upgrade if the specimen contained a clinically more significant histology, such as invasive cancer or ductal carcinoma in situ (DCIS). The rate of upgrade was correlated with initial radiologic indication for core needle biopsy and evaluated statistically with a chi-square analysis
Results Initially 284 women whose highest risk lesion on core needle biopsy was ALH or LCIS were identified, from which 140 went on to excisional biopsy after excluding those with ipsilateral cancers. The ages of the patients ranged from 32 to 91 years with a mean of 53 years. The rate of upgrade after excision is summarized in the table.

The rate of upgrade was not significantly different when the radiologic target of the initial biopsy was considered, including when palpable lesions were excluded (p = 0.904).
Conclusion While excision of breast lesions with a primary pathology of ALH or LCIS has been debated, especially when the indication for biopsy is calcifications, the rate of pathologic upgrade is similar to the rate of upgrade for ADH. Therefore, the risk for patients needing subsequent therapy due to an upgrade may justify excisional biopsy when these benign lesions are identified.

Radiologic target	Total	Pathologic upgrade	Rate of upgrade (%)	P value
Mammographic calcifications	85	15	17.6	0.485
Mammographic density	16	3	18.8	
MRI enhancement	28	4	14.3	
Palpable lesion	11	0	0	
	140	22	15.7	

Long-Term Results Over 10 Years After Video-Assisted Breast Surgery Are Evaluated for Early Breast Cancer
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Objective The conventional breast surgery, including breast conserving surgery (BCS), makes many long wound scars on the breast with granulated ugly scars. We devised endoscopic video-assisted breast surgery (VABS) to perform partial and total mastectomy without any wound on the breast. We have performed on more than 400 patients since 2001. We evaluated the long-term results of the aesthetics and curability over 10 years after surgery.
Methods VABS consists of BCS, mastectomy, sentinel node (SN) biopsy, axillary node dissection, and breast reconstructions. It uses periareolar approach and/or axillary approach. Transaxillary retromammary approach (TARM) is a single-port surgery with an axillary skin incision. Each wound length is usually 2.5 cm, but 1 cm for SN biopsy. We cut the mammary gland with clear surgical margin from behind the mammary gland. The postoperative aesthetic results were evaluated by ABNSW.
Results BCS was performed on 300 patients and skin-sparing mastectomy on 50 patients. The operative cost is very low as the conventional one. There was no significant difference in operational infestation. There was no serious complication after surgery. Surgical margin was minimally positive in 2 patients. The original shapes of the breast were preserved well. The follow-up is 160 months at maximum. There were 3 locoregional recurrences and 14 distant metastases. Five-year survival rate is 97.5%. The postoperative esthetic results were excellent and better. The sensory disturbance was minimal. All patients expressed great satisfaction.
Conclusion VABS can be considered as a good surgical procedure concerning locoregional control and esthetics.

The Decision Context and Sources of Information for Breast Surgery: A Prospective Study
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Objective Little is known about women's views regarding information they receive from their physicians in the preoperative setting to educate them about their choices for breast surgery.
Methods A 55-item survey validated with 20 breast cancer survivors was administered to 150 patients before surgery from 2 institutions. Women were asked about what sources of information they use, what information was provided, and their opinions about the information they received.
Results The median age was 58 years (range, 30-85). Eighty-three (69.2%) were white. Thirty-eight (28.6%) of patients had a first-degree relative with breast cancer. Seventy-nine (59.0%) had a lumpectomy, 43 (32%) a unilateral mastectomy, and 12 (9%) had a CPM. Fifty (35%) felt that decisions about breast cancer surgery were out of their control. Only 13 (9.2%) felt they wanted more time to consider their surgery options and 114 (80.3%) wanted their surgery scheduled as soon as possible. One-hundred twenty-two women (82.5%) said the information they read told the same story. Most women felt that getting information was helpful 88 (61%). The overwhelming majority of women (91.8%) sought out information in addition to what their physician gave them and 50 (34%) sought a second opinion. Sources of information that had strong or some influence on women were websites or

books recommended by their physician (44%), websites or books not recommended by their doctor (30.4%), and magazines (15.4%), but only 6.7% said that social media had some or strong influence. Approximately 90 (63%) stated that their physician mentioned the pluses and minuses about lumpectomy and mastectomy. However, 51 (35.4%) stated that their physician did not discuss the possibility of cancer returning in distant sites even if both breasts were removed and 49 (33.8%) said no one explained the risk of contralateral breast cancer. Moreover, 63 (50.8%) did not hear about what a survival rate means. Ninety-two (62.6%) women stated that none of the information they were given included information about removing the contralateral breast. Women ranked their physician's spoken advice as the most important source of information (74.3%) compared to advice from individuals outside of medicine, online information, breast cancer survivors, and advice from friends/family. Of medical personnel, women stated that their surgeon (81%) had the most influence on their decision, followed by the oncologist (59.1%), and plastic surgeon (29.8%). When asked which individuals outside of medicine influenced their decision, women chose breast cancer survivors as their top choice, compared to their spouse/partner, church leaders, and friends/relatives.

Conclusion Almost all women seek out additional information about their breast cancer surgery from other sources but the majority still highly value their physician's advice and information provided by their physician. Many women do not receive specific information about the distant recurrence risk of breast cancer or contralateral breast cancer risk from their physicians. These findings highlight opportunities for physicians to improve the decision-making process for newly diagnosed breast cancer patients.

Risk Assessment of Contralateral Breast Cancer

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Objective Estimating the risk of contralateral breast cancer (CBC) is becoming increasingly important when advising patients in their query about contralateral prophylactic mastectomy (CPM). Multiple factors have been found to impact that risk resulting in significant variability in our estimates. The aim of this study was to identify the most significant risk factors influencing the risk of CBC in our dataset and their impacts.

Methods The institutional tumor registry was queried for any patient with 2 separate breast cancer diagnoses between 2002 and 2012. Synchronous or ipsilateral cases were excluded so that only metachronous CBCs were included. The relative significance of age at diagnosis, BMI, hormonal factors, chemotherapy, and radiation therapy for the first primary cancer, family history, BRCA mutation, and other non-breast cancers was analyzed.

Results Of the 5057 new breast cancer patients, 134 (2.6%) were identified as metachronous CBC and 110 had records available for the study. The median age at first diagnosis is 50 years, and 20.9 % of the patients were diagnosed before the age of 40. The average time to recurrence was 11 years. Hormonal factors like nulliparity, hormone replacement therapy (HRT), and OCP use did not show a trend for higher risk of CBC. Twenty-one percent of the patients had a first-degree relative with breast cancer. In subset analysis of the patients with recurrence within 5 years, a significantly higher number of those patients were smokers, had HRT, and were treated with radiation therapy to the contralateral breast. BMI was not a significant risk factor for contralateral breast cancer.

Conclusion In our dataset, age at initial diagnosis and family history of a first-degree relative with breast cancer were significantly associated with CBC. In addition, tobacco use, HRT, and previous radiation therapy to the contralateral breast were associated with an earlier CBC.