Scientific Session Abstracts
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Presentation Awards and Eligibility

Abstracts submitted are eligible for awards. The George Peters Award recognizes the best presentation by a breast fellow and is awarded $1,000. The Scientific Presentation Award recognizes an outstanding presentation by a resident or fellow and is awarded $500. All presenters are eligible for the Scientific Impact Award. The recipient of the award is selected by the audience. The awards are supported by The American Society of Breast Surgeons Foundation.

The George Peters 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.

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Scientific Session Oral Presentations

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Perceptions of Contralateral Breast Cancer: An Overestimation of Risk

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Objective: Among patients with unilateral breast cancer, without BRCA mutation, the cumulative 10-year risk of contralateral breast cancer is less than 10%. Despite this relatively small risk, several studies have demonstrated that the rate of contralateral prophylactic mastectomy (CPM) has markedly increased in recent years. The aim of this study was to understand women's perceptions of their breast cancer risk at the time they presented for surgical evaluation and to evaluate tumor and patient factors to determine predictors of risk perception.

Methods: We designed a survey to evaluate perceptions of breast cancer risk and psychosocial well-being in women newly diagnosed with breast cancer. Surveys were distributed to women with ductal carcinoma in situ (DCIS) or invasive breast cancer prior to surgical consultation. Women were excluded from the study if they had a history of cancer, metastatic disease, bilateral breast cancer, identified BRCA mutation, or were undergoing chemotherapy or radiation for breast cancer. Survey items were constructed using open-ended response and 5-point Likert scales (5 = very likely, 1 = not at all likely).

Results: The survey was completed by 45 women with an average age of 53.0 years. Diagnoses included ductal cancer (66.7%), lobular cancer (11.1%), and DCIS (17.8%). Most patients had estrogen receptor positive (86.0%) tumors with a median size of 1.7 cm, and 44.2% of patients had a family history of breast cancer. The majority of patients (56.1%) had breast-conserving surgery (BCS); 17.1% had bilateral mastectomy, including CPM; and 12.2% had unilateral mastectomy (UM). Overall, women grossly overestimated their risk of developing breast cancer in the contralateral breast. The mean estimated 10-year risk of contralateral breast cancer was 32.6% (95% CI, 23.9% to 41.3%) and 2.6 +/- 0.19 on the rank scale. The perceived risk of contralateral breast cancer was not significantly associated with stage (DCIS vs invasive breast cancer), family history, age, or receipt of MRI. The mean perceived risk of recurrence was 40.7% (95% CI, 32.2% to 49.2%) and 2.7 +/- 0.18 on the rank scale. The mean perceived risk for developing metastatic disease was 27.7% (95% CI, 34.7% to 20.7%) and 2.5 +/- 0.16 on the rank scale. The perceived risk of contralateral breast cancer was not significantly different between women who ultimately underwent CPM versus BCS or UM (3.1 vs 2.5, p = 0.18). Likewise, we found no significant differences in anxiety, difficulty sleeping, or unhappiness between patients who underwent CPM versus those who did not.

Conclusions: At the time of surgical evaluation, women with unilateral breast cancer grossly overestimate their risk of contralateral breast cancer. Nevertheless, CPM rates were not significantly associated with perceived risk of contralateral breast cancer. This finding highlights the importance of early surgeon involvement in the decision-making process for cancer treatment and the need to provide patients with accurate information regarding their true contralateral breast cancer risk.

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The Potential Impact of USPSTF Recommendations on the Early Diagnosis of Breast Cancer

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Objective: Diagnosis of early-stage breast cancer relies on mammographic screening for detection. Current U.S. Preventive Services Task Force (USPSTF) guidelines recommend against routine screening mammography in women 40-49 years of age. However, breast cancer occurs at a relatively younger age in non-Hispanic (NH) black women, and survival is poorer in NH black women and in women of lower socioeconomic status (SES). We hypothesized that screening at a younger age may be important for detecting earlier and more treatable cancers for women in these demographic groups. We sought to determine the potential impact of the USPSTF recommendations on women age 40-49 diagnosed with breast cancer in California.

Methods: All female patients age 40-74 years who were diagnosed with DCIS or T1N0 breast cancer between 2004 and 2008 with records in the California Cancer Registry were evaluated. Patients were divided into two age groups: (1) women age 40-49 years, who are excluded from USPSTF recommendations for screening, and (2) women age 50-74 years, who are recommended for screening. Proportions of patients in the two age groups were compared by race/ethnicity, socioeconomic status (SES), and hormone receptor (HR) status, using Pearson chi-squared and logistic regression analyses. HER-2 and triple-negative(TN) status were evaluated for cases of invasive cancer.

Results: Of 46,691 patients identified, 22.6% were age 40-49 years, and 77.4% were age 50-74 years. Overall, 34.4% of the population had DCIS, 72.1% had hormone receptor positive disease, 9.6% had HER-2 positive tumors, and 5.1% had triple-negative tumors. More patients were of the highest SES quintile (30.7%) than lowest (9.6%). The majority of patients were NH white (65.5%), while 15.0% were Hispanic, 12.8% were Asian/Pacific Islander (PI), and 5.4% were NH black. Odds ratios and 95% confidence intervals for DCIS or T1N0 breast cancer in women age 40-49 years versus women age 50-74 years are provided in Table 1. Younger women with DCIS were statistically more likely to be HR positive, higher SES, and Hispanic and Asian/PI race/ethnicity, while younger women diagnosed with T1N0 breast cancer were more likely to be HR positive, HER-2 positive, triple-negative, higher SES, and of non-white race/ethnicity.

Conclusions: Young Hispanic, Asian/PI, and NH black women in California are at increased risk for being diagnosed with early breast cancer than their older counterparts. The lower likelihood of diagnosing DCIS in NH black women may be related to delayed access to screening and care or earlier onset of invasive disease. Excluding 40- to 49-year-old women from screening could impact early diagnosis of HR positive, HER-2 positive, and TN tumors. The implementation of the USPSTF recommendations would disproportionately impact non-white women and potentially lead to more advanced presentation at diagnosis. The impact of these recommendations on survival disparities for non-white and lower SES women warrants further investigation.

Table 1. Odds ratios for breast cancer in women age 40-49 years (versus 50-74 years)

		DCIS N = 16,067		T1N0 N = 30,624	
		OR	95% CI	OR	95% CI
Hormone receptor	Positive	1.85	1.61-2.12	1.43	1.21-1.69
	Negative	1		1	
HER-2	Positive	NA	NA	1.46	1.33-1.60
	Negative	NA	NA	1	
Triple negative	TN	NA	NA	1.67	1.37-2.04
	Not TN	NA	NA	1	
Socioeconomic status quintile	1 (lowest)	0.84	0.71-1.00	0.76	0.67-0.86
	2	0.84	0.73-0.97	0.86	0.78-0.95
	3	0.85	0.74-0.97	0.78	0.72-0.86
	4	0.89	0.79-1.00	0.87	0.80-0.95
	5 (highest)	1		1	
Race/ethnicity	Hispanic	1.62	1.42-1.83	1.82	1.67-1.99
	Asian/PI	1.50	1.33-1.70	1.66	1.51-1.82
	NH Black	0.91	0.75-1.12	1.44	1.25-1.66
	NH White	1		1	
	Other	1.53	1.05-2.24	1.34	0.99-1.82

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Contralateral Prophylactic Mastectomy: Consistency of Satisfaction and Psychosocial Consequences Over Time

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Objective: Several researchers using cross-sectional surveys have found that the majority of women are satisfied with their decision to have contralateral prophylactic mastectomy (CPM) 1 to several years after the procedure. This high level of satisfaction was despite the adverse effects they experienced. The most frequently cited adverse effects included difficulty with body image, sense of sexuality, and sexual relationships. We know very little about the consistency of satisfaction and changes in adverse effects in the same women with longer term follow-up.

Methods: A previously established cohort of women with unilateral breast cancer who had undergone CPM between 1960 and 1993 were surveyed at two time points and the results compared. The initial survey was distributed at a mean of 10.3 years after CPM and the follow-up survey 10 years later at a mean of 20.1 years after CPM. The survey assessed women's current satisfaction with their decision to have CPM, whether they would choose to undergo CPM again, and adverse effects they currently experienced. Patients were included if they returned surveys at both time points. Data were analyzed using McNemar's test for paired proportions or its nonparametric analog, the sign test.

Results: Of the 583 women who responded to the initial survey, 523 were alive and resurveyed 10 years later. Data from both surveys are available for analysis on 269 women. The majority of women continued to be satisfied with their decision to have CPM (86%, initial survey; 90%, follow-up survey, p = 0.06). Similar numbers to that of the initial survey reported neutral feelings or dissatisfaction with their CPM decision on follow-up survey (8% and 6%, respectively, initial survey; 4% and 6% follow-up survey). There was no significant change in the proportion indicating they would choose CPM again, but as with satisfaction, the proportion was slightly higher on the follow-up survey (95%, initial survey; 97%, follow-up survey; p = 0.27).The most frequently cited adverse effects were similar at both time points and included body appearance (29% vs 31%, initial vs follow-up survey, p = 0.61), sense of femininity (21% vs 24%, p = 0.25), and sexual relationships (24% vs 23%, p = 0.68).

Conclusions: There is remarkable stability of satisfaction with decision to undergo CPM over 20 years after surgery. Adverse psychosocial effects do not increase over time.

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Lumpectomy Cavity Shaved Margins Do Not Impact Re-Excision Rates

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Objective: The benefits of taking shaved cavity margins (SCMs) at the time of lumpectomy are unclear. Reports of decreased re-excision rates with additional shaved margins range from 14-66%. However, drawing conclusions from these studies is challenging due to the lack of direct comparison to lumpectomy groups alone, the exclusion of patients with DCIS, and the limited amount of information regarding overall volume of tissue excised. We sought to determine if taking SCMs at the time of lumpectomy decreases re-excision rates and increases overall volume of breast tissue removed during lumpectomy.

Methods: Five hundred and four patients who under went lumpectomy for invasive cancer or ductal carcinoma in situ at a single institution from 2004-2006 were identified. Patients who underwent an excisional biopsy for diagnosis were excluded. Patients were divided into three groups: Group 1 had a lumpectomy alone (n = 94), Group 2 had a lumpectomy plus selective (1-3) SCMs (n = 85), and Group 3 had a lumpectomy plus complete (≥4) SCMs (n = 325). Pathologic findings and surgical outcomes were compared between the groups.

Results: Of the 504 patients who underwent lumpectomy with or without SCMs, the mean age was 55 years and the mean tumor size was 1.6 cm. Two hundred and ninety-nine tumors contained IDC, 154 were DCIS alone, 40 were ILC, and 11 were other types. Forty-four percent (156/350) of invasive cancers were positive for EIC. There was a statistically significant larger mean total volume of breast tissue excised in Group 1 compared to Groups 2 and 3 ($p < 0.01$). There was no significant difference in close or positive margin rates (p = 0.29, p = 0.54) or reoperation rates (p = 0.73, p = 0.99) comparing lumpectomy alone with lumpectomy plus select and complete SCMs, respectively. Similarly, there was no significant difference in successful breast conservation rates between Group 1 and Groups 2 or 3 (p = 0.05, p = 0.53). At a mean follow-up of 4 years, the locoregional recurrence (LRR) rates were 1.3% for Group 1, 2.6% for Group 2, and 3.6% for Group 3. LRR rates were not significantly different between Groups 1 and 2 (p = 0.58) and Groups 1 and 3 (p = 0.30) [Table]. Distant metastases occurred in 0% of Group 1, 2.6% of Group 2, and 1.8% of Group 3. The rate of distant metastases was not significantly different for Group 1 compared to Group 2 (p = 0.50) or 3 (p = 0.59).

Conclusions: Taking additional shaved cavity margins at the time of lumpectomy did not decrease the frequency of close or positive margins or the rates of re-excision in our cohort of patients. Despite the finding that significantly less overall breast tissue was excised when shaved cavity margins were taken, there was no associated increase in locoregional recurrence rates.

Table: Comparison of study groups				
	Group 1 (No Shaves)	Group 2 (1-3 Shaves)	Group 3 (≥4 Shaves)	p value (Group 1 vs 2,
	n = 94	n = 85	n = 325	Group 1 vs 3)
Mean Total Volume (cm^3)	108	71.9	75.2	p < 0.01,
				p < 0.01
Close or Positive Margins	47.80%	40.00%	44.30%	p = 0.29,
	(45/94)	(34/85)	(144/325)	p = 0.54
Reoperation	42.50%	40.00%	42.50%	p = 0.73,
	(40/94)	(34/85)	(138/325)	P = 0.99
Successful BCT	81.90%	91.80%	84.60%	p = 0.05,
	(77/94)	(78/85)	(275/325)	p = 0.53
Radiation	94.80%	94.90%	94.20%	p = 1 .0,
	(73/77)	(74/78)	(259/275)	p = 1.0
LRR	1.30%	2.60%	3.60%	p = 0.58,
	(1/77)	(2/78)	(10/275)	p = 0.30

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Lymph Node Ratio Should Be Incorporated Into Staging for Breast Cancer

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Objective: It is well established that lymph node status is one of the most significant prognostic indicators in women with breast cancer; however, the optimal way to classify lymph node status remains unclear. Recently, it has been suggested that lymph node ratio (LNR; defined as number of positive nodes/number of nodes dissected) may provide more prognostic information than number of positive nodes alone. We sought to evaluate this hypothesis in a cohort of node-positive breast cancer patients.

Methods: Data from a cohort of 319 node-positive breast cancer patients diagnosed between 1956 and 1982 were analyzed for overall survival based on current AJCC nodal staging versus LNR. Kaplan-Meier survival analysis using log-rank tests were used for univariate analysis and Cox proportional hazards modeling was used for multivariate survival analysis.

Results: The median patient age at diagnosis was 58 (range, 29-88), and the median tumor size was 2.75 cm (range, 0.13-14.50). The median number of positive nodes removed was 4 (range, 1-41); the median number of total nodes dissected was 13 (range, 1-48). The median LNR was 0.40 (range, 0.3-1.00). In terms of AJCC categorization, 157 (49.2%) patients were pN1 (1-3 positive nodes), 97 (30.4%) were pN2 (4-9 positive nodes), and 65 (20.4%) were pN2 (≥10 positive nodes). Classifying LNR into low (>0-0.2), intermediate (>0.2-0.65), and high (>0.65) risk categories, 90 (28.2%) were low risk, 119 (38.3%) were intermediate risk, and 110 (34.5%) were high risk. The median follow-up of the cohort was 68.7 months (range, 2.3-498.0). AJCC nodal status correlated with overall survival, with median overall survival rates of 85.9, 70.4, and 48.4 months for pN1-3, respectively, $p = 0.018$. LNR also correlated with overall survival, with median overall survival rates of 105.8, 72.2, and 48.4 months for the low-, intermediate-, and high-risk groups, respectively, $p < 0.005$. On multivariate analysis, LNR predicted overall survival independent of pN status ($p < 0.001$). Stratifying by pN status, LNR could discriminate distinct subpopulations of patients with significantly different overall survival rates (see Table 1, Figures 1-3). On multivariate analysis, controlling for tumor size, LNR remained a significant predictor of overall survival ($p < 0.001$). In a multivariate model controlling for tumor size; histologic tumor grade; nuclear grade; and ER, PR, and her-2-neu status, LNR remained the only significant predictor of overall survival ($p < 0.001$).

Conclusions: LNR has the ability to discriminate populations with significantly different overall survival rates within traditional AJCC node classification groups and offers independent prognostic value over number of lymph nodes involved alone. Further, LNR predicts overall survival independent of traditional clinicopathologic factors. Consideration should be given to incorporating LNR into the breast cancer staging system.

FIGURE 1: *Overall survival of pN1 patients stratified by LNR*

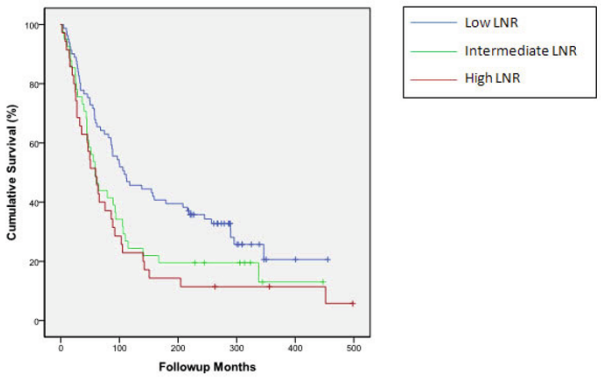

FIGURE 2: *Overall survival of pN2 patients stratified by LNR*

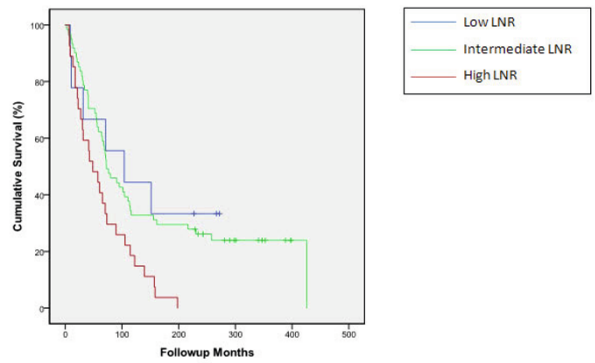

FIGURE 3: *Overall survival of pN3 patients stratified by LNR*

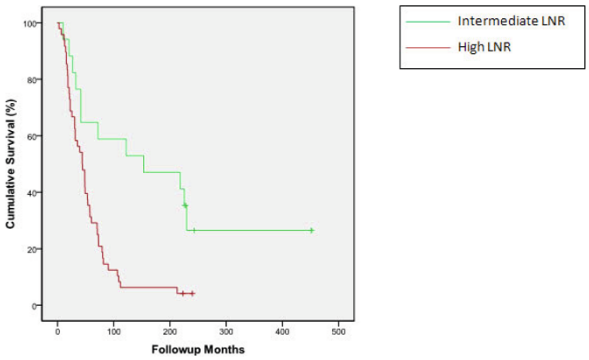

TABLE 1:

AJCC pN Status	Median Survival (months)			p-value
	Low LNR	Intermediate LNR	High LNR	
pN1 (N=157)	108.3 (N=81)	58.4 (N=41)	59.4 (N=35)	0.012
pN2 (N=97)	104.1 (N=9)	72.4 (N=61)	48.5 (N=27)	0.008
pN3 (N=65)	-- (N=0)	153.3 (N=17)	43.9 (N=48)	0.001

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Variability in the Quality of Pathology Reporting of Margin Status Following Breast Conservative Surgery

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Objective: Accurately determining the surgical margin status is vitally important to surgical decision-making, adjuvant care, and clinical management options for breast cancer patients undergoing conservative surgery. In an attempt to improve the quality of pathology reporting, the College of American Pathologists (CAP) developed guidelines to standardize reporting of surgical margin status. The aim of this study was to determine statewide concordance with CAP breast cancer reporting guidelines for margin status.

Methods: The Vermont Medicare Database represents services provided from 1998-2006 to 2,805 women aged 65 and older who underwent breast-conserving surgery at both small- and large-volume hospitals in Vermont. These data were accompanied by respective pathology reports and were analyzed for description of margin status for both invasive carcinoma and DCIS. CAP reporting guidelines originally developed in 1998 and updated as recently as 2009 were used as a standard to assess the degree of compliance of margin status reporting.

Results: From an original sample of 2,805, a total of 1,638 reports from the Vermont Medicare dataset met the inclusion criteria and were analyzed for margin status. Reports were considered guideline concordant for margin status if they described the status of each of the six margins as either positive or negative with a measurement of distance from the negative margin. Of the reports analyzed, only 34.5% adhered to the CAP guideline standards for margin status. Over the 8-year period, there was a significant rise in compliance with margin reporting from 4.7% in 1998 to 54.7% in 2006, chi-square trend test, $p < 0.001$. Of the 1,638 reports reviewed, factors resulting in noncompliant reporting included unoriented specimens in 3.7%, no mention of distance from negative margins in 42.3%, and complete omission of margin status report in 29.5%. Some cases contained more than one factor for noncompliance.

Conclusions: Breast cancer reporting of margin status varies widely. Vital information that affects surgical decision-making and treatment is often missing or incomplete. There is a positive trend that shows a significant rise in guideline compliance with reporting margin status from 1998 to 2006; however, overall compliance remains low. A better understanding of the barriers in adhering to CAP guidelines would greatly benefit the quality of pathology reporting and possibly subsequent care. This study provides evidence to support the need for quality improvement measures in the implementation of CAP guidelines for reporting margin status following breast conservative surgery.

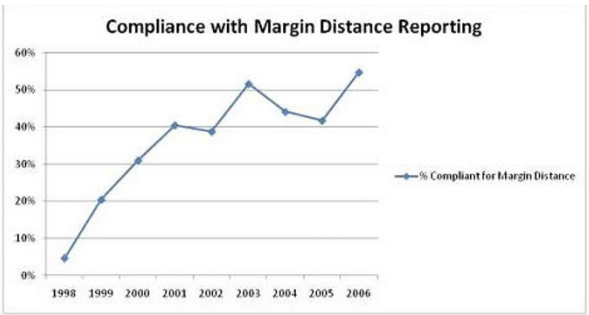

Figure 1. Compliance with margin status reporting from 1998 to 2006.

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Radioactive Seed-Localization for Nonpalpable Breast Lesions: Review of 1,000 Consecutive Procedures at a Single Institution

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Objective: Radioactive seed localization (RSL) is an alternative to wire localization of nonpalpable breast lesions that has been shown to decrease the rate of positive margins of excision and improve the logistics of surgery.

Methods: A retrospective review of all consecutive RSL procedures at a single institution from January 2003 through October 2010 was conducted. Data for patient and tumor characteristics, surgical margin status, local recurrences, and complications were collected.

Results: One thousand RSL breast procedures were performed in 978 patients; 21 patients had >1 RSL procedure. Mean age was 65 years and mean lesion size was 1.2 cm (SD 0.91). Indications for RSL included invasive carcinoma (52%), in situ carcinoma (22%), atypical hyperplasia (11%), and uncertain/suspicious percutaneous biopsy findings (15%). A total of 1,148 seeds were deployed; the numbers of procedures with 1, 2, 3, and 4 targeted lesions were 910, 84, 5, and 1, respectively. Most procedures (855, 86%) utilized 1 seed, with 145 (14%) involving bracketing of the lesion(s) with 2 or 3 seeds. All seeds were placed by radiographic guidance using ultrasound in 50% and mammography in 50%. The majority of RSL procedures (757, 76%) involved seed localization ≥1 day prior to surgery. All target lesions were successfully excised and all seeds were recovered at the time of surgery. Intraoperative re-excision of margins was performed in 463 procedures (46%), based on surgeon and/or pathologist judgment of a margin being close to or involving the target lesion. Of the 767 malignant lesions excised, final pathology demonstrated a negative margin (≥2 mm) in 87% of invasive cancer cases and 77% of DCIS cases. Close (<2 mm) or positive margins were found in 9% and 3% of invasive cases and 19% and 3% of DCIS cases, respectively. All cases with margins <2 mm from carcinoma/DCIS (15%) had re-excision involving a second surgery. Concurrent sentinel lymph node biopsy was performed successfully in 543/544 cases (99.8%). Adverse events included 3/1148 seeds (0.3%) not deployed correctly on first attempt in Radiology. In addition, 30/1148 seeds (2.6%) were displaced from the breast specimen (with successful excision of the targeted lesion and no resulting patient harm), including three seeds (0.3%) suctioned into the operative suction tubing/canister. There were no radiation safety concerns. Local recurrence rates were 0.9% for invasive breast cancer and 3% for DCIS (mean follow-up, 33.0 months). There was no evidence of a learning curve for RSL: the rates of margin re-excision, local recurrence, and seed complications did not change significantly when analyzing patients by each 100 cases of accumulated institutional experience or by comparing the first and last 25 cases for each of 3 surgeons.

Conclusions: Radioactive seed-localization is a safe and effective procedure that is easy to learn, associated with a lower incidence of positive/close margins than previously reported for wire localizations. We believe RSL should be the method of choice for preoperative localization of nonpalpable breast lesions.

TABLE: Margin status and local recurrence rates for invasive lesions following RSL

	Invasive Cancer	DCIS	Total
N	550	217	767
Negative margins (≥ 2 mm)	481 (87%)	168 (77%)	649 (85%)
Close margins (< 2 mm)	51 (9%)	42 (19%)	93 (12%)
Positive margins	18 (3%)	7 (3%)	25 (3%)
Re-excision of margins	69 (13%)	49 (23%)	118 (15%)
Local recurrences	5 (0.9%)	7 (3%)	12 (1.6%)
Mastectomy secondary to recurrence	3 (0.5%)	3 (1%)	6 (0.8%)

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MRI Staging After Neoadjuvant Chemotherapy for Breast Cancer: Does Tumor Biology Affect Accuracy?

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Objective: Magnetic resonance imaging (MRI) has been recommended to monitor the response of breast tumors to neoadjuvant chemotherapy. However, in some cases, a discrepancy exists between the postchemotherapy tumor size on MRI and tumor size on final pathology. This can often make it difficult to predict success of breast conservation and to provide the patient with meaningful prognostic information prior to surgery. In this study, we seek to determine the difference between tumor size as estimated by postchemotherapy MRI versus final surgical pathology and to determine if the accuracy of MRI varies with tumor subtype.

Methods: The University of Pittsburgh Medical Center (UPMC) Cancer Registry and radiology database were searched for patients with a diagnosis of breast cancer who underwent neoadjuvant chemotherapy and MRI staging between January 2004 and January 2009. Registry data obtained included demographic data, clinical, radiologic and pathologic staging, and histology, medical and surgical treatment data, and outcome/survival data. We used this data to compare radiologic to pathologic staging (based on largest dimension of tumor measured by MRI or H&E histology, respectively) and to stratify the differences in staging based on tumor biology. Accuracy of MRI in predicting pathologic tumor size post chemotherapy was compared among tumor subtypes using one-way ANOVA and two-tailed *t* test.

Results: Five hundred ninety-two patients underwent surgery at UPMC for a malignant tumor of the breast after neoadjuvant chemotherapy between 2004 and 2009. Of those, 227 had MRI staging before and after chemotherapy. All patients had intact tumors prior to the initiation of chemotherapy. Mean age was 49 (range, 29-73). Most tumors (88%) were classified as invasive ductal carcinoma, 8% were lobular, 4% were mammary or unknown. Most patients (77%) received taxane-based chemotherapy. All HER2 positive patients received trastuzumab. Tumors were stratified by receptor status and tumor subtypes using immunohistochemical surrogates as previously reported (Table 1). Average tumor size by MRI was 4.11 cm (range, 1-13 cm) pre-chemotherapy and 1.32 cm (range, 0-9 cm) post chemotherapy. The average pathologic tumor size was 1.86 cm. MRI tended to overestimate the size of the residual tumor by an average of 1.09 cm. MRI correctly predicted a pathologic complete response (no residual invasive tumor or DCIS only) in 40/51 patients (78%). The difference between MRI tumor size and pathologic tumor size post chemotherapy was greatest in Luminal A patients (1.42 cm) and least in triple-negative or basal tumor subtypes (0.59 cm) (p = .041). The difference in postchemotherapy tumor size between MRI and pathology was also significantly smaller for HER2-positive tumors as compared to ER-positive tumors (0.74 vs 1.37 cm, p = .022).

Conclusions: MRI is an effective tool for predicting response to neoadjuvant chemotherapy. The accuracy of MRI in estimating postchemotherapy tumor size varies with intrinsic tumor subtype and appears to be highest in Her2-positive and triple-negative basal tumors. MRI is least accurate in predicting response in Luminal A/ER positive tumors although it tends to underestimate response to chemotherapy. Knowledge of how MRI accuracy varies with tumor subtype can be applied when counseling patients for surgery following neoadjuvant chemotherapy.

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Outcomes Following Mastectomy With Immediate Tissue Expander Reconstruction With and Without the Use of Tumescent Solution

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Objective: The use of tumescent solution during mastectomy has become increasingly common, allowing for improved postoperative analgesia, sharp dissection with minimal intraoperative blood loss, and potentially decreased rates of postoperative infection by avoiding electrocautery. However, there is some concern that tumescent technique may also contribute to postoperative complications, such as hematomas, seromas, and poor wound healing or necrosis. This study evaluates patient outcomes following mastectomy and immediate tissue expander reconstruction with and without the use of tumescent solution.

Methods: Retrospective review of 897 consecutive patients (1217 breasts) undergoing mastectomy with immediate tissue expander reconstruction between 4/1998 and 8/2008 at a single institution was performed. Demographic and operative factors, the use of tumescent technique, and overall follow-up were recorded. Postoperative complication rates, including infection (requiring intravenous antibiotics), delayed wound healing, seroma, hematoma, minor (requiring local wound care or in-office excision) and major (requiring reoperation) mastectomy flap necrosis, tissue expander explantation, and overall surgical reoperation (in office or within the operating room, excluding explant) were evaluated. Chi square, student *t* test, and multiple logistic regression were used for statistical analysis.

Results: There were no significant differences in demographic or operative characteristics between patients undergoing tumescent (n = 332, 457 breasts) and nontumescent (n = 565, 760 breasts) mastectomies with immediate tissue expander reconstruction, with an overall mean follow-up of 36.8 months. Tumescent mastectomies had significantly more minor mastectomy flap necrosis (p < 0.0001) and surgical reoperation (p = 0.0008), with no difference in the rate of delayed wound healing, infection, hematomas, seromas, major mastectomy flap necrosis, or explantation. Multiple logistic regression analysis, adjusted for age, body mass index, tissue expander volume, and preoperative radiation, demonstrated that active smoking and the use of tumescent solution are independent risk factors for minor mastectomy flap necrosis (odds ratio [OR], 3.38; 95% confidence interval [CI], 1.70-6.72; p = 0.0004; and OR, 3.63; 95% CI, 1.88-6.99; p < 0.0001, respectively) (Table 1) and surgical reoperation (OR, 2.17; 95% CI, 1.33-3.53; p = 0.0029; and OR, 1.97; 95% CI, 1.34-2.90; p = 0.0004, respectively) (Table 2). The individual breast surgeon performing the mastectomy was not a risk factor for these complications.

Conclusions: Our review, the largest to date within the literature, demonstrates that using tumescent solution during mastectomy with immediate tissue expander reconstruction, although possessing distinct advantages, is an independent and significant risk factor for minor mastectomy flap necrosis and surgical reoperation. Tumescent technique does not affect postoperative infection rates, indicating that electrocautery dissection is a suitable alternative during mastectomy flap creation. Choice of operative technique should be made on an individual patient basis with discussion of these relevant perioperative and postoperative risks prior to surgical consent.

Table 1. Multiple Logistic Regression Analysis, Minor Flap Necrosis

Characteristic	Minor Flap Necrosis (n=42)	No Minor Flap Necrosis (n=855)	*p* value
Age (years)	51.8 ± 9.7	48.6 ± 10.6	0.1670
BMI	26.7 ± 5.8	25.4 ± 5.5	0.1530
Active Smoker	13	100	0.0004
Tissue Expander Volume (ml)	402.3 ± 120.6	392.8 ± 116.6	0.6647
Tumescent technique	28	304	<0.0001
Preoperative RT	5	80	0.7403

* BMI: body mass index; RT: radiation therapy

Table 2. Multiple Logistic Regression Analysis, Surgical Reoperation

	Surgical Reoperation (n=121)	No Surgical Reoperation (n=776)	
Age (years)	50.4 ± 10.7	48.5 ± 10.6	0.1121
BMI	26.8 ± 6.3	25.3 ± 5.4	0.1714
Active Smoker	26	87	0.0034
Tissue Expander Volume (ml)	415.1 ± 120.2	389.8 ± 115.9	0.1328
Tumescent technique	62	270	0.0004
Preoperative RT	11	74	0.8698

* BMI: body mass index; RT: radiation therapy

Table 1. Tumor Subtypes by IHC classification of receptor status

Tumor Subtype	N (%)	pCR (%)
Luminal A	66 (35)	7 (14)
Luminal B	32 (17)	4 (8)
ERBB2 (HER2)	21 (11)	12 (24)
TN/Basal	41 (22)	20 (40)
TN/Non Basal	1 (<1)	0 (0)
Luminal A/Her2	14 (7)	4 (8)
Luminal B/Her2	12 (7)	4 (8)

Luminal A = ER>200 (H score), HER2-; Luminal B = ER 11-199 or PR>10, HER2-; ERBB2(HER2) = ER/PR<10, HER2+; TN/Basal = ER/PR<10, HER2-, CK5/EGFR+; TN/NonBasal = ER/PR<10, HER2-, CK5/EGFR-; Luminal A/HER2 = ER>200, HER2+; Luminal B/HER2 = ER 11-199 or PR>10, HER2+
(Bhargava et al. Cancer Mar 2010)

1679

Definitive Diagnosis for High Risk Breast Lesions without Open Surgical Excision

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Objective: Open surgical excision (OSE) is generally recommended when image guided core needle breast biopsy demonstrates a high risk lesion (HRL) such as atypical ductal hyperplasia (ADH), lobular neoplasia (LN, including lobular carcinoma in situ and atypical lobular hyperplasia), papilloma (P) or radial scar (RS). The Intact Percutaneous Excision Trial (IPET) was designed to prospectively evaluate the integration of intact percutaneous excision (IPEX) with specific radiologic and histologic criteria, for definitive diagnosis of HRL in general and ADH in particular. The primary aim of IPET was to define criteria associated with less than 2% risk for upgrade to carcinoma, equivalent to that associated with BIRADS 3 lesions, for which imaging surveillance is appropriate; thus making OSE unnecessary in such cases.

Methods: After informed consent, in 25 institutions, 1170 patients recommended for breast biopsy were prospectively enrolled in IPET. Patients then had IPEX using a vacuum and radiofrequency assisted device (Intact™, Intact Medical Corporation, Natick, MA). The IPET protocol included OSE for all patients diagnosed with HRL. Because ADH is historically the most challenging HRL, the subset of HRL patients with ADH who met pre-specified radiologic and histologic criteria (removal of the imaged lesion and the lesion adequately centered for definitive characterization, respectively) were designated as the potential surgical avoidance ADH population (PSAP), prior to OSE. For all HRL subsequent OSE specimen pathology was compared with findings from the initial IPEX. Pathologist recommendations and post-biopsy mammogram findings were also recorded.

Results: 191 carcinomas and 83 HRL (32 ADH, 20 LN, 24 P, 7 RS) were diagnosed by IPEX. None of the 51 non-ADH HRL were upgraded to carcinoma on OSE (n=24) or radiologic follow-up if OSE was declined (n=27). Based on pre-specified histologic and radiologic criteria, 10 of the 32 ADH patients were categorized as PSAP patients. No ADH lesion which met PSAP criteria was upgraded to carcinoma on OSE; 3 (14%) of the 22 non-PSAP ADH lesions were upgraded to carcinoma. In summary, 7% (83 of 1170) of patients in this prospective, contemporary, image-guided breast biopsy trial had HRL. 3% of these 1170 patients had ADH. Patients with non-ADH lesions who had IPEX had no upgrades to carcinoma. ADH patients who had IPEX and met pre-specified histologic and radiologic criteria had no upgrades to carcinoma on OSE.

Conclusions: This prospective, multi-institutional clinical trial validates IPEX, combined with simple histologic and radiologic criteria, as definitive management of image-detected HRL in general and ADH in particular (risk below the 2% threshold for BIRADS 3 lesions). These findings are important since until now patients with HRL, especially those with ADH, have generally gone on to OSE for definitive diagnosis subsequent to image-guided needle biopsy. By eliminating OSE for properly selected patients with ADH and other HRL, substantial reductions in patient distress, discomfort and health care costs can be obtained with IPEX.

Scientific Poster Forum Presentations

1689

Triple-Negative Breast Cancer Is Not a Contraindication for Breast Conservation

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Objective: Triple-negative breast cancer (TNBC) is an aggressive subtype characterized by a lack of hormone receptors (ER and PR) and HER2 overexpression, and has been shown to have a high risk of locoregional recurrence (LRR). The purpose of this study is to determine the impact of operation type (breast-conserving therapy [BCT] versus mastectomy) on locoregional recurrence in triple-negative breast cancer patients.

Methods: One thousand three hundred twenty-nine patients with TNBC who underwent primary treatment with either BCT or mastectomy between 1980 and 2007 at a major cancer center were included in the study. Clinical and pathological factors were compared using chi-square test, and LRR-free, distant metastasis-free (DMFS), and overall survivals (OS) were estimated by Kaplan-Meier methods. Multivariable analysis was performed using Cox proportional hazards models.

Results: BCT was performed in 653 (49.1%) patients and mastectomy was performed in 676 (50.9%) patients. There were no significant differences in age, menopausal status, nuclear grade, or resection margin status between the two groups. The mastectomy group had significantly larger tumors, a higher incidence of lymphovascular invasion, and a higher pathologic N stage (all $p < 0.001$). At a median follow-up of 80 months, 373 women had LRR, 170 (26%) in the BCT group and 203 (30%) in the mastectomy group. Five-year LRR-free survival rates were significantly higher in the BCT group (76% vs 71%, $p = 0.032$), as was DMFS (68% vs 54%, $p < 0.0001$) and OS (74% vs 63%, $p < 0.0001$). On multivariable analysis, T stage (HR, 1.37; 95% CI, 1.09-1.72; $p = 0.006$), high nuclear grade (HR, 1.92; 95% CI, 1.28-2.89; $p = 0.002$), lymphovascular invasion (HR, 1.93; 95% CI, 1.54-2.42; $p < 0.0001$), close/positive resection margin (HR, 1.89; 95% CI, 1.37-2.6; $p < 0.0001$), and use of adjuvant chemotherapy which did not include anthracyclines or taxanes (HR, 2.01; 95% CI, 1.46-2.77; $p < 0.0001$) all increased the risk of LRR while age > 50 was protective (HR, 0.73; 95% CI, 0.58-0.92; $p = 0.007$). Operation type (mastectomy vs BCT; HR, 1.07; 95% CI, 0.86-1.34; $p = 0.55$) did not have a significant impact on the risk of LRR.

Conclusions: Patients with TNBC have a high risk of LRR. BCT is not significantly associated with increased LRR rates compared to mastectomy; therefore, TNBC should not be considered a contraindication for breast conservation. Novel strategies are needed to decrease LRR rates in TNBC.

1723

Does the Proximity of Breast Cancer to the Nipple Affect Axillary Lymph Node Positivity?

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Objective: Lymphatic drainage of the breast is via the subareolar plexus. Therefore proximity of tumors to the nipple may impact nodal positivity. The aim of this study was to examine whether tumors closer to the nipple have a higher risk of nodal metastases.

Methods: With Institutional Review Board approval, a retrospective review was performed of all patients with T1 or T2 breast cancer who underwent radiologic evaluation and surgical resection at Mayo Clinic, Rochester, between August 2009 and August 2010. Only cases with ultrasound images performed prior to percutaneous biopsy were included. Ultrasound images were reviewed to determine the distance of the tumor from the nipple and tumor size. Clinical data regarding pathologic tumor size and nodal status were collected. Patients receiving neoadjuvant chemotherapy were excluded.

Results: We identified 146 patients (144 women, 2 men) who underwent 147 operations (89 WLE, 58 mastectomy) for T1 or T2 breast cancers. There were 118 (80%) patients who underwent sentinel lymph node (SLN) biopsy, 10 (7%) who underwent ALND, and 19 (13%) who underwent SLN and ALND. One hundred eleven patients (76%) were node negative and 36 (24%) were node positive. On univariate analysis, factors associated with axillary lymph node positivity were tumor size on ultrasound ($p < 0.001$), tumor distance from the nipple ($p = 0.016$), palpable presentation ($p = 0.016$), presence of lymphovascular invasion ($p = 0.008$) and T2 versus T1 tumors ($p < 0.001$). Estrogen and progesterone receptor status and Her2 status, histologic tumor type, and tumor grade were not univariately associated with axillary lymph node positivity. On multivariable analysis factors associated with axillary lymph node positivity were tumor size on ultrasound, lymphovascular invasion, and tumor distance from the nipple. Each 1-mm increase in ultrasound tumor size was associated with a 9% increased risk of positive lymph nodes (odds ratio, 1.09; $p = 0.001$). The presence of lymphovascular invasion was associated with a nearly 6-fold increased risk of positive lymph nodes (odds ratio, 5.73; $p = 0.028$). After adjusting for ultrasound tumor size and lymphovascular invasion, each 1-cm increase in the distance of the tumor from the nipple was associated with a 20% decreased risk of positive lymph nodes (odds ratio, 0.79; $p = 0.006$).

Conclusions: T1 and T2 breast cancers located closer to the nipple have a higher incidence of spread to the axillary lymph nodes than tumors located more peripherally. Distance from the nipple should be evaluated when considering likelihood of nodal positivity along with ultrasound tumor size and lymphovascular invasion.

1661

Margin Index Is Not a Reliable Tool for Predicting Residual Disease After Breast-Conserving Surgery for DCIS

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Objective: Our group has previously shown that in patients with stage I-II breast cancer, margin index is a reliable method of predicting residual disease after attempted breast-conserving therapy (BCT) with close margins. In this study, we sought to apply the margin index to patients with stage 0 ductal carcinoma in situ (DCIS) to determine its reliability in predicting residual disease in the re-excision specimen.

Methods: We reviewed our prospectively maintained database and identified all patients with DCIS who were treated with attempted BCT from 2004-2009. Only those who had close but negative margins and also underwent re-excision were included in the analysis. Margin index was calculated as follows: margin index = closest margin (mm)/tumor size (mm) x 100. A receiver operating curve was created using the derived margin index and the presence or absence of residual disease in the reexcision specimen. Sensitivity and specificity were calculated at various margin indices to determine the optimum margin index.

Results: Of the 289 patients who underwent attempted BCT during the study period, 84 (29%) underwent re-excision for close or positive margins. Of the 84 patients undergoing re-excision, 36 (43%) had positive margins and were excluded from the study, 14 (17%) were excluded due to an inability to determine the size of DCIS on pathology reports, and 34 (40%) met study criteria and were included in the analysis. Of the 34 evaluable patients who underwent re-excision, 14 (41%) had residual disease in the re-excision specimen. There were no significant differences between patients who had residual disease and those who did not. The overall c index for the receiver operating curve was 0.71. However, there was no optimum margin index that reliably predicted the presence or absence of residual disease. For example, a margin index of >5 resulted in a sensitivity of 79% but a specificity of only 45%.

Conclusions: Margin index is not a reliable method for the prediction of residual disease after attempted BCT with close margins in patients with DCIS only. Although the study population was small, we believe this is likely a reflection of the complexities in accurately determining DCIS size and margin status in pathologic specimens. A prospective analysis of the margin index tool for DCIS patients undergoing BCT may be beneficial in overcoming these limitations.

1702

An Effective Intervention for Improving Symptoms and Quality of Life of Female Cancer Survivors: A Randomized, Controlled Study

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Objective: For cancer survivors, completing treatment can be almost as difficult as going through it. Even though Mindfulness Based Stress Reduction (MBSR) methods may benefit survivors, randomized, controlled trials using standardized measures are limited. The primary objective was to evaluate the effects of a unique, interactive, 8-week cancer recovery program on symptoms and quality of life of female, predominantly breast, cancer survivors utilizing standardized measures.

Methods: Sixty-eight female cancer patients, including 52 affected by breast cancer, participated in four workshops offered through a major teaching hospital oncology department over the 12-month study period ending September 2010 using the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ-30), the Symptoms of Stress Inventory (SOSI), and the Symptoms Checklist (SCL-90-R). Participants were randomized into intervention or wait-listed control groups. Intervention group subjects practiced MBSR and mindful communication skills in weekly 2-hour workshops. Subjects practiced daily meditation and recorded daily logs. Assuming a medium effect size of 0.5, a power level of 80% and a two-sided alpha of 0.05, an estimated 64 patients (randomized 3:1) were required for parametric variables.

Results: The major cancer type represented was breast cancer (table). The intervention group (n = 48) and control group (n = 20) did not differ in mean age (57.7 years, $p = 0.85$) or years since diagnosis (3.9, $p = 0.86$). The intervention group improved significantly on the EORTC ($p = 0.005$), on six of the eight SOSI subscales ($p \leq 0.049$), and on both SCL-90-R subscales ($p \leq 0.023$), while the control group did not improve on any of these measures ($p > 0.2$).

Conclusions: The MBSR-based intervention improved the symptoms and quality of life of this largely breast cancer survivor population.

MBSR Participants Diagnosis			
	Diagnosis	**n**	**Percent**
Treatment Group			
	Unaffected BRCA +	1	2.1
	Breast cancer	**33**	**68.8**
	Ovarian cancer	2	4.2
	Endometrial cancer	1	2.1
	Hodgkins lymphoma	2	4.2
	Colon cancer	3	6.3
	Choriocarcinoma	2	4.2
	Non-Hodgkins lymphoma	4	8.4
	Treatment Group Total	**48**	**100%**
Control Group			
	Breast Cancer	**14**	**70.0**
	Ovarian cancer	1	5.0
	Endometrial cancer	1	5.0
	Hodgkins Lymphoma	1	5.0
	Colon Cancer	1	5.0
	Non-Hodgkins Lymphoma	2	10.0
	Control Group Total	**20**	**100%**
Treatment + Control		**68**	

1701

Serum 25-Hydroxyvitamin D and Prognostic Tumor Characteristics in Breast Cancer Patients

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Objective: Epidemiologic studies show that women with low 25-OH vitamin D levels have an increased risk of breast cancer incidence and mortality. Our prior research found 25-OH vitamin D levels were significantly lower in women with locally advanced breast cancer. However, there is a lack of research between vitamin D levels and prognostic variables in breast cancer patients. The aim of this study is to determine the association between 25-OH vitamin D levels, demographic variables, and prognostic tumor characteristics.

Methods: This study cohort consists of 155 women who underwent surgery at the University of Rochester Medical Center between 1/2009 and 9/2010. Vitamin D levels were obtained in the 1-year period prior to and after surgery (74% of vitamin D levels were within 6 months). Prognostic variables included age, race, menopausal status, Oncotype DXscore, TNM staging, ER status, PR status, HER2 expression, and gene expression. Linear regression and ANCOVA were used to calculate correlations and mean values, respectively, between prognostic variables and 25-OH vitamin D levels,while controlling for relevant covariates (age, race, and month of blood draw). Lastly, 25-OH vitamin D levels were dichotomized into optimal (≥32 ng/ml) and suboptimal (<32 ng/ml) categories. Logistic regression was used to calculate odds ratios (OR) for the dichotomous vitamin D groups and each prognostic variable while controlling for relevant covariates.

Results: Non-Caucasian breast cancer patients were significantly more likely to have suboptimal 25-OH vitamin D levels than Caucasian patients (OR = 3.8; $p < 0.01$). Premenopausal breast cancer patients had significantly higher suboptimal vitamin D rates than postmenopausal women (OR = 3.5; $p < 0.01$). A significant inverse correlation ($r = -0.42$, $p = 0.04$) between decreasing vitamin D levels and increasing Oncotype score was noted. Women with Oncotype scores <18 had a higher mean 25-OH vitamin D level than women with Oncotype DX scores >30 (<18: 32.0 ng/ml vs >30: 13.6 ng/ml; $p = 0.13$). Breast cancer patients who had ER- and triple-negative breast tumors were more likely to have suboptimal levels of 25-OH vitamin D (ER- OR = 2.4, $p = 0.07$) (triple-negative OR = 2.6, $p = 0.09$). Additionally, compared to women with in situ breast tumors, women with invasive breast tumors were more likely to have suboptimal vitamin D levels (Invasive OR = 2.4, $p = 0.10$) and lower mean 25-OH vitamin D levels (invasive: 30.5 ng/ml vs in situ: 36.9 ng/ml, $p = 0.04$). Lastly, women whose tumors expressed basal-like gene profiles had lower 25-OH vitamin D levels than women whose tumors expressed luminal-A gene profiles (basal-like: 25.1 ng/ml vs luminal-A: 30.6 ng/ml; $p = 0.09$).

Conclusions: Breast cancer patients with suboptimal vitamin D levels were more likely to have tumors with more aggressive tumor profiles and worse prognostic markers, lending support to previous research that found decreased breast cancer survival among vitamin D deficient individuals. In addition, this study found that suboptimal vitamin D levels were not only associated with poor prognostic markers of survival (ER- and triple-negative tumors) but also increased risk of recurrence (Oncotype scores). Based on these findings, physicians should strongly consider monitoring and correcting vitamin D levels in breast cancer patients. Further research is needed to elucidate the biological mechanism between vitamin D and breast prognostic tumor markers.

Table 1. Average serum 25-OH vitamin D by demographic and tumor characteristics

	Mean 25-OH Vitamin D*	SD	P-Value
All Patients	31.5	13.2	
Race			
Caucasian	33.1	12.9	
Non-caucasian	22.9	11.5	<0.01
Age			
54 and younger	29.0	11.2	
55-66	32.2	12.7	
67 and older	33.9	15.0	0.15
Menopausal Status			
Premenopausal	27.6	10.8	
Postmenopausal	32.9	13.6	0.04
ER Status			
Negative	28.1	12.5	
Positive	32.1	13.1	0.15
Triple Negative			
No	30.7	12.8	
Yes	27.7	13.2	0.34
Invasiveness			
No	36.9	13.4	
Yes	30.5	12.9	0.04
Tumor Size			
≤ 0.5 cm	32.7	10.5	
> 0.5-1.0 cm	30.8	14.9	
> 1.0-2.0 cm	29.2	13.3	
> 2.0 cm	30.4	12.0	0.82
Positive Lymph Nodes			
No	31.2	14.0	
Yes	32.8	12.1	0.55
Oncotype Score			
< 18	32.0	11.9	
18-30	28.0	13.2	
> 30	13.6	14.8	0.13
Gene Expression			
Luminal A	30.6	12.7	
Luminal B	33.1	13.3	
Basal-like	25.1	12.0	
In situ	38.7	13.3	0.02
Season of Blood Draw			
Winter/Spring	30.8	13.8	
Summer/Autumn	32.8	12.1	0.37
*Adjusted for age, race, and month of blood draw			

Table 2: Odds ratios (OR) and 95% Confidence Intervals for Sub-optimal Vitamin D Levels by Demographic and Tumor Characteristics

	Vitamin D Category						
	Optimal (≥ 32 ng/ml)	%	Sub-optimal (<32 ng/ml)	%	Odds Ratio*	95% Confidence Interval	P-Value
Race							
Caucasian	68	52.7%	61	47.3%	1.00	Referent	
Non-Caucasian	5	22.7%	17	77.3%	3.77	1.29 10.99	<0.01
Age							
54 and younger	20	37.7%	33	62.3%	1.00	Referent	
55-56		25	51.0%	24	49.0%	0.59	0.27 1.30
67 and older	29	55.8%	23	44.2%	0.47	0.22 1.03	0.06
Menopausal Status							
Postmenopausal	65	55.1%	53	44.9%	1.00	Referent	
Premenopausal	9	26.5%	25	73.5%	3.46	1.46 8.24	<0.01
ER Status							
Positive	64	50.4%	63	49.6%	1.00	Referent	
Negative	8	32.0%	17	68.0%	2.35	0.93 5.92	0.07
Triple Negative							
No	53	48.6%	56	51.4%	1.00	Referent	
Yes	5	27.8%	13	72.2%	2.60	0.85 7.93	0.09
Invasiveness							
No	12	66.7%	6	33.3%	1.00	Referent	
Yes	58	45.0%	71	55.0%	2.40	0.83 6.99	0.11
Gene Expression							
Luminal A	41	50.0%	41	50.0%	1.00	Referent	
Luminal B	13	46.4%	15	53.6%	0.99	0.40 2.50	
Basal-like	4	26.7%	11	73.3%	3.39	0.97 11.87	0.06
*Adjusted for age, race, and month of blood draw							

Poster Presentations

1668

Compromised Margins Following Mastectomy for Stage I-III Breast Cancer

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Objective: Margin status is a risk factor for local recurrence. Although re-excision for positive margins is standard in patients undergoing lumpectomy, it is rarely performed for positive margins following mastectomy. The reasons for this are multifactorial, including the difficulty in determining the exact margin for re-excision and reliance on adjuvant therapies. We sought to investigate the factors associated with positive margins following mastectomy and the impact on patient outcomes.

Methods: We identified 240 patients from our prospectively maintained surgical database with stage I-III invasive breast cancer who were treated with mastectomy (simple or modified radical) from 1999-2009. Data included patient and tumor characteristics, pathologic margin assessment, and outcomes. Margin positivity was defined by the presence of in situ or invasive malignancy focally or extensively present at any margin. Descriptive statistics were utilized for data summary and data were compared using chi-square.

Results: Of 617 patients with stage I-III breast cancer treated during the study period, 240 (39%) underwent mastectomy. Of the 240 patients, 132 (55%) had a simple mastectomy with sentinel lymph node biopsy and 108 (45%) had a modified radical mastectomy. The pathologic stage included 74 (31%) stage I, 108 (45%) stage II, 35 (15%) stage III, and 23 (9%) unknown. Sixty-one (25%) patients received neoadjuvant chemotherapy. Overall, 22 (9%) patients had positive margins on the final mastectomy specimen, including 13 (59%) with 1 positive margin, 3 (14%) with 2 positive margins, and 6 (27%) with 3 or more positive margins. The most commonly affected margin was the deep margin (48% of patients). Two of the 22 patients underwent re-excision for positive margins; no residual disease was identified. Eight (36%) of the 22 patients received adjuvant chest wall irradiation. There were no differences between patients who had a positive margin versus those who did not with respect to patient age, race, percentage of in situ component, tumor size, tumor grade, lymphovascular invasion, or immunostain profile ($p > 0.05$ for all). At follow-up, none of the patients with positive margins have experienced a local recurrence.

Conclusions: Positive margins following mastectomy occurred in nearly 10% of our patients, and the most commonly affected site was the deep pectoralis major muscle margin. This finding likely contributes to the observed low rate of re-excision. No specific patient or tumor characteristics predicted a risk for having a positive margin. Despite the finding that only one-third of patients received adjuvant radiation in the setting of a positive margin, no local recurrences have been observed.

1708

Factors Predicting Quality of Life in Women Undergoing a Breast Biopsy

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Objective: Every woman who undergoes a breast biopsy faces the possibility of breast cancer. The associated stress invariably impacts the woman at many different levels. In this study, we investigate predictors of quality of life (QoL) in women who had a breast biopsy within the previous 4 months. We hypothesized that QoL would be related to biopsy diagnosis, as well as markers of psychological well-being, cognitive status, social support, spirituality, and sleep quality.

Methods: Participants were part of a larger study addressing QoL, spiritual and emotional well-being, cognitive performance, neuroactivation, and immunologic resilience in women newly diagnosed with breast cancer. Women with cancer were treated with breast preservation and prognosis assessed with Adjuvant! Online. Those ever diagnosed with breast cancer or diagnosed with any other cancer (except skin cancer) in the previous 5 years were excluded. Measures included the Hope Quality of Life Scale, the Bottomley Social Support Scale, the PhQ-9 Patient Health Questionnaire to assess depression, the National Comprehensive Cancer Network Distress Management Screening Measure, the Spiritual Involvement & Beliefs Scale, the CogState Paired Associate Learning Test, the STAI - State Anxiety short form, and Self-Reports of Cognitive Functioning and Sleep Quality. A multiple regression analysis (SAS v9.2) was performed to investigate the predictive value of the diagnosis, mood, social support, spirituality, and cognitive functioning on QoL, using a priori variables of age, income, and education level.

Results: Eighty-five women newly diagnosed with breast cancer (DCIS or ductal or lobular breast cancer) and 70 benign controls were assessed, with an average age of 55.8 years (range, 30–88; sd, 8.7). The groups were comparable on age, education, income, race, and menopausal status. Higher overall QoL was significantly associated ($F = 13.20$, $p < .0001$, adjusted $R2 = 0.60$) with older age ($p < .0009$), increased social support ($p < .0003$), lower depressed mood score ($p < .03$), lower overall distress ($p < .0001$), and higher levels of spirituality ($p < .02$). Measures of education, income, cognitive functioning, state anxiety, and sleep quality did not predict overall QoL. Although the Adjuvant! Online score was not related to overall QoL, it was associated with lower social and increased spiritual QoL subscale scores.

Conclusions: Women's perception of their QoL shortly after a breast biopsy is strongly related to their sense of social support, mood, spirituality, and self-reported level of distress. Younger women appear to be less satisfied with their QoL during this period. Feelings of depressed mood and a general sense of distress represent important issues to monitor during this period, though strength of spirituality and stronger social networks appear be significant moderating factors and may represent important avenues for intervention.

1732

Screening Mammography Is Indicated in the 40- to 50-Year Age Group

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Objective: Screening mammography is associated with a significant decrease in breast cancer mortality. The new U.S. Preventive Services Task Force guidelines on breast cancer screening recommend routine screening mammography starting at age 50. We did a retrospective review of our breast cancer patients between ages 40 to 49 to determine if the breast cancer diagnosis was established by screening mammography.

Methods: During the period from 2004 to 2009, breast cancer patients were selected from the tumor registry database. A subset of 583 women, ages 40 to 49, were included. Cancer was defined as invasive or ductal carcinoma in situ (DCIS). In this analysis we excluded patients with lobular carcinoma in situ (12 cases), large tumors (>25 mm), patients with locally advanced cancers and metastatic disease. A total of 361 cases with breast cancer were analyzed. DCIS was present in 96 (27%) and invasive carcinoma in 265 (73%) of 361 patients with breast cancer.

Results: Screening mammography identified 284 of 361 (79%) of breast cancers in women ages 40 to 49. Screening mammography detected DCIS in 90 of 96 (94%) patients and invasive cancer in 194 of 265 (73%). Breast cancer was detected by patients or clinicians in 58/284 (20%) of the cases and by magnetic resonance imaging (MRI) in 19/284 (6%). Invasive breast cancer was identified in 93 patients with tumors less than 10 mm in size. Of these, 76 (82%) were detected by screening mammography. Invasive cancer was associated with microcalcifications in 32 (42%) of the cases. In the 11- to 15-mm tumor size group, 90 invasive tumors were detected. Of these, 74 (82%) were detected by mammography and in the 16- to 25-mm tumor size group mammography detected 42 (51%) breast cancers. Tumor histology included 235 invasive ductal, 15 lobular, 7 tubular, 4 mucinous, 3 papillary cancers, and 1 adenoid cystic carcinoma.

Conclusions: During the period from 2004 to 2009, screening mammography identified more than 79% of the breast cancers in women ages 40-49 at our institution.

1639

The Success of a One-to-One Mentoring Support Service for Breast Cancer Patients

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Objective: After Breast Cancer Diagnosis (ABCD) is a Wisconsin-based nonprofit telephone mentoring service for patients recently diagnosed with breast cancer. This program has been training volunteers, all of whom have had personal experience with breast cancer as a patient or family/friend of a patient, to provide personalized information and emotional support, focusing on issues of survivorship in breast cancer patients since 1999. The purpose of the study was to determine the effectiveness of a one-to-one mentoring support service and identify areas of improvement to better meet the needs of breast cancer survivors.

Methods: ABCD has conducted three "mentor effectiveness studies since its inception, the most recent occurring in October 2006, with the assistance of an independent marketing and survey company. The survey was administered by ABCD volunteers and consisted of a 5-minute telephone interview, which included evaluations of the ABCD organization, evaluations of mentors, and awareness of ABCD resources. Respondents were asked to evaluate the attributes of ABCD on a 5-point Likert scale, where 1 is "Strongly Disagree" and 5 is "Strongly Agree."

Results: Of the 139 respondents, 41% reported an estimated relationship with their mentor for 6 months to 1 year. Ninety-six percent of respondents would refer a breast cancer patient to ABCD and 60% would consider being mentors. The mean rating on the most recent survey concerning the helpfulness of the program to the respondent was 4.41 and 3.84 for helpfulness to the respondent's family members. When compared to the previous two studies in 2002 and 2004, the confidentiality of the discussion had with the mentor received the highest performance score of 4.77, as did emotional support from the mentor, with a score of 4.40 (Table). When looking at the respondent's familiarity with ABCD resources, 61% were not familiar with the ABCD website and 38% were not familiar with the ABCD help line. Methods that ABCD has implemented to improve scores between surveys include three revisions of the mentor training curriculum based on responses on postsession surveys after each mentor training session. There was also an improvement in the staffing from one part-time person to three full-time people with more experience managing a volunteer corps and with a greater knowledge of breast cancer.

Conclusions: In conclusion, ABCD is an effective mentoring support service for patients and their loved ones coping with breast cancer. Three "mentor effectiveness" studies over a 9-year period have demonstrated improvement in the program over time, as well as consistently confirmed that participants are satisfied with the information and support they receive from the program. The ABCD website and help line are other, lesser known resources that are available to participants, which could potentially serve as other sources of support. Participants almost universally would recommend the program and the majority of participants would volunteer as mentors. This is an effective program that could be expanded nationally to provide support to breast cancer survivors and their loved ones.

Survey Questions	2006	2004	2002
ABCD is a reliable source for support.	4.55	4.67	4.33
ABCD is a reliable source for information.	4.37	4.47	4.09
One-on-one contact is valuable.	4.65	4.74	4.62
Overall evaluation of ABCD.	4.58	4.56	4.43
Mentor was well informed.	4.48	4.52	4.31
Mentor provided emotional support.	4.40	4.38	4.09
Trusted mentor to keep discussions confidential.	4.77	4.74	4.74
Overall evaluation of mentor.	4.35	4.41	4.31
Length of relationship (6-12 mo).	41%	33%	17%
Program has helped me.	4.41	4.47	---
Program has helped family members.	3.84	---	---

1660

Sentinel Lymph Node Biopsy in Patients Undergoing Neoadjuvant Chemotherapy

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Objective: Sentinel lymph node (SLN) biopsy after neoadjuvant chemotherapy for breast cancer patients remains controversial. We aimed to assess the incidence of positive SLNs and additional nodal disease on completion axillary lymph node dissection (CALND) in cases with a positive SLN following completion of neoadjuvant chemotherapy.

Methods: With IRB approval, we retrospectively analyzed all patients who completed neoadjuvant chemotherapy and subsequently underwent SLN biopsy at time of definitive breast surgery between January 2000 and July 2010. Intraoperative frozen section of the SLN was performed in all cases.

Results: Of 33 patients undergoing SLN biopsy, 30 patients (91%) were clinically node negative and 3 patients were node positive by fine needle aspiration biopsy at presentation. SLNs were identified in all (100%) cases. Ten patients (30%) had positive SLNs and one additional patient had isolated tumor cells. Intraoperative frozen section analysis detected the metastatic disease in 9 of 10 node-positive cases (90%). All nine cases underwent immediate CALND and additional nodal disease was found in six patients (66%). The one case with delayed positive SLN had a 1.3-mm micrometastasis noted in one of three SLNs and the patient elected not to pursue further surgery. In one case, a metastasis measuring 0.02 mm was seen only on immunohistochemical cytokeratin staining in one of five SLNs and was classified as node negative with isolated tumor cells and the patient did not undergo additional axillary surgery. The one delayed positive SLN lymph node metastasis measured 1.3 mm compared to average metastasis size of 7.9 mm (range, 2.5-11 mm) in the positive SLNs detected on frozen section intraoperatively. The mean number of SLNs harvested was similar in the node-negative and node-positive patients (3.65 vs 3.10, respectively, p = 0.32). In node-positive cases, the mean number of additional positive axillary lymph nodes was 3.17 (range, 0-8). Residual tumor size in the breast was significantly larger in the node-positive patients than node-negative patients (4.1 cm vs 2.0 cm, p = 0.01). All three patients with node-positive disease at presentation were found to have positive SLNs after neoadjuvant chemotherapy and underwent completion axillary dissection with a mean of 3.67 additional positive axillary nodes (range, 1-8). The average size of lymph node metastasis in these patients appeared larger compared to clinically node-negative patients at diagnosis (10.0 mm vs 5.1 mm, p = 0.10).

Conclusions: Intraoperative histologic examination of SLNs appears reliable in patients after completion of neoadjuvant chemotherapy. Patients with macrometastases in SLNs after chemotherapy have a high rate of additional positive nodes and should undergo completion axillary dissection.

1707

Re-evaluating the Role of Axillary Clearance in Screen-Detected Breast Cancer Patients

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Objective: Currently, the gold standard for all invasive breast cancers without palpable/radiological apparent axillary lymphadenopathy is primary excision with sentinel node biopsy (SNB), which, if positive, mandates an axillary clearance. However, given the recent findings of the ACOSOG, Z0011 trial, it is unclear whether patients with asymptomatic screen-detected tumors derive any benefit by undergoing an axillary clearance with its attendant morbidities. Our aim, therefore, was to evaluate the role of axillary clearance in an asymptomatic screen-detected breast cancer population.

Methods: Patients were recruited from a national screening program which offers women (aged 50 to 65) biannual mammography. Over a 2-year period, 519 screen-detected breast cancer patients were recruited. All patients were asymptomatic and had invasive disease and a positive sentinel node with subsequent axillary clearance. Patients were excluded if they had palpable or radiologically (axillary ultrasound) detected axillary nodes, in situ disease, or if they did not have an SNB or a T3 tumor. All patients undergoing breast-conserving surgery had radiotherapy.

Results: Of 519 patients in a national screening program that were clinically/radiologically determined to be axillary node negative, 110 (21.2%) had a positive SNB. All 110 (T1 = 68, T2 = 42) patients proceeded to have an axillary clearance. Sixty-eight (59%) had T1 tumors and, of these, 39 (60%), despite a positive SNB, had no metastatic nodes on final pathological analysis of their axilla. In addition, 20 (47.5%) patients with T2 tumors had no metastatic nodes except for a positive SNB. Furthermore, only 5 (7.8%) of T1 tumors with a positive SNB had 4 or more metastatic lymph nodes.

Conclusions: Of patients with a screen-detected T1/T2 tumor, 53.4% failed to derive any benefit from an axillary clearance. Moreover, 7.8% of patients with screen-detected T1 cancers harbor four or more metastatic nodes. These findings compel us to re-evaluate the role of axillary clearance in the screen-detected asymptomatic breast cancer population.

1721

Which Is a Better Predictor of Outcome After Neoadjuvant Chemotherapy: Microscopic Disease in Bone Marrow or Lymph Nodes?

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Objective: Neoadjuvant chemotherapy (NACT) effectively reduces primary tumor size and lymph node (LN) metastases in operable breast cancer (BC) patients. However, the effect of NACT on minimal residual disease is unknown. Cancer cells that disseminate to bone marrow (disseminated tumor cells, DTCs) are identified in 30% of primary BC patients and independently predict survival. In current clinical practice, LN positivity following NACT is employed as a prognostic indicator. This study compared prognostic significance of minimal residual disease in bone marrow (DTCs) and LN following NACT.

Methods: Clinical stage I-III BC patients from one tertiary cancer center provided informed consent to participate in an IRB-approved prospective study involving intraoperative collection of bone marrow (5 ml) from bilateral iliac crests after completion of NACT. DTCs were identified using Ficoll gradient separation and cytospin followed by anti-pancytokeratin antibody (cocktail of AE1/AE3, CAM5.2, MNF116, CK8, CK18) immunostaining. The presence of any cytokeratin-positive cell with morphological features consistent with those of tumor cells was considered positive for DTC. LN status prior to NACT was determined by axillary ultrasound and FNA of any suspicious LNs. LNs were collected intraoperatively, paraffin-embedded, sectioned, and microscopically evaluated for tumor invasion. Micrometastatic LNs were defined as tumor invasion between 0.2 -2.0 mm. The presence of DTCs was also correlated with standard prognostic markers including T size, estrogen receptor, progesterone receptor, and HER2 status of the primary tumor.

Results: We prospectively evaluated 96 patients. Mean age was 51 years and median follow-up 25 months. Nine percent had T1; 34%, T2; 23%, T3; and 34%, T4 tumors. Prior to NACT, 20% were N0; 34%, N1; 4%, N2; and 42%, N3. Fifty-seven percent (52/92) had pathologically positive LNs removed at the time of surgery, of which 19% (10/52) had micrometastatic LNs. DTCs were identified in 27% (24/88) of patients post-NACT. No significant associations were observed between DTCs and LN positivity or any other clinicopathologic variables. Twenty-one percent (5/24) of DTC positive patients died (log-rank, P: 0.02), compared to 20% (2/10, P = 0.27) of patients with micrometastatic LNs. The Cox proportional hazard ratio (HR) for DTCs was 4.93 (1.18-20.66, P = 0.03), whereas micrometastatic LNs had an HR of 2.65 (0.53-13.17, P = 0.23).

Conclusions: Minimal residual disease in bone marrow, but not in LNs, was a significant predictor of outcome following NACT. Bone marrow aspiration for DTCs may offer important prognostic information independent of LNs and standard primary tumor markers.

1648

Receptor Changes in Metachronous Breast Cancer--Our 10-Year Experience

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Objective: All patients with breast cancer are at risk for synchronous and metachronous tumors. We attempted to examine the pattern of receptor expression and conversion in metachronous tumors as compared to the primary tumor. Our objective aimed at establishing a relationship between the subsequent metachronous tumor and also the response to therapy.

Methods: Reviewed charts of 108 women diagnosed and treated for primary breast cancer presenting with metachronous cancer over the past 10 years. The significant factors analyzed were age, grade, size, location of the tumor, hormone receptor status, Her2, and treatment received. Patients with metastasis and regional recurrence were excluded.

Results: Mean age at diagnosis was 59.4 years and subsequent second primary was within 2.2 years. Of 35 patients with ER+/ PR+ in the primary, 24 (68%) retained the status in the metachronous tumor. From 49 patients with ER-/PR- in primary, 40 (82%) retained status. Among 22 patients with ER+/PR-, 16 (73%) retained the receptor status in metachronous tumors. Only three converted from ER- to ER+, and four converted from PR- to PR+. The highest concordance of 93% was seen with PR- primary tumors which retained status in 60 metachronous tumors from 65 primary tumors. Unusually no ER-/PR+ combination was found in either the primary or metachronous tumor group. Most Her 2- tumors (22/31, 71%) remained negative, but 50% (8/16) of Her 2+ (Grade 3) receptors became negative (Grade 0). Twenty-eight patients received both chemotherapy and radiation and 36 did not receive either. Thus we noted that therapy was not strongly associated with receptor changes except for Herceptin.

Conclusions: Most metachronous tumors retained the ER/PR expression patterns of the primary tumor irrespective of the treatment for the primary tumor. Half of primary tumor Her2 expression was lost in metachronous tumors most probably due to Herceptin therapy. Metachronous tumors are least likely with ER-/PR+ primary tumor.

Receptor patterns in primary and metachronous breast tumors

ER/PR and Her 2 Receptor Status	Number in Primary Tumor	Number Retained in Metachronous Tumor	Percent (%)
ER+/PR+ to ER+/PR+	35	24	69%
ER-/PR- to ER-/PR-	49	41	84%
ER+/PR- to ER+/PR-	22	16	73%
ER+/PR+ to ER-/PR-	35	9	25%
ER-/PR+ to ER-/PR+	--	--	
ER-/PR+ to ER+/PR+	--	--	
Her 2+ to Her 2+	16	8	50%
Her 2 - to Her 2 -	31	22	71%

1749

Preoperative Predictors of Nipple-Areolar Complex Involvement in Patients Undergoing Mastectomy for Breast Cancer

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Objective: Nipple-sparing mastectomy has gained wider acceptance as a surgical option to improve cosmetic outcomes for patients undergoing mastectomy for breast cancer. Recognizing which patients are at risk for pathologic nipple areolar complex (NAC) involvement is best done preoperatively for both surgical planning and patient education. We aimed to identify the preoperative factors that were most predictive of NAC involvement.

Methods: A retrospective review was performed of a prospectively collected database of patients undergoing mastectomy for DCIS or invasive breast cancer at a single institution from January 2005 through August 2010. Cases with NAC involvement (NI+) were confirmed by pathology and compared to those without NAC involvement (NI–). For nipple-sparing mastectomies, pathology was determined by sampling the nipple base. Continuous variables were compared using two-sample *t* tests, and categorical variables were compared using chi-square tests. A multivariate analysis was performed to determine the factors most predictive of NAC involvement.

Results: A total of 45 nipple-sparing, 107 skin-sparing, and 240 standard mastectomies were evaluated. Two attempted nipple-sparing mastectomies were converted to skin-sparing mastectomies due to positive frozen section. The overall incidence of NAC involvement was 16% (n = 62). Eighty-five cases (22%) had patient- or physician-determined clinical involvement of the NAC, of which pathology confirmed NI+ in 38 (45%), resulting in a 61% sensitivity, 86% specificity, 45% positive predictive value (PPV), and 92% negative predictive value (NPV). Nipple retraction and retroareolar mass were the most common exam findings, each present in 27% of NI+ cases. NI+ tumors were more commonly detected initially by breast exam (61%), while NI– tumors were more commonly detected by imaging (55%, p = 0.02). Preoperative imaging was interpreted as involving the NAC in only 10% of patients. Of those with positive imaging, 62% were pathologically confirmed, conveying a 38% sensitivity, 96% specificity, 62% PPV, and 89% NPV. The NI+ group had larger tumors than the NI– group (mean, 2.4 cm vs 1.7 cm, respectively; p = 0.02). Tumor-to-nipple distance (TND) was reported on imaging in 54% of cases. TND was closer in the NI+ than the NI– group (mean, 2.0 cm vs 4.7 cm, respectively; p < 0.0001). Sixty-three percent of NI+ tumors were ≤2 cm from the nipple, compared to only 21% of NI– tumors with known TND (p < 0.0001). However, for all cases with TND ≤2 cm, the majority were still NI– (Table). On multivariate analysis, the only preoperative factors predictive of NAC involvement on pathology were the presence of NAC symptoms or exam findings (OR, 5.52; 95% CI, 2.83-10.77) and involvement of the NAC on imaging (OR, 5.55; 95% CI, 2.41-12.81). Tumor grade, hormone markers, and angiolymphatic invasion did not bear any influence on NAC involvement.

Conclusions: The only significant preoperative predictors of pathologic NAC involvement are the presence of clinical exam findings and imaging that demonstrates extension to the NAC. The absence of these factors conveys a relatively low probability of NAC involvement, which should be considered when determining patient candidacy for nipple-sparing mastectomy. Although the majority of NI+ tumors were ≤2 cm from the nipple, TND alone is not a reliable predictor.

Table. NAC involvement according to tumor-to-nipple distance

Tumor-to-Nipple Distance by Imaging	NAC Involvement No	NAC Involvement Yes	P-Value
≤2 cm (N = 61)	59%	41%	<0.0001
>2-4 cm (N = 65)	86%	14%	
>4 cm (N = 86)	93%	7%	

1629

Comparative Prognostic Significance of Sentinel Lymph Node Biopsy and Axillary Lymphadenectomy in Carcinoma of the Breast

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Objective: It has been hypothesized that the enhanced pathologic assessment for nodes identified by lymphatic mapping/sentinel lymph node biopsy will identify patients with small metastases, resulting in a stage migration and better outcomes for pN0(i-) patients. This study compares the prognostic accuracies of axillary lymphadenectomy (ALND) and SLNB in patients with carcinoma of the breast, operated on by a single breast surgeon during the period 1991-2004.

Methods: An Institutional Review Board-approved retrospective analysis of a prospectively maintained database of breast cancer patients was searched and all node-negative women were identified. This population included 135 women who underwent ALND from 1991-1996 and 238 patients assessed by SLNB from 1997-2004. The demographics of these cohorts were compared using chi-square analyses. Disease-free status was calculated for both groups and compared.

Results: The ALND and SLNB cohorts were statistically similar (Table 1). Although there were no statistically significant differences in the demographics, women from the ALND cohort had a slight preponderance of T2 cancers, possibly reflecting less frequent employment of screening mammography during that time period. This may have impacted the extent of breast surgery performed. The SLNB patients were more likely to have breast preservation (87% vs 64%, p < 0.01) and consequently were also more often treated with adjuvant radiation therapy (85% vs 61%, p = 0.03). Adjuvant chemotherapy (21% vs 16%) and endocrine therapy (49% vs 48%) were employed equally in these two cohorts. In our study, 89.6% of the ALND cohort was disease free at a median follow-up of 130 months, while 95.8% of the SLNB cohort was disease free at a median follow-up of 71 months. At a comparable median follow-up of 71 months, 92.2% of the ALND cohort was free of disease (p = 0.73).

Conclusions: This dataset demonstrates equivalent prognostic ability for sentinel node biopsy and axillary lymphadenectomy as assessed by disease-free survival at a median follow-up of almost 6 years. These two cohorts were statistically similar in age, stage of disease, grade of disease, and use of adjuvant systemic therapy. Significant differences exist in the frequency of breast-conserving surgery and radiation therapy, perhaps reflecting more frequent and more sensitive screening mammography in the cohort operating upon from 1997-2004.

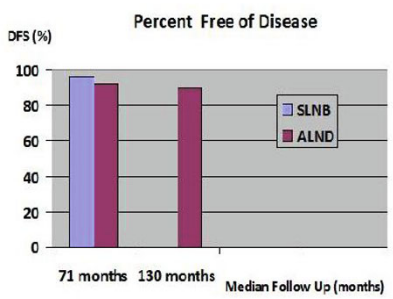

Table I. Patient demographics

	Axillary Lymph Node Dissection	Sentinel Lymph Node Biopsy	P
N	135	239	
Age	61.3	60.5	NS
% ER Positive	108/130 (83%)	187/225 (83%)	0.16
Stage			
0	2 (1%)	13 (5%)	0.07
1	108 (80%)	204 (85%)	0.57
2	25 (19%)	22 (9%)	0.03
Grade			
Well	37 (27%)	102 (43%)	0.05
Moderate	53 (39%)	71(30%)	0.02
Poor	31 (23%)	54 (23%)	0.41
N/D	14 (10%)	12 (5%)	
Tx			
BCS	86 (64%)	208 (87%)	< 0.01
MAST	49 (36%)	31 (13%)	< 0.01
CT	28/135 (21%)	39/239 (16%)	0.33
HT	66/134 (49%)	114/239 (48%)	0.64
RT	82/135 (61%)	202/239 (85%)	0.03

1662

Sentinel Lymph Node Biopsy in Pure DCIS: Is It Necessary?

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Objective: Sentinel lymph node positivity ranges from 1.4% to 13% in pure ductal carcinoma in situ (DCIS) due to the different examination methods such as H&E or immunohistochemistry. Yet sentinel lymph node biopsy (SLNB) in patients with pure DCIS has been a matter of debate. In the present study, our aim was to identify factors in a single institutional series to select patients who may benefit from SLNB.

Methods: Of 637 patients with breast cancer between July 2000 and July 2010, 62 patients (9.7%) diagnosed with pure DCIS or DCIS associated with microinvasion were reviewed. All the sentinel lymph nodes were examined by serial sectioning (50 µm) of the entire lymph node and H&E staining, and by cytokeratin immunostaining in suspicious cases.

Results: Of 62 patients, 57 patients (92%) were found to have pure DCIS, and 5 (8%) had microinvasive disease associated with DCIS. Median age was 51 (range, 30-79). Of patients with pure DCIS, mastectomy was performed in 28 patients (49%), whereas 29 patients (51%) underwent breast-conserving surgery. Thirty-six patients (63%) with pure DCIS underwent SLNB, and 3 of them had a positive SLNB. Of patients with SLNB positivity, two patients (5.6%) were found to have isolated tumor cells (ITCs), whereas one patient had macrometastasis (2.8%). Axillary lymph node dissection was performed in one patient with ITC, and in one patient with macrometastases. In all three cases with SLN metastases, only one sentinel lymph node was involved with tumor cells, whereas all the other sentinel and nonsentinel lymph nodes were found to be reactive. Patients who underwent SLNB, were more likely to have a tumor size >30 mm or DCIS with high nuclear grade or necrosis or a mastectomy due to extensive disease. Other factors, including age >50, estrogen or progesteron receptor status, or c-erbB2 positivity, did not significantly influence the surgeon's decision to perform SLNB.

Conclusions: In our series, we found a relatively higher SLNB positivity in patients with pure DCIS than the large series reported elsewhere. This may either be due to the meticulous examination of SLNs by serial sectioning technique or due to our patient selection criteria or both. Although the importance of presence of ITC in SLNs has not been clarified yet, it may be reasonable to perform SLN in selected patients with pure DCIS.

1646

Can Surgeons Avoid Preoperative Wire Localization Using Sonographically Visible Breast Biopsy Marker Clips?

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Objective: Preoperative wire localization to guide resection of nonpalpable breast lesions is resource-intensive. We assessed if collagen-based marker clips placed at biopsy are detectable by surgeons before and during surgery using 2D ultrasound, if target visibility is enhanced using 3D ultrasound, and if ultrasound visibility impacts final surgical margin adequacy.

Methods: Patients presenting for consultation within 4 weeks of ultrasound-guided breast biopsy and clip placement were eligible for this prospective IRB-approved pilot study. 2D and 3D ultrasound clip and lesion visibilities were rated by surgeons preoperatively and intraoperatively from 1 (not visible) to 5 (clearly visible), with 4 or 5 deemed adequate. 2D and 3D visibilities were compared and correlated with margin status. The Wilcoxon signed rank test was used for statistical analysis.

Results: There were 25 patients with 26 lesions. Twelve (12) of 18 (67%) who underwent lumpectomy had 2D ultrasound clip visibility rated 4 or 5 preoperatively, while 6 of these 12 (50%) also had adequate clip visibility intraoperatively. There were 5 patients with clip and lesion visibility rated 4 or 5 preoperatively that also had clip and/or lesion visibility rated 4 or 5 at surgery. Surgeons consistently rated clip and lesion visibility as better with 2D than with 3D ultrasound (p < 0.01). Of 44 paired 2D and 3D clip assessments, 3D visibility was better by 1 rank level in 4 cases, but 2D was better by 1-5 levels in 17 (39%). For lesions, 3D visibility was better by 1 rank level in 2 cases, but 2D was better by 1-2 levels in 14 (32%). Among the 16 patients undergoing lumpectomy for cancer, 5 (31%) had inadequate surgical margins. Of the 5 patients with clip and lesion 2D ultrasound visibility of 4 or 5 at both time periods, final margins were adequate for 3 (60%) and inadequate for 2 (40%).

Conclusions: Intraoperative surgeon-directed ultrasound target localization may be feasible in patients with adequate preoperative visualization of both marker clip and lesion. The addition of 3D to 2D ultrasound did not enhance clip or lesion visualization, nor did adequate intraoperative ultrasound visibility eliminate the possibility of inadequate surgical margins for malignant lesions.

1745

The Clinicopathological Risk Factors for Recurrence of Phyllodes Tumor of the Breast

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Objective: Phyllodes tumors are uncommon biphasic breast tumors that usually occur in adult females. They are composed of a connective tissue stroma and epithelial elements. The present study demonstrates the recent experiences in diagnosis, surgical management and clinical follow-up of this disease.

Methods: We retrospectively reviewed the medical records and pathological slides of 164 patients with phyllodes tumors that had undergone surgical treatment at the Department of Surgery, Samsung Medical Center, from January 1995 to July 2009. Clinical data analyzed included age, type of surgery, tumor size, location, time to recurrence and metastasis, previous surgical history, a number of the tumor, resection margin. Pathological characteristics of the tumors such as mitosis, tumor margins, cellular pleomorphism, and stromal pattern were examined.

Results: The mean follow-up was 34.0 months (range, 2.7-179.3). The median age of the patients was 43 (range, 11-72). The tumor size ranged from 1.0 cm to 30.0 cm, with a median of 6.1 cm. The most commonly performed surgical procedures were local or wide excision (148 case, 90.2%), mastectomy and MRM in 16 cases (9.8%). The pathologic diagnosis included 82 (50.0%) benign, 41 (25.0%) borderline, and 41 (25.0%) malignant phyllodes tumor. The tumor margin was infiltrating in 44 (26.8%) cases and pushing in 115 (70.1%) cases. A local recurrence was observed in 27 (16.1%) patients and distant metastasis developed in 4 patients with malignant phyllodes tumor. Bone metastasis observed in two patients and lung metastasis developed in one patient. Both bone and lung metastases were detected in one patient. The 5-yr diseasefree survival rate of each histologic grade was 79.8%, 67.3%, and 37.9%, respectively (benign vs malignant, $p = 0.025$). A disease mortality occurred in only malignant phyllodes tumor patient and the 5-yr overall survival rate was 88.1%. Risk factors for local recurrence of a phyllodes tumor were a tumor size ($p = 0.001$) and an invasive resection margin ($p = 0.007$). Distant metastasis is associated with malignant histology ($p = 0.002$).

Conclusions: A positive resection margin and a size of tumor were the significant prognostic factors of local recurrence of phyllodes tumor. Distant metastasis of phyllodes tumor developed in only malignant phyllodes tumor patient. Since none of the pathological factors significantly affected the rate of recurrence, further studies are needed to define the risk factor for the management of phyllodes tumor.

1624

Is Accelerated Partial-Breast Irradiation Safe in Patients With an Intermediate or High Oncotype Dx Score?

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Objective: Oncotype DX, a 21-gene assay, assesses the risk of distant recurrence in patients with estrogen receptor positive, node-negative breast cancer. A recently published study demonstrated that recurrence score (RS) is also an independent predictor of locoregional recurrence (LRR). The goal of our study was to assess whether accelerated partial breast irradiation (APBI) was equivalent to whole-breast radiation in patients deemed to have high-risk tumors by Oncotype DX.

Methods: An IRB-approved retrospective chart review was conducted between April 2004 and December 2008. Forty-five patients (pts) with invasive breast cancer were identified; all had an intermediate or high RS (>18) and received APBI or whole- breast radiation following breast-conserving surgery. APBI was administered via balloon catheter brachytherapy; one pt received 3D conformal partial breast radiation. The primary endpoint was time to LRR. The secondary endpoints were time to distant metastases, and contralateral breast cancer.

Results: Of 45 pts, 36 had an intermediate RS and 9 had a high RS. Median age at diagnosis was 61. Mean tumor size was 1.52 cm (range, 0.3-4.5cm). One pt was node positive. Ninety-six percent of pts had negative surgical margins. Forty-four (98%) received hormonal therapy and 12 (27%) received chemotherapy. Eleven of 36 (30%) pts with an intermediate RS received whole-breast radiation, 24 (67%) had APBI, and 1 (3%) had 3D conformal partial breast. Three of 9 (33%) with a high RS received whole-breast radiation, and 6 (67%) had APBI. There were no local (in-breast) recurrences at a median follow-up of 3.2 years. Two pts (4%) developed distant disease; one was a synchronous regional and distant metastases and one was an isolated distant metastases. Both pts had an intermediate RS; both were treated initially with APBI. No pt developed a contralateral breast cancer.

Conclusions: APBI is equivalent to whole-breast radiation therapy in pts with stage I or IIA breast cancer. Pts with an intermediate or high Oncotype DX score do not have a higher risk of LRR with APBI versus whole-breast radiation. These "high-risk" pts may be safely treated with APBI.

Table 1. Clinicopathologic features of patients with metastatic disease

Case no.	Age	Histology	Tumor Size(CM)	LVI	Radiation	OncotypeDX Score	DFI (yrs)	Site of Distant Disease
44	63	ILC	2.60	No	Partial	30/Intermediate	1.13	Liver
45	71	IDC	2.00	Yes	Partial	19/Intermediate	2.21	Axillary, lung, mediastinum

1716

Accuracy of Clinical Exam, Digital Mammogram, Ultrasound, and MRI in Determining Post-Neoadjuvant Pathologic Tumor Response in Operable Breast Cancer Patients

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Objective: The purpose of this study is to determine the accuracy and predictive value of clinical examination and breast imaging for a complete pathological response (cPR) in breast cancer patients following neoadjuvant chemotherapy for locally advanced operable breast cancer.

Methods: An IRB-approved retrospective review was performed of data collected from patients treated with neoadjuvant chemotherapy or hormonal therapy between January 2005 and September 2010. Patients were evaluated by one of three surgical breast oncologists before neoadjuvant therapy and within 1 month of surgery by clinical breast exam (CBE), digital mammogram (DM), breast ultrasound (BUS), and/or MRI. The accuracy, negative predictive value (NPV), and positive predictive value (PPV) when compared to the final pathologic report were analyzed. DCIS was considered as a positive pathologic diagnosis although it was evaluated separately.

Results: A total of 62 tumors in 61 patients with an average age of 56 (range, 34 to 87) were evaluated. The overall accuracy of CBE compared to the final pathologic diagnosis was 54% with a NPV of 28% and a PPV of 87% in 52 available patients. Age over 50 increased accuracy to 70% with an increased NPV of 50% and slightly decreased PPV of 83%. For patients younger than 50, accuracy decreased to 32% due to the reduced NPV of 12%. The overall accuracy of DM was 71% with an NPV of 30% and a PPV of 82% in 49 available patients. Age greater than 50 improved NPV to 43% but did not affect accuracy or the other predictive variables. The overall accuracy of BUS was found to be 80% with an NPV of 33% and PPV of 85% in 54 available patients. Age did not appear to affect any variable except for improving PPV to 95% in patients under the age of 50. The overall accuracy of MRI was 70% with an NPV of 44% and a PPV of 77% in 40 available patients. PPV was also increased for patients under the age of 50 to 83%. When these methods are combined, the overall NPV was 40% for any two methods in agreement trending toward improvement to only 50% when considering radiologic methods only. The PPV for two or more methods in agreement at 84% was not improved. Controlling for the finding of DCIS on final pathology by excluding it had no significant effect on any method evaluated.

Conclusions: BUS was the most accurate predictor of final pathology in this patient population. All modalities had a PPV of greater than 75% for identifying the presence of residual disease which generally improved in the younger patients. No examination method, even when combined, was able to predict pCR as the NPV was less than 50%. In younger patients the accuracy and NPV were compromised even further.

Table 1.

TEST	Clinical Exam	Digital Mammogram	Breast Ultrasound	Breast MRI
Overall accuracy	54	71	80	70
Overall PPV	87	82	85	77
Overall NPV	28	30	33	44

Accuracy, PPV, and NPV of exam method relative to the final pathology.

1757

BRCA Testing by Specialty--A Regional Review

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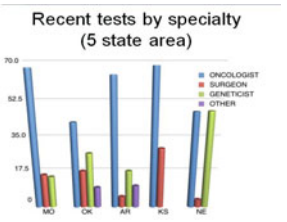
Objective: BRCA status significantly influences the surgical recommendations for a newly diagnosed cancer patient. The testing may be done by the surgeon, medical oncologist, or referral to a genetic specialist. Surgeons began testing in the state of Kansas out of necessity. In an effort to determine if Kansas fell within standard guidelines for testing, a review was performed of genetic testing by specialty for Kansas, as well as the surrounding states.

Methods: Numbers of BRCA tests ordered on affected patients during the years of 2003-2008 were obtained. The tests were divided into ordering groups of surgeon, medical oncologist, geneticist, and "other." Genetic counselors ordering tests were listed under the MD specialty with whom they worked. Results for Missouri, Oklahoma, Arkansas, Kansas, and Nebraska were obtained and analyzed.

Results: Although the number of cancers by state did not change significantly, the number of tests ordered by all five states increased by almost 10-fold. If one considers that 20% of breast cancer patients are appropriate for testing, none of these states were testing within this range in 2003. Only Missouri, Kansas, and Nebraska were testing at a 20% rate by 2008. Medical oncologists were responsible for ordering more BRCA tests than any other specialty in essentially all states. Nebraska had the highest percentage of tests ordered by a medical geneticist, as might be expected. Surgeons contributed a large volume of testing in Missouri and Kansas to place these states within the recommended appropriate testing range.

Conclusions: Surgeons should recognize the indications for BRCA testing. We cannot assume that another specialist within the cancer care system will recognize the need and proceed with testing of our patients. Failure to test may result in failure to counsel about surgical options and follow-up recommendations for high-risk patients. Testing at or above the 20% rate was aided in states where surgeons were actively involved in identifying and testing appropriate patients.



1695

Correlation of Ductal Lavage Cytology With Ductoscopy-Directed Duct Excision Histology in Women at High Risk for Developing Breast Cancer: A Prospective Single-Institution Trial

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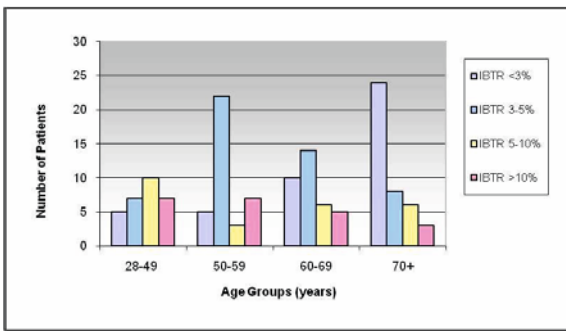
Objective: Monitoring patients at high risk for developing breast cancer is limited to physical exam and imaging. Ductoscopy with ductal lavage allows visualization and cytologic evaluation of the epithelium at risk. The study aim was to determine which histological lesions produce cellular atypia in lavage specimens, and whether ductoscopy adds useful information for the evaluation of high-risk patients with atypical lavage cytology.

Methods: We prospectively recruited women aged 35 and older at high risk for developing breast cancer. High risk included a previous breast cancer diagnosis, personal history of lobular carcinoma in situ or atypical ductal hyperplasia (ADH), BRCA mutation carrier, or a 5-year Gail score of >1.7%. All women underwent ductal lavage. Women found to have atypia on lavage specimens underwent ductoscopy-directed duct excision (Group 1). Women without atypia were observed (Group 2). Data included patient demographics, risk assessment, cytologic and histologic findings, and outcomes. Descriptive statistics were utilized for data summary and were compared using Fisher's exact test.

Results: We enrolled 102 women; 93 (91%) were Caucasian. Their median age was 49 years (range, 34-73) with a median follow-up of 80 months (range, 5-90). Overall, 27 (26%) had atypical lavage cytology (Group 1), while 75 (74%) had benign cytology. Subsequent duct excision in Group 1 patients revealed benign ductal histology in 11 (44%), papillomas in 9 (36%), ADH in 4 (16%), and ductal carcinoma in situ in 1 (4%). At follow-up, three patients developed breast cancer, including one Group 1 patient with atypical lavage cytology but benign ductal histology and two Group 2 patients. There were no differences between Groups 1 and 2 with respect to patient demographics, risk level, Gail scores, or risk for subsequent breast cancer ($p > 0.05$).

Conclusions: Although 20% of high-risk women with ductal lavage atypia have ADH or malignancy on subsequent excision, the vast majority do not. Atypia identified by ductal lavage is not associated with a higher risk of developing subsequent breast cancer, even in this high-risk population.



1754

Mammography in 40-Year-Old Women: What Difference Does It Make? The Potential Impact of the U.S. Preventative Services Task Force (USPSTF) Mammography Guidelines

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Objective: Recently, the USPSTF recommended against annual mammography screening for 40-year-old women, unless the patient had a genetic mutation (BRCA1, BRCA2) or known chest radiation exposure. This 10-year retrospective chart review evaluates the potential impact these recommendations could have on women diagnosed with breast in the 40-49 age group.

Methods: The medical record database of our tertiary referral center was systematically reviewed to identify those women aged 40-49 treated for breast cancer over a 10-year period (1998-2008). The women were divided according to their method of diagnosis: either mammographically detected cancers (MDC) or cancers that were detected clinically not by mammographic screening (non-MDC). Statistical analysis was performed to determine if there was a difference in tumor size, stage at presentation, family history, diseasefree, and overall survival between the two groups.

Results: During the 10-year time period, 1581women were treated for breast cancer at our institution. Of these, 320 (20%) were between the ages of 40 and 49, 9 patients were excluded from the study due to incomplete records. Of the remaining 311 women, 145 (47%) underwent mammographic screening and were diagnosed with a MDC, the other 166 (53%) were diagnosed by clinical symptoms or nonmammographically detected cancer (NMDC). The median tumor diameter of the MDC group was 20 mm significantly smaller than the NMDC group 30 mm ($p < 0.0001$). Women with MDC had a significantly lower incidence of lymph node-positive cancer than the NMDC group, 28/113 (24.78%) vs 85/130 (55.92%), ($p < 0.0001$). Women with MDC had a significantly higher incidence of a family history of breast cancer than the than NMDC group, 14.62% and 25%, respectively ($p = 0.0304$). Five-year diseasefree and overall survival rates were determined for both groups. Five-year diseasefree survival was 94% (87%, 97%) for the MDC group and 71% (62%, 78%) for the non-MDC group. Five-year overall survival rates for each group were 97% (92%, 99%) for the MDC and 78% (69%, 85%) for the non-MDC. In multivariate analysis mammographic detection, node negativity and smaller tumor size were found to be associated with a significant increase in survival.

Conclusions: This 10-year retrospective review demonstrates the importance of early detection and treatment of breast cancer to improve overall and diseasefree survival. Mammographic screening in women aged 40-49 detected smaller tumors with less nodal metastasis resulting in improved survival supporting annual mammographic screening in this age group.

1753

Comparison of the MammaPrint 70-Gene Expression Profile With Clinical Parameters in Patients With Breast Cancer: Findings From a United States Cohort

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Objective: The MammaPrint 70-gene tumor expression profile is established as a powerful predictor of disease outcome in breast cancer. In addition, TargetPrint, a microarray-based test that measures the mRNA expression level of ER, PR, and HER2 was developed as an objective and more quantitative assessment of tumor receptor status versus immunohistochemistry (IHC) alone. In a Kaplan-Meier analysis (see figure) of 317 untreated patients who would have received adjuvant chemotherapy according to NCCN guidelines, classification by MammaPrint showed that low-risk patients have an excellent breast cancer-specific survival (BCSS) (de Snoo et al. ASCO 2009). In the present study, the 70-gene MammaPrint profile was measured in a U.S. breast cancer patient cohort to determine how MammaPrint compares to treatment advice according to NCCN consensus guidelines and how TargetPrint results compare to IHC/FISH.

Methods: MammaPrint results were evaluated in fresh tumor samples from 89 breast cancer patients (clinical T1-4N0-2M0; median age, 64 [range, 40 to 95] years) collected by core needle biopsy (6) or from a surgical specimen (83) in 6 of 8 planned U.S. hospitals from July 2008 to September 2010 (study protocol MP 090). We compared treatment advice as recommended by NCCN guidelines and classification according to the 70-gene MammaPrint profile. A direct comparison was also made between MammaPrint and the Oncotype DX assay in a subset of patients. In addition, we compared IHC/FISH assessments of ER, PR, and HER2 with gene expression readouts by TargetPrint.

Results: According to NCCN treatment recommendations, one patient did not require any adjuvant treatment (ie, tumor size 0.6 to 1 cm, grade I disease, no lymph node involvement); this patient was also classified as low risk by MammaPrint. For five patients, NCCN recommendations could not be assessed due to a missing clinical parameter (four high risk and one low risk, according to MammaPrint). For the remaining 83 patients, NCCN guidelines recommended adjuvant endocrine therapy plus adjuvant chemotherapy (75) or recommended considering chemotherapy (8); 18 of these patients were classified as low risk by MammaPrint and the remaining as high risk. Comparison of microarray receptor results with IHC/FISH performed at the U.S. hospitals indicated similar results with a concordance of 96% for ER; 95% for PR; and 96% for HER2. For 11 patients the Oncotype DX assay was also performed, resulting in 1 patient classified as low risk and 10 patients classified as intermediate risk. All these patients were high risk, according to MammaPrint.

Conclusions: For the majority (93%) of these 89 breast cancer patients from 6 U.S. hospitals, NCCN guidelines either recommended or suggested considering treatment with cytotoxic adjuvant chemotherapy, whereas MammaPrint indicated a low risk of recurrence in 22% of these cases. Integration of the 70-gene MammaPrint profile into clinical risk assessment and adjuvant treatment advice could provide added value for the management of early-stage breast cancer and potentially avoid unnecessary chemotherapy in low-risk patients.

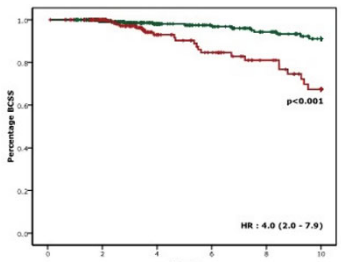

Figure depicting KM-curve for BCSS according to MammaPrint for ER+/HER2- patients for whom NCCN recommends chemotherapy (n=566), classified by MammaPrint into Low (green) and High (red) risk patients. At 10 years, BCSS was 91% vs. 67% (HR 4.0 [95%CI 2.0-7.9], p<0.01).

1747

Surgical Outcomes of 63 Patients From an International Trial of Preoperative Concurrent Paclitaxel-Radiation in Locally Advanced Breast Cancer

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Objective: Locally advanced breast cancer (LABC) is the most common presentation of breast cancer worldwide. In the United States, neoadjuvant therapy has become the standard of care for LABC. Recently, Adams et al reported a 34% pathologic response rate among 105 patients with LABC treated with taxane-based, preoperative chemo-radiation: 5-year DFS and OS results were comparable to those of much more aggressive chemotherapy regimens in the neoadjuvant setting. As is reported for patients treated by neoadjuvant chemotherapy, the achievement of a pathological response to chemo-radiation reflected better DFS and OS. Importantly, a pathological response occurred in 54% of patients with hormone-negative tumors. Since this approach is simple and cost-effective, it has attracted interest from several international centers. We report the surgical outcomes after taxane-radiation in 63 LABC patients treated in a multi-institutional clinical trial in India, South Africa, and the United States.

Methods: Women with LABC (stages IIB-IIIC), ECOG performance status of 0 to 1, were eligible. Patients were treated with paclitaxel (30 mg/m(2) intravenously twice a week) for 6-12 weeks. Daily radiotherapy was delivered to breast, axillary, and supraclavicular lymph nodes during weeks 2-7 of paclitaxel treatment, at 1.8 Gy per fraction to a total dose of 45 Gy with a tumor boost of 14 Gy at 2 Gy/fraction. Seventeen of 63 patients received four cycles of doxorubicin 60 mg/m2 and cyclophosphamide 600 mg/m2 prior to the paclitaxel -RT regimen. Mastectomy or lumpectomy, as decided by each surgeon, was performed 4 weeks after completion of preoperative therapy or upon recovery of chemoradiation-induced dermatitis. All patients had a level I/II axillary lymph node dissection. Postoperatively, patients who responded to paclitaxel and RT received four cycles of doxorubicin/paclitaxel, whereas patients who did not respond received doxorubicin/cytoxan. Surgical complications were recorded.

Results: Forty-three patients underwent modified radical mastectomyand 20 underwent lumpectomy. Of mastectomy patients, 17 (39.5%) underwent immediate breast reconstruction: free flap reconstruction (8), pedicle flaps (3), advancement flaps(2), tissue expander placement (2), and major chest wall and sternum reconstruction (1). Of lumpectomy patients, five (25%) had further surgery for positive margins; a second lumpectomy (3), and a mastectomy (2). All revealed residual disease and negative margins were achieved. Twenty-one patients had at least 1 complication of whom 17 were treated as outpatients. Eleven (17.4%) had a recurrent seroma, 8 (12.7%) had delayed healing, and 7 (11.1%) developed a postoperative infection. Of the 17 who underwent reconstruction, 3 (17.6%) developed flap necrosis, requiring surgical debridement. The degree of acute chemo-radiation dermatitis was analyzed to explore correlation with the surgical complications. Dermatitis was grade 1 in 21 patients, grade 2 in 29 patients, grade 3 in 11 patients, and 2 had none. The grade of dermatitis did not correlate with risk of complications.

Conclusions: Preoperative paclitaxel with radiotherapy is relatively well tolerated. Risk of complication is similar to that reported in the literature for patients treated with neoadjuvant therapy. The highest morbidity was associated with immediate free flap reconstruction. Delayed reconstruction may be advisable for patients treated with neoadjuvant chemo-radiation.

Institution	MRM	Lumpectomy	Reconstruction	
New York University NY,NY	41	16	14	
AIMS-Cochin, India	9	2	1	
University of Stellenbosch	5	1	2	
Tygerberg, South Africa				
Surgery Complications	**Infection**	**Revision**	**Seroma**	**Delayed Healing**
Mastectomy	2	0	1	2
Mastectomy with reconstruction	3	3	2	4
Lumpectomy	2	0	8	2

1638

A Positive Intramammary Lymph Node Does Not Mandate a Complete Axillary Node Dissection

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Objective: Sentinel lymph node (SLN) biopsy is the standard method to stage the axillary regional nodal basin. Intramammary nodes (IMLN) are lymph nodes located outside of the axilla that are surrounded by breast tissue. There is a strong correlation of a positive IMLN with synchronous axillary disease. We hypothesized that even in the face of a positive IMLN a negative axillary SLN biopsy reliably stages the axillary basin and a complete axillary lymph node dissection (CALND) can be safely avoided. The purpose of this analysis was to answer this question using data from the published literature as well as data from an updated review of our institutional database.

Methods: A comprehensive search of the available English literature was performed to identify published reports that included IMLNs and SLN biopsy. A total of 386 publications were identified meeting the search criteria. Manuscripts were reviewed to identify the status of the IMLN, SLN, and if a CALND was performed. Patients with a positive IMLN and a negative axillary SLN that underwent a CALND were identified. With IRB approval, a review of our prospective institutional breast surgical database was also performed. Patients with the same criteria as above were identified, and pathology reports were reviewed to assess the status of the SLN, IMLN, and CALND.

Results: Twelve publications met the selection criteria; this included six retrospective studies, five case reports, and a letter to the editor. From an initial pool of 27,328 breast cancer cases, only 14 cases had a positive IMLN, a negative axillary SLN biopsy and also underwent a CALND. We next identified seven patients from case reports who also had a positive IMLN, negative SLN biopsy and underwent a CALND. In all 21 cases, the CALND was negative and the status of the axilla was reliably determined by the axillary SLN. In essence there were no false-negative axillary SLNs based on pathologic analysis of the CALND. A review of our institutional breast surgical database resulted in 40 additional cases of IMLNs that were surgically resected; in 10 cases the IMLN was positive. Three of these cases had a negative axillary SLN and underwent CALND. Combining the literature review and our institutional data 24 patients were identified that had a positive IMLN but negative SLN biopsy and underwent a CALND. In all 24 cases the CALND was negative.

Conclusions: These data show that axillary SLN biopsy accurately represents the disease status of the axilla in cases with a positive IMLN. CALND can be avoided in the setting of a positive IMLN and a negative axillary SLN biopsy.

1630

Modern Surgical Approach to Paget Disease

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Objective: Paget's disease (PD) constitutes between 1 and 3% of all breast malignancies. The small numbers make defining standard surgical therapy difficult. It has been suggested that carefully selected patients may be candidates for breast conservation. We sought to identify preoperative factors that would select patients for successful breast conservation and result in low local recurrence rates.

Methods: Fifty-one patients with PD underwent surgical therapy at our institutions between 1998 and January 2010. Using the Clinical Research Information System, clinical presentation of PD, preoperative imaging, pathologic tumor characteristics as well as surgical, radiation, and adjuvant therapies were reviewed. Local, regional, and distant recurrences were captured with a median follow-up of 29 months.

Results: Nineteen of 51 patients (37%) underwent breast conservation with central lumpectomy while 32 patients (63%) underwent mastectomy. Physical finding was the most common presentation of PD as 36/51 patients presented with a change in the nipple areolar complex. Twelve patients presented with palpable mass, and all of these patients were treated with mastectomy. Twenty-two patients underwent mammogram that identified extensive abnormality requiring mastectomy. Twenty-six patients had negative mammograms, and 17 of these patients were successfully treated with breast conservation. Twenty-three patients had MRI performed for surgical planning, and 18 had MRIs that reflected the extent of disease in the breast. Five patients had negative MRIs, and all had disease confined to the nipple areolar complex. Twelve (52%) of the patients with an abnormal MRI results had no mammographic abnormalities noted. Seventeen of 19 patients who were treated with central lumpectomy received adjuvant radiation therapy. None of our patients had a local/regional recurrence at 29 months of follow up. One patient treated with breast conservation therapy and one treated with mastectomy developed a distant recurrence.

Conclusions: PD of the breast can be treated with breast conservation in a properly selected subset of patients. Successful breast conservation was achieved in patients without a palpable finding, a benign mammogram, and normal MRI. No local or regional recurrences were noted in this cohort with short-term follow-up.

Table 1 **PATIENT CHARACTERISTICS**		
Number of patients (N) = 51		
	BREAST CONSERVATION	**MASTECTOMY**
NUMBER	19	32
AGE (mean)	66	52
INVASIVE DISEASE	10 (53%)	21 (66%)
LOCAL-REGIONAL RECURRENCE	0	0
DISTANCE RECURRENCE	1	1
GRADE (invasive component)		
Not recorded or no	12 (63%)	15 (47%)
invasive disease		
I	1 (5%)	0
II	3 (16%)	4 (12%)
III	3 (16%)	13 (41%)
PATHOLOGIC STAGE		
0	10 (52%)	12 (38%)
I	7 (37%)	11 (34%)
IIA	2 (11%)	6 (19%)
IIB	0	2 (6%)
IIIA	0	1 (3%)
IIIB	0	0
IIIC	0	0
CLINICAL PAGET'S DISEASE	19 (100%)	17 (53%)
PALPABLE MASS ON EXAM	0	12 (38%)
POSITIVE MAMMOGRAM	1/18 (6%)	22/31 (71%)
ACCURATE MRI FINDINGS	9/12 (75%)	9/11 (82%)
ADJUVANT THERAPY		
RADIATION	17 (89%)	4 (12%)
ENDOCRINE THERAPY	6 (37%)	5 (16%)
CHEMOTHERAPY	2 (11%)	13 (41%)
TRASTUZUMAB	0	8 (25%)

1650

Optimizing Outcomes in Stage 4 Breast Cancer

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Objective: Surgery for stage 4 breast cancer has historically been considered futile. Recent studies suggest that there may be improved survival with resection of the primary site of tumor. We embarked on this study to understand which treatments benefited which stage 4 patients.

Methods: This is an IRB-approved retrospective analysis of all stage 4 breast cancer patients who had all therapies and follow-up at a single institution from 2001-2008 inclusive. Demographics, pathology, co-morbidities, clinical and radiographic staging, and therapies received were all analyzed using tumor registry and chart review collection methods. Survival analysis was by Kaplan- Meier.

Results: In this interval, 122 stage 4 patients were treated with an average age of 56 and mean follow-up of >36 months. Of the 24 patients who refused therapy, the average age was older (62). Of the remaining 98 patients, all received some form of systemic therapy (81 included chemotherapy). Surgery was only performed after a documented response to systemic agents and prior to progression. All surgical patients continued on some form of maintenance systemic therapy after surgery. Systemic therapy, chemotherapy, and surgical resection of the primary are all associated with statistically improved outcomes as seen in the table ($p < 0.01$). There is a nonsignificant trend toward improved survival for patients who required only lumpectomy instead of mastectomy for local control of the primary—3-year survival mastectomy = 32.2% and lumpectomy = 75.0%. There were no observed effects of radiation of the primary site on overall survival. Our bias became to treat all stage 4 patients with aggressive induction multidrug chemotherapy, surgical ablation of primary at first significant response, and then usually single-agent maintenance therapy afterward. Now we see a statistically significant trend in the latter half of the time period toward more early responses and subsequent surgical resection.

Conclusions: Effective systemic therapy followed by surgical ablation of the primary site and maintenance therapy is associated with best outcomes for stage 4 breast cancer patients at our center. Multi-institutional trials are needed to determine if this approach is ideal for those with acceptable performance status and truly offers improved palliation and survival.

		Overall Survival				
	Months	12	24	36	48	60
Systemic Therapy	Yes	65.0%	43.1%	36.4%	22.2%	15.3%
	No	23.8%	11.9%	0.0%	0.0%	0.0%
Chemotherapy	Yes	62.6%	40.9%	35.5%	23.5%	16.8%
	No	46.8%	30.3%	24.5%	10.5%	5.2%
Surgery	Yes	77.6%	61.0%	49.9%	34.9%	26.2%
	No	46.3%	20.9%	19.3%	8.4%	4.2%

1678

Upper Extremity Lymphedema Rates Following Surgery for Breast Cancer

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Objective: Lymphedema (LE) is a known complication following axillary surgery for breast cancer. Studies have shown significantly lower rates of LE following sentinel lymph node biopsy (SLNB) compared to axillary lymph node dissection (ALND). The American College of Surgeons Oncology Group (ACSOG) defined LE as a 2 centimeter or greater change in arm circumference. The purpose of this study was to compare volumetric measurements used by a lymphedema specialist to circumferential measurements used by a surgeon for detecting clinically significant LE. This study evaluated whether patients were symptomatic with a 1-cm change in circumference.

Methods: Twenty-five of 103 breast cancer patients previously involved in a long-term follow-up study of LE were prospectively enrolled. Patients had a SLNB or ALND for breast cancer between 2005 and 2008. Bilateral arm circumferences were measured by the surgeons 10 cm above and below the olecranon process. Bilateral arm volumes were calculated using a lymphedema specialist's protocol of 5 circumference measurements at 10-cm intervals from the ulnar styloid process. The contralateral arm served as the control arm. Subjective symptoms of LE were evaluated by a questionnaire given to patients prior to performing measurements. LE was defined as a 10% increase in arm volume, 1- or 2-cm increase in arm circumference, or at least two patient-reported symptoms.

Results: Five of 25 patients (20%) were found to have LE by a 10% volume change. One (20%) of those patients reported symptoms and was found to have an increase in arm circumference. Four patients (16%) were identified by a 2-cm increase in arm circumference of which three (75%) were symptomatic. Of the 13 patients with measurements greater than 1 cm, 6 (46%) were symptomatic. When five circumference measurements at 10-cm intervals from the ulnar styloid process were used, eight patients (32%) were found to have a 2-cm increase in arm circumference, and four (50%) were symptomatic. Of the seven symptomatic patients, three (42%) were identified by a 2-cm change of the surgeon's two circumferential measurements and four (57%) by the five circumferential measurements. When a 1-cm change in circumference was used, four (57%) of the seven symptomatic patients were identified using two measurements and five (71%) by using five measurements.

Conclusions: In this long-term follow-up study of breast cancer patients, the volumetric analysis was not an accurate measure of clinically significant LE. This study verifies that the previously published guideline by ACSOG using a 2-cm circumference change is an accurate measure of LE, although five measurements may be necessary to identify patients with symptomatic LE. A 1-cm change in circumference may be useful in identifying LE before patients become symptomatic, which would enable earlier intervention. Larger studies are necessary.

1744

Breast-Specific Gamma Imaging Influences Surgical Management in Patients With Breast Cancer

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Objectives: Breast-specific gamma imaging (BSGI) is a physiologic approach to breast cancer detection that can be used to obtain more detailed imaging of breast cancers than mammography or ultrasound. It has previously been shown to have greater specificity than MRI in the detection of breast cancer. The purpose of this retrospective study was to evaluate how often BSGI resulted in additional imaging and biopsies, and how often it changed surgical management in patients with breast cancer.

Methods: Charts were reviewed from 278 patients who had surgery for breast cancer from Jan 2008 to May 2010. Most patients had preoperative evaluation with either BSGI or MRI. Patients who underwent MRIs were not included in this study. Patients who were initially considered by the breast surgeon to be eligible for breast-conserving therapy (BCT) and had BSGI were evaluated to determine how many ultimately had mastectomies. Patients who may have been eligible for BCT but underwent mastectomy for unrelated reasons (eg, personal preference, contraindications for radiation) were excluded from the analysis. Additionally, the number of patients who underwent additional imaging and biopsies, and the result of those biopsies, was analyzed.

Results: A total of 132 patients were considered by the breast surgeon to be eligible for BCT based on physical exam and available imaging before BSGI. Surgical management was changed to mastectomy in nine (6.8%) of those patients based on the results of BSGI. Review of the final pathology reports showed that all of these patients would not have been candidates for breast conservation (due to extent or multicentricity of disease). Eleven patients who were initially thought eligible for BCT based on BSGI required re-excisions and ultimately mastectomies after BCT due to persistently positive surgical margins. This was most often due to extensive DCIS. A total of 40 (30.3%) patients required additional imaging due to findings on BSGI, and 25 (18.9%) required an additional biopsy. Ten of the 25 biopsies (40%) showed carcinoma. Of the 10 positive biopsies, 2 were in the contralateral breast.

Conclusions: BSGI is an effective method to evaluate the extent of disease in patients with breast cancer. Additional cancers were detected in 40% of patients who had additional biopsies prompted by BSGI. The rate of additional foci of mammographically occult cancers identified by BSGI was slightly higher than rates previously reported for MRI. Of those patients thought to be eligible for BCT, 6.8% had mastectomies as a result of BSGI, and all of these were accurately identified as having disease not amenable to BCT, however, BSGI appeared to be less effective in the identification of patients who need mastectomy due to extensive DCIS. Larger studies are necessary to evaluate the role of BSGI in surgical management and to compare it to MRI.

1655

A Look Into the Ductoscope: Its Role in Pathologic Nipple Discharge

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Objective: Most breast cancers originate in the ductal epithelium with normal cells progressing through atypia to carcinoma. Mammary ductoscopy allows direct visualization of the ductal system and provides a method for directed excision and pathologic diagnosis. We sought to review our experience and findings with mammary ductoscopy in the evaluation of pathologic nipple discharge.

Methods: We retrospectively reviewed all patients who underwent ductoscopy for pathologic nipple discharge at our institution from 2006-2010. All procedures were performed by a single surgeon using a 0.9-mm Acueity scope and a video monitor with 60X magnification under general anesthesia. Data included patient and imaging characteristics, indications, operative findings, and pathologic outcomes. Descriptive statistics were used for data summary.

Results: During the study period, 122 patients underwent ductoscopy and directed duct excision for pathologic nipple discharge, including 62 (51%) with bloody discharge. Breast imaging (mammography, ultrasound, and/or magnetic resonance imaging [MRI]) revealed BI-RADS category I/II findings in 113 (93%), BI-RADS category IV findings in 6 (5%), and was unknown in 3 (2%). Ductography was attempted in three patients; two were unsuccessful and one was negative for an intraductal defect. Final pathology revealed papillomas in 64 (53%) patients, duct ectasia and associated benign findings in 49 (40%) patients, ductal carcinoma in situ (DCIS) in 7 (6%) patients, and atypical ductal hyperplasia in 2 (1%) patients. No invasive cancers were identified in this cohort. Of the 7 patients with DCIS, 5 had bloody discharge. None of the patients with DCIS underwent pre-ductoscopy MRI, but all had BI-RADS category I/II breast imaging. The extent of DCIS identified by ductoscopy and subsequent surgical excision ranged from <1 cm to 10 cm (median, 3 cm).

Conclusions: Mammary ductoscopy is a useful tool in the evaluation of patients with pathologic nipple discharge. The diagnostic and therapeutic benefit of operative ductoscopy and directed duct excision is evident by the uncommon use of ductography in our patient cohort. The majority of patients with pathologic nipple discharge have either benign nonspecific findings or benign papillomas. Although atypia and malignancy were diagnosed in only 7% of patients undergoing ductoscopy for pathologic nipple discharge, there were no routine imaging findings indicative of these diagnoses preoperatively.

1690

Ultrasound-Guided Lumpectomy for Palpable Breast Cancers

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Objective: Intraoperative imaging is increasingly utilized by the breast surgeon. Intraoperative ultrasound has been described as an alternative to needle localization in the excision of nonpalpable breast cancer during breast-conserving therapy (BCT). In contrast, the use of intraoperative ultrasound during BCT for palpable breast cancers has not been described. We sought to determine the re-excision rate following BCT for palpable breast cancers using intraoperative ultrasound. A secondary aim was to investigate the impact on surgical decision-making.

Methods: We reviewed our prospectively maintained database and identified 74 consecutive women who underwent ultrasound-guided lumpectomy for palpable breast cancer between 2006-2010. All procedures were performed by a single surgeon. The lumpectomy specimens were interrogated by ultrasound intraoperatively and cavity shave margins were taken when the ultrasound margin was <5 mm. Re-excision was performed for any histologic margin of 2 mm or less. Data collected included patient demographics, tumor characteristics, intraoperative findings, and pathologic outcomes. Descriptive statistics were utilized for data summary.

Results: During the study period, 74 women (mean age, 58 years) with clinical stage I (32, 43%) or stage II (35, 47%) breast cancer underwent ultrasound-guided lumpectomy. Tumor histology included 58 (78%) patients with invasive ductal cancer, 5 (7%) with invasive lobular cancer, 3 (4%) with ductal carcinoma in situ, and 8 (11%) with mixed/other cancers. The mean tumor size was 2 cm (range, 0.6 - 4.2 cm). Positive estrogen receptor status was observed in 51 (71%) patients, and 6 (9%) patients had Her2neu amplified tumors. Intraoperatively, shave margins were taken in 46 (62%) of patients. The overall re-excision rate for ultrasound-guided lumpectomy was 23%, including 7 patients with positive margins and 10 patients with margins <2 mm.

Conclusions: Although palpable breast cancers can be excised based on direct palpation or needle localization, we believe that ultrasound guidance provides an excellent tool to aid the breast surgeon. Intraoperative ultrasound impacts surgical decision-making, and nearly two-thirds of our patients had additional tissue taken as a result of the specimen interrogation. Only 9% of patients had a positive margin on final pathology as a result, and the overall re-excision rate was acceptably low. Further analysis will focus on a direct comparison of localization techniques.

1720

A Comparison of Intraoperative Versus Traditional Specimen Radiography in Patients Undergoing Breast-Conserving Surgery for Nonpalpable Breast Lesions

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Objective: The current standard of care for specimen evaluation in breast-conserving surgery (BCS) for nonpalpable breast lesions is specimen radiography in the mammography suite. Transferring the specimen from the operating room to radiology prolongs operative time and precludes the surgeon from orienting and evaluating the specimen X-ray. By using an intraoperative specimen radiograph device, image acquisition occurs within seconds and the surgeon can orient the specimen and evaluate the specimen X-ray. The goal of this study was to assess whether the use of an intraoperative specimen radiograph device, such as the KUBTEC™, results in fewer positive margins and decreased re-excision rates compared to traditional specimen radiography.

Methods: An IRB-approved retrospective chart review was conducted between November 2009 and August 2010. One hundred patients (pts) with high-risk or malignant breast lesions diagnosed by minimally invasive biopsy were identified. Each pt underwent BCS with preoperative needle localization of the lesion. Fifty pts had intraoperative specimen radiographs performed using the KUBTEC system and 50 pts had specimen radiographs performed in Radiology (standard). Primary endpoints of the study were comparison of margin status and re-excision rates between the two groups.

Results: Both the KUBTEC and the standard group had 50 pts with each group having 52 procedures performed. Of the 52 procedures, the number of malignant and high-risk lesions were equally matched between the two groups with 12 ductal carcinoma in situ, 24 invasive ductal carcinoma, and 16 high-risk lesions. In the 39/52 (75%) procedures performed using the KUBTEC for which time was recorded, median time to image acquisition was 80 seconds (range, 40-1140 sec). Overall, there were 11/52 (21.2%) procedures in the KUBTEC group with positive margins compared to 12/52 (23.1%) in the standard group (P = .81). There was no difference in the number of additional margins taken during the first operation between the KUBTEC group and the standard group (26 vs 32, P = .23). In comparing re-excision rates, the KUBTEC group had significantly fewer re-excisions than the standard group (5.8% vs 19.2%, P = .03). The lower re-excision rate was related to a fewer number of positive radial margins in the KUBTEC group (n = 9) compared to the standard group (n = 17).

Conclusions: Intraoperative specimen radiography permits the surgeon to orient and visualize the specimen X-ray in the operating room, which allows for more selective margin excision at the first operation. Specimen evaluation in the operating room leads to fewer positive radial margins and ultimately fewer re-excisions compared to standard specimen radiography performed in the mammography suite. This, coupled with improved operative efficiency, makes intraoperative specimen radiography a new standard for specimen evaluation.

1647

Should Patients With Invasive Lobular Carcinoma Be Considered "Cautionary" for the Use of Accelerated Partial Breast Irradiation?

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Objective: The American Society for Radiation Oncology (ASTRO) issued a consensus statement in 2009 regarding patient (pt) selection for accelerated partial breast irradiation (APBI) following breast-conserving surgery (BCS) for early-stage breast cancer. Pts with invasive lobular carcinoma (ILC) fall into a "cautionary" group for APBI. We reviewed our single-institution experience with APBI in pts with ILC to determine safety and patterns of recurrence.

Methods: From January 2005 to November 2009, 24 pts with ILC treated with BCS and APBI were identified. Twenty-three pts received APBI via balloon catheter brachytherapy; one pt received 3-D conformal PBI. The primary endpoint was time to locoregional recurrence (LRR). Secondary endpoint was time to distant metastases.

Results: Median age at diagnosis was 67 and median tumor size was 1.3 cm. Median follow-up was 2.5 yrs. Of the 24 pts, 22 (92%) were node negative (N0), 1 (4.2%) had isolated tumor cells (N0i+), and 1 (4.2%) had no axillary evaluation. Twenty-two pts (92%) were estrogen receptor (ER) positive and 2 (8.3%) were ER negative. One pt (4.2%) was HER-2/neu positive. Eighteen pts (75%) received hormonal therapy and three (12.5%) received chemotherapy. Eighteen pts (75%) had negative margins on final pathology. Of 23 pts who received APBI via balloon brachytherapy, 16 (69.6%) were placed in the operating room and 7 (30.4%) were placed in the office. None of the pts developed an infectious complication. One pt (4.2%) developed a local recurrence at 2.5 yrs. She was treated with an aromatase inhibitor and her local disease is currently stable. One pt (4.2%) developed a distant recurrence in her liver 1.1 yrs after diagnosis. Her original cancer was HER-2/neu positive and she was originally treated with chemotherapy and herceptin.

Conclusions: In our initial cohort of pts with ILC treated with BCS and APBI, our local recurrence rates were low (4.2%). However, given our short median follow-up time, longer follow-up is needed to determine whether APBI is safe in this "cautionary" group of pts.

1741

Improved Cancer Diagnostic Outcomes Obtained Through Surgeon-Performed Ultrasound Screening

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Objective: Physician-performed, whole-breast ultrasound has been shown to improve the diagnostic yield of conventional mammographic screening in women who have heterogeneously dense breasts or other risk factors for breast cancer. The recent advent of tomographic, whole-breast ultrasound imaging has automated the process of screening and placed this capability into the hands of the surgeon.

Methods: In July 2007, we developed a surgeon-directed sonographic tomography screening program to improve diagnostic yield in a community-based breast clinic. Between July 2007 and July 2010, we performed 2190 screening tomogram studies in high-risk women with negative mammograms. All tomographic studies were performed using a Somo-V three-dimensional automated ultrasound scanner (U-Systems, Sunnyvale, CA). The entirety of both breasts and axillae were imaged. Suspicious findings on tomographic evaluation were confirmed by focused, hand-held ultrasound imaging prior to either biopsy or additional imaging. All studies were interpreted by a surgeon reader with 15 years of ultrasound experience. Criteria for performing a tomographic screening study included heterogeneously increased breast density, a personal history of breast cancer, or a calculated lifetime breast cancer risk of 15% or greater. This report is a retrospective review of our experience with sonographic tomography to determine diagnostic yield and false-positive rates.

Results: Two thousand one hundred ninety sonographic tomography studies resulted in a recommendation for needle biopsy in 82 women, of whom 76 underwent sampling. Cancer was diagnosed in 11 of these women. Additional imaging with MRI was recommended in 45 women, of whom 40 had the study. This resulted in 15 additional biopsies, of which 4 were positive. Diagnostic yields were 5.0 cancers/1000 women screened for tomographic screening alone and 6.8 cancers/1000 women screened for the program overall. The cancers diagnosed were 10 invasive ductal carcinomas, 3 invasive lobular carcinomas, and 2 cases of ductal carcinoma in situ. Excluding DCIS, all cancers were stage I except one invasive lobular carcinoma that was stage II. The stage II lobular was the only node-positive cancer. Median age at diagnosis was 46 (34-67). Short interval follow-up was recommended in 195 (8.9%) women and 1868 women received a recommendation for annual follow-up. To date, one interval cancer has been detected. False-positive findings occurred in 112 (5.1%) women.

Conclusions: Our diagnostic yield is in accordance with reported outcomes from hand-held sonographic secondary screening. This represents a significant improvement over mammography alone in high-risk women. The young average patient age at diagnosis and the overall low stage of the cancers diagnosed suggests an improvement in mortality may be possible with tomographic screening. Compared to secondary screening with MRI, tomographic screening can be performed by surgeons experienced in hand-held sonography and involves no administration of contrast or radiation exposure. False-positive findings do occur as a result of tomographic screening. This will result in an increase in additional imaging studies, needle biopsies, and cost. It is our view that this disadvantage is more than offset by the benefit of detecting early-stage cancers in young women.

1625

Breast Cancer in the Octogenarian

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Objective: The percentage of breast cancer patients who are elderly is clearly increasing. In spite of this, there is concern that the older patient--especially the patient over the age of 80--is being underdiagnosed and undertreated. The current analysis was designed to evaluate breast cancer in this elderly population and contrast it to the disease in the younger patient.

Methods: A retrospective review was performed of all breast cancer patients reported in the American College of Surgeons National Cancer Database from 1998 to 2005. The study cohort included all patients 80 years of age and older. Data collected included: stage at time of diagnosis, histologic type, and initial treatment performed. These data were then compared to those of patients under the age of 80 years.

Results: The 149,530 cohort patients comprised 10.6% of all breast cancer patients reported during the study period. There was a small but statistically significant difference in stage at the time of presentation: 15.3% of octogenarians presented with advanced disease (stage III or IV) vs 13.8% of younger patients. A slightly lower percentage of older patients presented with infiltrating ductal carcinoma as opposed to the younger population (64.3% vs 68.8%). A significantly greater percentage of octogenarians was treated with mastectomy when compared to the younger population (39.6% vs 36.9%). This difference persisted even when data were controlled for stage.

Conclusions: Octogenarian patients comprise an increasing percentage of all patients diagnosed and treated with breast cancer. The octogenarian presents with more advanced disease, suggesting either a more aggressive disease or a greater delay in diagnosis. Also, in all stages, the octogenarian patient is less likely to be treated with breast conservation initially.

1719

Assessing the Ability of a CoC-Accredited Hospital Tumor Registry to Provide Recurrence and Survival Data

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Objective: CoC national cancer registries have been shown to be effective in capturing accurate cancer incidence data. They are uniquely positioned to contribute to clinical outcomes and quality improvement research through collection of recurrence and survival data; however, their ability to do so has not yet been assessed. The goal of this study was to: (1) compare Cancer Registry (CR) breast cancer distant recurrence (DR) data to breast center medical record (Meditech) data and assess the accuracy and completeness of disease status, (2) review CR methods of collecting and recording disease follow-up to evaluate effectiveness and accuracy of these processes, and (3) assess the usability of CR disease follow-up information as a data source for outcomes and quality measures research.

Methods: Patients selected were diagnosed with stage I-III breast cancer between January 1, 2001, and December 31, 2009, and were diagnosed with stage IV disease before June 1, 2010. Patients meeting criteria were obtained through Meditech search for records having breast procedure codes with corresponding breast cancer ICD-9 codes, and having subsequent inpatient visits with corresponding DR codes. This work resulted in 111 eligible patients. Eligibility and DR diagnoses were confirmed by chart review. Identical selection criteria were submitted to CR to obtain analogous patients. Case capture rates and DR codes were compared between both lists.

Results: CR successfully captured 100% of 111 DR breast cancer stage I-III cases. CR recorded a DR code for 62% of confirmed stage IV patients from Meditech. Of the remaining 38% (42 patients), 20 were ambiguously coded in CR as "never disease free" (code 70). Code 70 is a "placeholder," and was used in 11% of all breast cancer cases during the study timeframe. CR recorded a site-specific DR code for 43% of cases. For the remaining patients, codes did not provide specific information on recurrence type or location. CR recorded a DR code matching the first DR diagnosed in Meditech in 37% of cases. DR codes appear in CR with significantly less frequency than they do in Meditech, indicating numerous DRs diagnosed among these patients failed to be recorded. Based on our findings, 57% of patients were inaccurately assessed.

Conclusions: The initial focus of CoC national cancer registries has been to collect accurate cancer incidence data. Contributing hospital registries have additional and unique potential as an easily accessible and low-cost data source for clinical outcomes and quality improvement research. While our CR has been in compliance with CoC registry guidelines, the data show that current registry data on disease follow-up do not meet accuracy or completeness requirements necessary to be useful in these areas. Thus, the ultimate goal of collecting survival and recurrence data is not being achieved. The major reasons for lost or incomplete DR data were the result of CoC registry methods of capture and entry of disease follow-up information. Modification to these CoC-standard processes would drastically improve registries' value to current breast cancer programs and research.

1764

Local Recurrence of Ductal Carcinoma In Situ After Mastectomy: Does Resection Margin Status Matter?

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Objective: Ductal carcinoma in situ (DCIS) accounts for about 25% of breast cancer diagnoses in the United States due to the advent of widespread screening mammography since 1980. Mastectomy remains a safe and viable surgical treatment option for DCIS. Margin status has been implicated as a significant risk factor for local recurrence. This study aims to elucidate the incidence and risk factors for DCIS recurrence in patients undergoing mastectomy.

Methods: The medical records of patients with a histologic diagnosis of pure DCIS at City of Hope National Medical Center between 1/1980 and 12/2009 who underwent mastectomy were retrospectively reviewed. Relevant data analyzed included patient demographics, type of mastectomy, pathologic findings, margin status, and type and location of recurrence.

Results: A total of 99 patients and 106 affected breasts were identified. Median age was 53 years (30-88). Median follow-up was 97 months (1-208). Procedure types included total mastectomy (61%), skin-sparing mastectomy (37%), and nipple-sparing mastectomy (2%). Immediate reconstruction was performed in 46% of cases. Median pathologic size of the DCIS in the mastectomy specimen was 4.5 cm (0.1 -11). Eighteen patients (17%) had multifocal or diffuse disease, while 19 patients (18%) had undergone prior excisional biopsies for DCIS with positive biopsy margins. One patient (1%) had positive margin and eight patients (7%) had close (<5 mm) margins on the final mastectomy specimens. Overall recurrence rate was 4% and local recurrence rate was 2.8%. Two patients had local chest wall recurrence, one patient had locoregional recurrence followed by distance metastasis, and one presented with distant recurrence. Histologically, all of the recurrences belonged to intermediate grade. Two of the 8 patients (25%) with close margins (<5 mm) on initial mastectomy specimens developed chest wall recurrence; however, margin status was not a significant risk factor for local recurrence ($p = 0.06$).

Conclusions: The risk of local recurrence in this series of patients who underwent mastectomy for DCIS is low and does not correlate significantly with margin status. Prior studies have advocated postmastectomy radiation for close or positive margins to decrease rate of local failure in DCIS patients. The low rate of recurrence for DCIS after mastectomy found in our study does not justify a recommendation for postmastectomy radiation therapy.

1619

BRCA Mutations and Variants in Young Asian Women at Risk of Hereditary Breast Cancer

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Objective: Mutations of BRCA1 and BRCA2 genes increase risk of breast cancer by age 50. Genetic testing may guide risk reduction strategies. Little is known about BRCA mutations in Asians. Our objective was to determine if frequencies of BRCA1 and BRCA2 mutations and variants of unknown significance (VUS) differ between Asians and Caucasians.

Methods: Two hundred sixty women at risk of hereditary breast cancer were tested for BRCA1 and BRCA2 mutations and VUS between 2005 and 2009: 126 Caucasians, 68 Asians, 27 Blacks, and 39 other race. At risk was defined as having breast cancer before age 50, or a family history of breast or ovarian cancer.

Results: Among women of all racial groups, there was no difference in frequencies of BRCA1 and BRCA2 mutations and VUS. Each group, however, had different types of mutations without overlap. The number of women with breast cancer at the time of genetic testing was: Caucasian, 65 (51.2%); Asian, 51 (72.9%); Black, 19 (70.4%); and other race /ethnicity, 21 (52.5%); $p = 0.0117$. The mean+SD age of onset of breast cancer was 43.8 ± 8.3 in Asians and $48.9 + 10.5$ in Caucasians, $p = 0.0085$.

Conclusions: The frequencies of BRCA1 and BRCA2 mutations and variants were comparable in Asians and Caucasians, although specific mutations were different. Fewer Asians had genetic screening prior to developing breast cancer, and Asians with breast cancer were younger compared to Caucasians. Further education about genetics and breast cancer risks is needed to overcome screening barriers.

1748

Does Mode of Presentation Affect the Need for Chemotherapy in 40- to 49-Year-Old Breast Cancer Patients?

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Objective: In November 2009, the United States Preventive Services Task Force (USPSTF) released new guidelines reversing the recommendation for screening mammography to begin in the average-risk women at the age of 40. This was based on mortality data and a risk/benefit analysis, but did not take into account the financial, personal, and social burden of adjuvant treatments, including chemotherapy. We previously demonstrated that in our population a breast cancer patient age 40-49 is 3.2 times more likely to have early-stage disease if detected by mammogram rather than as a palpable mass. In this study, we sought to examine the relationship between mode of presentation and need for chemotherapy in this same age group.

Methods: A prospective database was reviewed to identify patients ages 40-49 with in situ and invasive breast cancer from 1984-2008. The method of detection of the breast cancer, mammographic versus palpable mass, was noted, as was the use of chemotherapy.

Results: There were 709 eligible patients for whom information regarding adjuvant treatment was available. There were 412 (58%) patients diagnosed by mammography and 297 (42%) presenting with a palpable mass. Of the patients whose cancer was diagnosed by mammogram, 134 (33 %) received chemotherapy. This compared to 222 (75%) patients who presented with a palpable mass and required chemotherapy. A patient in the 40-49 year old age group was 2.9 times more likely to receive chemotherapy if her breast cancer was diagnosed by a palpable mass than by mammography (odds ratio) (CI, 2.36-3.64; $p < 0.0001$) (Table 1).

Conclusions: Our analysis demonstrates that a breast cancer patient age 40-49 is more likely to receive chemotherapy if her cancer is diagnosed as a palpable mass. The addition of chemotherapy to breast cancer treatment is costly in several ways--financial, physical, and emotional. This argues against recent USPSTF recommendations, and provides an additional benefit to performing screening mammography in this age group.

Table 1. Chemotherapy use vs. mode of presentation in 40-49 year old breast cancer patients.

	Chemotherapy	No chemotherapy	P-value
Mammo (N=412)	134 (33%)	278 (67%)	
Palpable (N=297)	222 (75%)	75 (25%)	
Chi square			0.0001

1667

Is Intraoperative Imprint Cytology Evaluation Still Feasible for the Evaluation of Sentinel Lymph Nodes for Lobular Carcinoma of the Breast?

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Objective: The evaluation of sentinel lymph nodes (SLN) from a patient with lobular breast cancer is challenging. Metastatic lobular cancer is difficult to identify in SLN due to its low-grade cytomorphology and its tendency to resemble lymphocytes. Intraoperative imprint cytology (IIC) is a rapid, reliable method for evaluating SLN intraoperatively. We sought to reexamine our experience with this technique in the identification of lobular breast cancer SLN metastases.

Methods: A retrospective review of a prospectively maintained database of IIC results of 1010 SLN mapping procedures for individual breast cancer patients was performed. From this cohort we reviewed SLN cases of lobular cancer. The SLN were evaluated intraoperatively by bisecting the SLN. Imprints were made of each cut surface and stained with hematoxylin and eosin and Diff-Quik. Permanent sections were evaluated with up to four hematoxylin and eosin-stained levels and cytokeratin immunohistochemistry. IIC results were compared with final pathologic results.

Results: Sixty-seven cases of pure invasive lobular cancer were identified. The sensitivity was 71%; specificity, 100%; and accuracy, 92%. No statistically significant differences in sensitivity, specificity, or accuracy were identified between the intraoperative detection of lobular carcinoma versus ductal carcinoma. The specificity has remained the same since 2004. However, the accuracy (82% vs 92%, $p = 0.09$) and sensitivity (52% vs 71%, $p = 0.02$) has improved since 2004.

Conclusions: As we have previously shown, the sensitivity and specificity of IIC in evaluating lobular carcinoma is feasible and accurate. IIC continues to be a viable alternative to frozen section for intraoperative evaluation.

1696

Features Associated With Abnormal Axillary Ultrasound in Breast Cancer

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Objective: Axillary staging with ultrasound has been adopted for preoperative planning in breast cancer patients. Our objective is to determine clinicopathologic features predictive of an abnormal axillary ultrasound (AUS) and/or positive axillary lymph node fine needle aspiration (FNA).

Methods: A single-institution database of newly diagnosed breast cancer patients was reviewed and identified 310 patients between March 2004 and September 2010 that had preoperative staging AUS. Patient demographics, clinicopathologic features, and results of axillary staging were reviewed and correlated to AUS and FNA. Univariable logistic regression and Spearman's and Kendall's Tau B correlation coefficients were computed to identify features that had a significant relationship with AUS (normal/abnormal) or FNA (positive/negative).

Results: Of the 310 patients reviewed, a total of 313 breast cancers were evaluated. Median patient age was 53 years (range, 23-86). Median clinical tumor size was 3.5 cm (range, 0.6-30). Two hundred fifty-two cases (80.5%) had invasive ductal carcinoma (IDC) histology; 24 (7.7%) had invasive lobular carcinoma (ILC) histology. Two hundred fifty (79.9%) of 313 cases demonstrated an abnormal AUS. FNA was performed in 247 cases, of which 167 (67.6%) were positive. One hundred forty-six sentinel lymph node surgeries (46.6%) and 206 complete axillary lymph node dissections (65.8%) were performed. Sensitivity of AUS for nodal disease was 91.8% with a specificity of 36.9%. FNA had a sensitivity of 86.1% and specificity of 100% for nodal disease. The false-positive rate for an abnormal AUS in tumors with IDC histology was 18.4% (95% CI, 13.5-24.5) compared to 33.3% (95% CI, 14.4-58.8) with ILC histology. One hundred forty-one tumors (45%) had associated palpable axillary adenopathy; this was significant in the logistic regression model for both abnormal AUS and positive FNA (p values < 0.05). There were statistically significant positive correlations between tumor grade, clinical T stage, clinical TNM staging, IDC histology, and inflammatory breast carcinoma to both AUS and FNA (p values < 0.05). ILC histology did not correlate with either abnormal AUS or positive FNA. Lymphovascular invasion correlated with a positive FNA (p value = 0.01) but not with an abnormal AUS (p value = 0.20). Although not associated with a positive FNA (p value = 0.74), progesterone receptor negative disease was associated with an abnormal AUS (p value = 0.04).

Conclusions: AUS is an effective tool for preoperative staging in breast cancer. There are multiple clinicopathologic features that may guide judicious application of AUS.

1718

Guided Pathological Sampling (GPS): Sensitivity of Axillary Specimen X-Ray to Predict Nodal Count and Positivity

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Objective: The number of examined axillary lymph nodes has been proposed as an indicator not only of prognosis but of quality and adequacy in breast cancer staging surgery. Furthermore, some payor sources are denying reimbursement based on inadequate pathologic nodal examination. The purpose of this study was to examine the utility of imaging axillary specimens with x-ray (ASX) to determine the number of lymph nodes retrieved and the potential use of ASX in guiding pathological sampling (GPS). In addition, we sought to determine the sensitivity and specificity of ASX in identifying nodal positivity.

Methods: Patients undergoing SLN and ALND were prospectively accrued to this double-blinded, single-institution trial from 12/2009 until 9/2010. Ex vivo specimen magnified compressed plain x-ray views were performed on all axillary tissue removed (ASX). A single physician interpreted all radiographs independent of the operation by counting the total number of lymph nodes on the film along with prediction of positivity by size, shape, density, and calcifications.

Results: A total of 17 female (age, 50.8 ± 14.8) patients were accrued to the study that included 15 axillary lymph node dissection specimens and 7 sentinel lymph node specimens. ASX located more lymph nodes when compared to final pathology results in 11 of 15 cases (73.3%). In these 11 cases, ASX identified 170 nodes and the pathologist located 132 (77.6% of the total lymph nodes seen on ASX). The median number of additional lymph nodes identified by the surgeon on ASX was 3 (range, 1-8). In 26.7% of cases, the pathologist found more nodes (median difference, 3.5; range, 1-6). Of the 15 ALND specimens, 8 were from patients who received neoadjuvant chemotherapy, and on final pathology these 8 had an average number of 14.6 ± 7.8 nodes. Seven specimens were from patients who did not receive preoperative chemotherapy and averaged 13.3 ± 6.2 nodes on final pathology. In patients who had not had a recent biopsy (neoadjuvant patients), sensitivity of ASX to detect nodal positivity was 87.5% and specificity was 75%.

Conclusions: This study demonstrated that ASX accurately identifies nodal count. This can be used for documentation of an adequate ALND as well as GPS. In addition, ASX is an inexpensive way to document nodal count for ALND reimbursement. Unlike popular consensus, number of nodes recovered after neoadjuvant chemotherapy is not less than in naïve patients. Further, there may be potential value of ASX in intraoperative determination of nodal positivity.

1727

Significantly Better Cosmetic Outcome After Intraoperative Radiotherapy Compared With External Beam Radiotherapy for Early Breast Cancer: Objective Assessment of Patients From a Randomized Controlled Trial

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Objective: The international randomized TARGIT Trial started accrual in 2000 to determine if there is noninferiority between the technique of TARGIT using IORT (intraoperative radiotherapy with Intrabeam® [Carl Zeiss, Germany]) and conventional external beam radiotherapy (EBRT) in women with early, low-risk breast cancer suitable for breast conservation as primary treatment. The main outcome measure is risk of local relapse within the treated breast. We report here the 1-year data from a subprotocol assessing cosmesis in a subset of 114 women over 50 participating in the TARGIT Trial from one center (Perth, Australia).

Methods: Frontal digital photographs from 115 patients (59 TARGIT, 55 EBRT) taken at baseline and 1 year after completion of breast-conserving surgery were assessed blinded to randomized treatment using specialist software (BCCT.core 2.0; INESC, Porto, Portugal) which produces a composite score (excellent, good, fair, poor) based on symmetry, color, and scar. Statistical advice was provided by the Biostatistics Group, The Joint UCL, UCLH, and Royal Free Biomedical Research Unit.

Results: Median age at randomization was 62 (IQR, 56-68) years; photographs were taken before (baseline) and 1, 2, and 3 years after surgery; all patients were free from recurrence and none had subsequent surgery. The composite scores were combined into excellent/good (EG) and fair/poor (FP) cosmetic outcome. On average, patients in the TARGIT group attained EG significantly sooner than those in the EBRT group. A higher cumulative proportion of patients in the TARGIT group had attained EG by each of the three annual examinations post surgery, log-rank test, p = 0.0244. By 1 year post surgery 74.6% (SE 5.7%) and 56.4% (SE 6.7%) had achieved EG cosmesis in the TARGIT and EBRT groups, respectively.

Conclusions: These results indicate that the cosmetic effects of targeted radiotherapy using Intrabeam® are significantly improved compared to those obtained with conventional EBRT, particularly 1 year after surgery.

1705

Presentation of Metachronous Breast Cancer: The Importance of Self and Clinical Breast Exams

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Objective: Patients treated with breast-conserving surgery remain at risk of developing metachronous cancer in the ipsilateral or contralateral breast. Mammography and clinical exam remain critical in detecting local of these second primary cancers. We sought to determine the method of presentation of metachronous breast cancer, comparing this to the presentation of the first primary breast cancer.

Methods: A prospectively maintained database of 2300 breast cancer patients treated with surgery by an individual breast surgeon was reviewed to identify patients who developed metachronous breast cancer. Metachronous breast cancers were contralateral or, if ipsilateral, in a different quadrant than the first cancer, greater than 1 year after diagnosis of the primary tumor, and usually with pathology inconsistent with a local recurrence. The presentation of the primary cancer was compared to the presentation of the metachronous cancer. In addition, the presentation of ipsilateral metachronous cancers was compared to the presentation of contralateral metachronous cancers.

Results: After excluding patients with incomplete data, 136 patients with metachronous breast cancer were identified (Table 1). The presentation of metachronous cancers was comparable to that of the primary cancers, although patients palpated the primary cancer more frequently and physicians palpated the metachronous cancer more frequently. Fifty-three percent of primary cancers were identified on exam, physician or patient, and 50% of metachronous cancers by exam. Metachronous cancers were significantly more likely to be mammographically occult ($p < 0.027$). The presentation of contralateral metachronous cancers were compared to that of ipsilateral metachronous breast cancers (Table 2). The concordance of method of detection between the primary and second cancers was 43% and 22%, respectively. In addition, ipsilateral metachronous cancers were more frequently mammographically occult, however, not statistically significant. Overall, two patients (4%) had mammographically occult primary and ipsilateral metachronous cancer. Two patients (2%) with contralateral metachronous cancer had mammographically occult primary and contralateral metachronous cancers.

Conclusions: More than half of metachronous breast cancers are detected by patients' self-exam or physicians'clinical exam, and 24% of these cancers are mammographically occult, therefore self-exam and clinical exam should be encouraged in breast cancer survivors. Although screening mammography continues to be an integral in the care of breast cancer patients, metachronous cancers are more frequently detected clinically. Therefore, clinical breast exams and patient self-exam in combination with mammography remain critical in detecting new breast cancers in breast cancer survivors.

Table 1- Presentation of primary and metachronous cancer

	Primary Cancer % (n = 136)	Metachronous Cancer % (n = 136)
Presentation		
Calcifications	30% (41)	25% (34)
Mammographic density	16% (22)	20% (27)
Patient self-exam	31% (42)	21% (28)
Physician exam	22% (30)	29% (40)
Other	1% (1)	5% (7)
Mammographically occult	13% (18)	24% (33)

Table 2- Presentation of metachronous cancer

	Ipsilateral Metachronous % (n = 45)	Contralateral Metachronous % (n = 91)
Presentation		
Calcifications	29% (13)	23% (21)
Mammographic density	16% (7)	23% (20)
Patient self-exam	31% (14)	15% (14)
Physician exam	22% (10)	28% (26)
Other	2% (1)	11% (10)
Mammographically occult	31% (14)	21% (19)

1637

Immediate Breast Reconstruction of Segmentectomy Defects Using Extended Autologous Latissimus Dorsi Flap via a Single Incision

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Objective: The aim of this study is to describe the technique of extended autologous latissimus dorsi flap to reconstruct segmentectomy defects via single axillary incision and to assess the outcomes of this procedure.

Methods: Between December 2008 and December 2009, 20 patients with early breast carcinoma underwent extended latissimus dorsi flap for reconstruction of segmentectomy defects (reaching about 20-3-% of breast volume). Measured outcomes included surgical complications, cosmetic outcome, and functional disability.

Results: Acceptable results were noticed with this technique, regarding postoperative complications (four patients) with no further surgical intervention, sensory loss (nipple-areola complex, two patients; quadrant, eight patients), restricted activities (two patients). Considering aesthetic evaluation, very acceptable results were noticed regarding panel assessment and patient satisfaction.

Conclusions: This technique is associated with few adverse surgical and physical sequalae, without compromising cosmetic outcome, representing good alternative to mastectomy (if similar), and avoiding additional scars and use of prosthesis.

1664

Intraoperative Evaluation of Axillary Sentinel Lymph Nodes Using Touch Imprint Cytology and Rapid Immunohistochemistry

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Objective: Haematoxylin and eosin-stained frozen sections (FS) are traditionally used for the intraoperative evaluation of sentinel axillary lymph nodes. The aim was to compare FS with touch imprint cytology (TIC) and ultrarapid immunohistochemistry (IHC) as intraoperative diagnostic tools.

Methods: TIC and ultrarapid IHC (Choi et al. Jpn Clin Oncol 2006) were performed on 62 consective cases of fresh axillary sentinel lymph node biopsies and compared with FS. Permament paraffin sections H&E diagnosis was taken as gold standard. TIC smears were prepared from every corresponding tissue submitted for frozen section. Ultrarapid IHC (CK AE1/AE3) took 25 minutes and was performed at the same time.

Results: Final diagnosis on paraffin section showed 27 cases with axillary sentinel lymph node metastasis, including 6 micrometastasis. The frozen section H&E detected 26 (96.3%) positive lymph nodes. One case of micrometastasis was missed on FS. TIC detected 21 (77.7%) metastasis; 6 metastasis were missed, including 5 micrometastasis. One case of metastatic carcinoma was missed due to poor smear technique. IHC detected 25 (92.6%) metastasis, 2 metastatic deposits failed to pick the immunostain, however, all cases of micrometastasis were positive. Final results are shown in Table 1.

Conclusions: This study shows that frozen section H&E remains superior to TIC and ultrarapid IHC in detecting axillary sentinel node metastasis. TIC missed five of six (83.3%) micrometastais and should not be considered a sole diagnostic tool for intraoperative diagnosis. Ultrarapid IHC is best at detecting micrometstais, however, the procedure requires technical expertise.

Table 1

	Touch Imprint	IHC	Frozen
Sensitivity	77.77%	88.88%	96.29%
Specificity	100%	97.1%	100%
Positive predictive value	100%	96%	100%
Negative predictive value	85.36%	91.89%	97.22%
Accuracy	90.31%	93.54%	98.38%

1758

Idiopathic Lobular Granulomatous Mastitis: An Institutional Experience

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Objective: Idiopathic lobular granulomatous mastitis (ILGM) is a rare inflammatory breast disease that on histopathological examination reveals noncaseating granulomas appearing to originate from breast lobules. The clinical presentation can mimic a breast abscess, cellulitis, or an inflammatory breast cancer. The etiology is unknown, but associations with breast feeding, hormonal contraception, and infections with nonpathogenic bacteria, such as Corynebacteria, have been described. A possible allergic or autoimmune response to breast secretions has also been postulated.

Methods: A retrospective chart analysis was performed of all female patients with benign inflammatory breast disease treated at a single institution from January 2000 to April 2009. Patients with ILGM were compared with non-ILGM patients for age, ethnicity, history of breast feeding, hormonal contraception, surgical interventions (incision and drainage, excision, mastectomy), medical therapy, and observations. Logistic regression model was applied between cases and controls. Institutional IRB approval was obtained for this study.

Results: One hundred twelve total patients were identified, with 18 patients having a pathological diagnosis of ILGM and 94 with other inflammatory breast lesions. ILGM was seen in younger patients as compared to non-IGM (37.3 vs 45.1 years, $p < 0.01$). Nine of 18 ILGM patients (50%) were of American Indian ethnicity as compared to the 42 of 94 (44%) controls ($p = 0.6$). A history of lactation within the past 36 months was seen in 11/18 patients (61%) with ILGM, and 36/94 (38%) of non-ILGM patients ($p < 0.0\ 8$). Hormonal use, including OCPs, was seen in 9/18 (50%) patients with ILGM as compared to 41/94 (44%) non-ILGM patients ($p = 0.7$). Three of 18 patients (16%) with ILGM did not undergo any surgical intervention. Six of 18 (33%) of the ILGM patients underwent incision and drainage. Five of 18 (27%) patients underwent mastectomies, and 4/18 (22%) patients had wide local excisions. No association with cancer was seen in any of the patients, although follow-up was short (range, 0-9 months, mean of 4 months).

Conclusions: ILGM is a rare but debilitating inflammatory disease seen in younger women. Previously described risk factors were not confirmed by this study, although a trend toward breast feeding within 36 months of clinical presentation was seen. ILGM can lead to extensive surgical excision procedures, including mastectomies. A clinicopathologic analysis is presently underway to better elucidate potential causative factors.

1752

The Impact of the CED (Cavity Evaluation Device) on Infection Rates for Intracavitary Brachytherapy for Breast Cancer: A Single Institution's Experience With 426 Patients

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Objective: The CED (Cavity Evaluation Device) is an FDA-approved device for evaluating breast cavities after breast-preserving surgery for intracavitary brachytherapy. It offers the theoretical advantage to the breast team for better identification of patients who are technical candidates for treatment. We present a single institution's experience with the CED and its impact on infection rates.

Methods: Records of 426 patients who were consecutively treated with intracavitary brachytherapy at our institution either with or without CED were evaluated. Infection was defined as requiring either intervention or antibiotics during or within 30 days of completing therapy.

Results: Four hundred twenty-six patients underwent treatment with intracavitary brachytherapy with or without CED. A total of 36 surgeons implanted catheters in this group of patients. One hundred twenty-nine (30%) had implantation without CED (no CED) and all 129 were implanted with closed tunneling technique. Infections were found in three (2.3%) of these "no CED" patients. The remaining 297 (70%) patients were implanted with CED exchange technique. CED exchange was performed between 2 and 4 days from surgery in all patients. Infections were found in 5 (1.7%) of the CED patients.

Conclusions: In patients treated at our institution, infection rates appear similar in patients whose brachytherapy catheter was inserted with or without the CED.

1743

The Impact of Multifocality/Multicentricity on Surgical Treatment and Breast Reconstruction

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Objective: The use of adjunct imaging studies often results in discovery of multicentric (MC) and/or multifocal (MF) disease preoperatively. Oftentimes, breast conservation therapy (BCT) can still be safely performed if additional lesions are in close proximity or located within the same quadrant of the breast as the primary. The objectives of this study were to determine rates of mastectomy and partial mastectomy among patients with MC or MF disease, compared to those with unicentric (UC) disease. In addition, we sought to determine whether the presence of MC/MF disease influenced the likelihood of undergoing breast reconstruction.

Methods: A retrospective review of all breast cancer patients treated surgically at our institution from 2002 to 2009 was performed. Patients with biopsy-proven MF/MC disease were identified. Operative, imaging, and pathology reports were reviewed. The type of definitive surgery as well as reconstruction was determined and compared to those with UC disease.

Results: Many patients (40%) with MF disease and even some (16%) with MC disease were able to safely undergo BCT. (Table 1). Among patients who underwent mastectomy, patients who had reconstruction were significantly younger, had smaller tumors, and were more likely to have had an MRI ($p < .05$ for all comparisons). Among those with MF or MC disease who underwent mastectomy, patients with MC disease were more likely to undergo breast reconstruction vs those with MF disease (66% vs 37%, $p < .005$). The reasons for this, however, are not completely clear. Patients with MC disease were significantly younger than those with MF disease (57 vs 51 years, $p < .05$), which may account for some of the difference. However, there was no significant difference with respect to mean tumor size or the use of preoperative MRI between the MF and MC groups.

Conclusions: Tumors that are MF and/or MC are biologically interesting and clinically important and warrant further study.

Type of Surgery by Tumor Pattern

		Type of Surgery		
	Mastectomy Alone	**Mastectomy With Reconstruction**	**Partial Mastectomy**	**Total**
Tumor Pattern				
Unicentric	268 (21%)	184 (15%)	793 (64%)	1245
Multifocal	55 (38%)	3 2(22%)	58(40%)	145
Multicentric	14(29%)	27 (55%)	8 (16%)	49
	337	243	859	1439

1657

Frozen Section Analysis of the SLN, Is It Worth It?

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Objective: Routine intraoperative pathologic evaluation of the sentinel nodes is used at many institutions. A recent study published by McLaughlin et al from Memorial Sloan-Kettering Cancer Center in July 2007 concluded that among patients undergoing FSA of the SLN only 7% were spared a return trip to the operating room. Among patients who did not undergo FSA of the SLN, they concluded that only 3% would have been spared a return trip to the operating room had FSA been performed. Positive margin status on the final pathology of the partial lumpectomy specimen remained a frequent indication for reoperation in this study. Our goal is to review our experience with FSA of the SLN at Geisinger Medical Center. We will review breast cancer patients undergoing SLN biopsy and total/partial mastectomy to determine whether reoperation rates are affected by FSA of the SLN. Our hypothesis is that FSA will decrease reoperation rates.

Methods: This study is a retrospective chart review of 272 consecutive recent patients. The data were collected from the electronic medical records from 1/1/2007 to 1/1/2010. All patients who underwent an SLN for invasive or noninvasive breast cancer were collected from the tumor registry at GMC. We excluded patients who underwent SLN prior to neoadjuvant systemic therapy. The following variables were collected on each patient: type of surgery (partial/total mastectomy), histology of tumor, margin status of lumpectomy specimen, size of tumor, grade, receptor status, final pathology of SLN and breast tissue, pathologic stage, FSA results on SLN, and reason for reoperation (positive margin of lumpectomy specimen or positive SLN on final pathology).

Results: 91.6% of the patients had invasive disease and 8.4% of patients had DCIS. The margins on the partial lumpectomy specimens were positive in 9.9% of the patients. 80.6% were ER+, 68.9% were PR+, and 9% Her-2Neu amplified. The average number of SLN retrieved per patient was 2.9. We performed ~800 FSA on SLN. Sensitivity of the FSA was 83% and specificity was 100%. Seventy-nine percent of patients were pN0 and 21% were pN1-3 on final pathology. Thirty-eight patients (14%) return to the operating room within 3 months. Twenty-seven patients returned for positive margins, 13 patients for positive SLN on final pathology and 2 patients for both. If the intraoperative FSA had been ignored, 80 patients (29%) would have returned to the operating room for a second procedure (53 patients for positive SLN, 19 patients for positive margins, and 8 patients for both).

Conclusions: Routine use of FSA of the SLN biopsies in patients with invasive or noninvasive breast cancer resulted in a 15% absolute difference in probability of returning to the operating room by performing a routine FSA on the SLN. There was a 48% relative risk reduction of a return to the operating room for a completion axillary lymph node dissection (ALND). Identification of pathological predictors of positive FSA will permit selective use of FSA. Selective use of FSA will decrease the use of laboratory resources consumption and may maintain the benefit of FSA.

1684

A Comparison of Prognostic Factors in Locally Advanced and Inflammatory Breast Cancer

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Objective: Inflammatory breast cancer (IBC) comprises approximately 5% of all invasive breast cancers. Despite advances in the treatment of breast cancer, IBC patients continue to have poor overall survival (OS). Locally advanced breast cancer (LABC) can present with similar characteristics and is often confused with IBC. We hypothesized that IBC patients were more likely to have estrogen receptor (ER), progesterone receptor (PR), and HER2 negative cancers with a poorer prognosis than triple-negative (TN) LABC.

Methods: We performed a retrospective review of female patients with nonmetastatic LABC or IBC treated at our institution from 1999 to 2009. LABC was defined as stage IIB or stage III; patients were staged with the AJCC Sixth Edition Staging Manual. IBC was defined as diffuse erythema involving at least one third of the breast with less than 6 months duration of symptoms prior to diagnosis, documented by a surgical or medical oncologist. Primary endpoints included OS, locoregional recurrence-free survival (LRFS), and metastatic-free survival (MFS). Statistical analysis was performed with the Kaplan-Meier method for univariate analysis (UA) and the Cox proportional hazard model for multivariate analysis (MA) controlling for patient characteristics, prognostic factors, and treatment modalities.

Results: A total of 191 patients were included. Mean follow-up was 4.8 years. Larger tumor size, presence of lymphovascular or dermal lymphatic invasion, lack of ER/ PR expression, HER2 amplification, and elevated Ki67 were all significantly associated with decreased OS on UA ($p < 0.05$). Treatment factors associated with improved OS on UA included receipt of adjuvant chemotherapy ($p = 0.009$) and hormonal therapy ($p < 0.0001$), while neoadjuvant chemotherapy was associated with decreased OS ($p = 0.006$). Patients who suffered a locoregional recurrence were significantly more likely to suffer a metastatic recurrence ($p < 0.0001$). On MA, only absence of LVI ($p = 0.05$, HR 3.3,) and receipt of adjuvant chemotherapy ($p = 0.009$, HR 0.2) remained significant for LABC patients. None of the prognostic or treatment variables were significant on MA for IBC patients. Twenty (10.74%) patients had IBC. The majority of IBC patients were Caucasian (60%) with a similar mean age. IBC patients were significantly more likely than LABC patients to receive neoadjuvant therapy (90% vs 14%, $p < 0.0001$) as well as tri-modality treatment, including chemotherapy, radiation, and surgery (89.5% vs 54.3%, $p = 0.003$). Despite more aggressive treatment, OS ($p = 0.008$) and MFS ($p < 0.0001$) for IBC patients was significantly worse. TN patients had worse OS compared to non-TN patients for the overall dataset ($p < 0.0001$). There was a marginally significant higher prevalence of TN cancers in IBC patients ($p = 0.057$). While there was no significant difference in OS between IBC TN patients ($n = 7$) compared to LABC TN patients ($n = 27$) ($p = 0.24$) in this small subset analysis, a significant difference in MFS was noted with worse outcomes for IBC TN patients ($p = 0.02$).

Conclusions: Despite more aggressive treatment, patients diagnosed with IBC had significantly worse OS and MFS. IBC is associated with a trend toward greater TN disease with a poorer prognosis when compared to LABC. Future studies are necessary to elucidate better treatment options and prognostic factors for IBC.

1683

Evaluation of a Collagen-Based Breast Biopsy Marker (HydroMARK®) As an Alternative to Wire and Radioactive Seed Localization for Nonpalpable Breast Lesions

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Objective: Surgical excision for nonpalpable breast lesions requires image-guided localization. Typically, localization involves placement of a wire or radioactive seed as an additional procedure prior to operation. In this study, we reviewed our initial experience with the use of a newly available collagen-based breast biopsy marker. The objective was to determine if the sonographically visible marker could be utilized independently as a localization method using intraoperative ultrasound rather than the currently used methods of wire and radioactive seed localization.

Methods: In a retrospective review of surgical excisions performed from November 1999 to October 2010, we identified patients who underwent image-guided needle biopsy which resulted in need for surgical excision. The HydroMARK® was placed at the time of image-guided biopsy in all cases. Twenty-five lesions were also preoperatively localized under radiologic guidance with either a wire (8) or radioactive seed (17). Our endpoints included intraoperative visualization of the marker, successful excision of the lesion, and presence of the marker on specimen radiograph.

Results: Thirty-one lesions in 25 patients had the collagen-based marker placed at time of preoperative image-guided needle biopsy. A malignant diagnosis on biopsy was the indication for excision in 20 lesions (64.5%) and high-risk pathology in 6 lesions (19.4%). The majority of markers were placed under stereotactic guidance (58%). Twenty-nine (93.6%) of the lesion markers were adequately visualized by intraoperative ultrasound performed by the surgeon. Intraoperative ultrasound imaging alone was successful for localization in 6 cases (19.4%). Intraoperative difficulties were encountered in 16 of 31 (51.6%) procedures. This included either extrusion of the marker when the biopsy tract was transected in 14 (45.2%) cases or migration of the marker prior to the procedure in 2 (6.4%) cases. The marker was visualized on specimen radiograph in 15 (48.4%) cases. This low rate was attributed to extrusion. The marker itself was retrieved in all procedures. We examined the association between extrusion of the marker and method of localization, length of time between placement and excision, size of lesion, and whether a skin ellipse was taken or not. Method of localization, specifically use of a radioactive seed, was the only factor that showed a significant association with marker extrusion. This was felt to be secondary to a smaller volume of tissue excised. Despite extrusion, all 31 lesions were successfully retrieved. In addition, negative margins were achieved in 100% of the excisions for malignant lesions.

Conclusions: Use of a localization marker that is placed at the time of initial core biopsy would obviate the expense and inconvenience associated with a separate localization procedure. While intraoperative sonographic visibility of the collagen-based marker was excellent in our initial experience, a large number of our excisions were associated with extrusion of the marker. Further adjustments are needed in order for this marker to be utilized independent of preoperative wire or seed localization. Recommendations for modifications of the device include a reduction in the length of the collagen component of the marker or a coating that would promote better tissue adherence.

1715

Socioeconomic and Racial Differences in Hospital Utilization in Breast Cancer Patients

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Objective: Population-based studies have revealed decreased mortality and superior outcomes in hospitals that treat higher volumes of breast cancer patients. Studies have also found disparities in breast cancer survival, with non-white and lower socioeconomic status (SES) patients having worse outcomes. The purpose of our study was to determine whether non-white or low SES patients are disproportionately treated in low-volume hospitals.

Methods: A population-based cohort of Medicare breast cancer patients who underwent breast cancer surgery in 2003 participated in a survey study examining breast cancer outcomes. Demographic, socioeconomic, and tumor stage information was obtained from survey responses, Medicare claims, and state tumor registry data. Hospital volume was categorized based on terciles at the patient level. The low-volume group (defined as hospitals performing 20 breast cancer procedures a year or less) was compared to the higher volume group (the remaining hospitals).

Results: Of 2,435 women, 864 (35%) were treated at 366 low-volume hospitals and 1,571 were treated at 176 higher volume hospitals. On univariate analysis, patients treated at low-volume hospitals were less likely to be white (p = <0.0001), less likely to have completed more than a high school education (p = 0.005), had lower ZIP code per capita incomes (p < 0.0001), were more likely to have Medicaid (p = 0.006), less likely to have another source of insurance coverage (p = 0.004), and were also less likely to report a higher degree of available emotional/informational support (p = 0.021). Low-volume hospitals were more likely to treat patients with missing stage of disease information (p = 0.002). Age, co-morbidity index, marital status, and tangible support scale were unrelated to hospital volume. On multivariate analysis, the independent predictors of being treated at a low-volume hospital were being black (p = 0.018), having a lower ZIP code per capita income (p<0.0001), and having an unknown disease stage (p = 0.003) (Table).

Conclusions: In this large, population-based Medicare cohort, black women, poorer women, and those without full staging were more likely to be treated at low-volume hospitals for their breast cancer. These differences may explain some of the racial and SES disparities in breast cancer outcomes. Future studies should examine the influence of treatment variables in addition to patient variables to further explore the hospital volume-outcome relationship.

Multivariate analysis of variables predicting treatment at a low volume hospital*

Variable	Odds Ratio	95% Confidence Interval	P-Value
Race			0.018
White	1.00		
Black	1.89	1.20-2.96	
Hispanic	1.32	0.79-2.20	
Other	1.49	0.84-2.62	
Zip code per capita income **	0.76	0.70-0.84	<0.0001
SEER Summary Stage			0.003
0	1.00		
I	0.98	0.76-1.26	
II	2.12	0.88-5.09	
III	1.04	0.76-1.43	
IV	1.01	0.46-2.21	
V	0.84	0.08-9.39	
Missing	1.78	1.26-2.52	

*Model adjusted for age, education, NCI co-morbidity index, Medicaid status, having another source of insurance, marital status, emotional/informational support, and tangible support.
** An increase of $10,000 results in an odds ratio of 0.76; 24% less likely to go to a low volume hospital

1762

Variations in Postmastectomy Reconstruction Rates: Invasive and In Situ Carcinoma

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Objective: Many factors influence whether breast cancer patients undergo reconstruction after mastectomy for both in situ and invasive cancer. This study was undertaken to determine the patterns of care and variables associated with the use of reconstruction at hospitals in four counties within Southern California: Los Angeles, Orange, San Bernardino, and Riverside.

Methods: Postmastectomy reconstruction rates were determined from the California Office of Statewide Health Planning and Development (OSHPD) inpatient database over a 6-year timespan from 2003-2008. International Classification of Disease-9 codes were used to identify female breast cancer patients with a diagnosis of ductal carcinoma in situ (DCIS) (233.0) or invasive breast cancer (174.0-174.9) who underwent mastectomy only or mastectomy with reconstruction. Variations in reconstruction rates were examined by type of breast cancer (DCIS vs invasive), calendar year, age, type of insurance, type of hospital (comprehensive cancer center (CCC), teaching hospital, other) and race of patient (white, African-American, Asian or other). Multivariable logistic regression was used to calculate odds ratios (OR) and 95% confidence intervals (CI).

Results: A higher proportion of DCIS patients underwent immediate reconstruction following mastectomy as compared to patients with invasive breast cancer. For the years 2003 through 2008, the proportion of patients undergoing immediate reconstruction after mastectomy for DCIS ranged from 40.0 to 53.1% as opposed to 21.1 to 28.1% for invasive carcinoma. For both DCIS and invasive breast cancer, the likelihood of any reconstruction increased with later calendar year (p trendDCIS = 0.004, p trendinv < 0.001). Likewise, for both diagnoses women under the age of 40 consistently had the highest proportion of immediate reconstruction rates compared to other age groups. Women with invasive breast cancer between 40 and 59 years of age were 34% less likely to undergo immediate reconstruction vs women less than 40 years of age (OR, 0.66; 95% CI, 0.58-0.76). DCIS and invasive breast cancer patients with private insurance were three times more likely to undergo immediate reconstruction compared to patients with Medicare (ORDCIS, 3.50; 95% CI, 2.76-4.42; ORinv, 3.31; 95% CI, 3.00-3.65). Teaching hospitals were roughly twice as likely to perform immediate reconstruction when compared to nonteaching hospitals, for either diagnosis (ORDCIS, 2.09; 95% CI, 1.66-2.64; ORinv, 2.49; 95% CI, 2.27-2.73). African-American patients with invasive breast cancer were half as likely to undergo immediate reconstruction compared to whites (OR, 0.53; 95% CI, 0.44-0.64). No statistically significant difference in likelihood of immediate reconstruction was apparent between these two race groups for DCIS. Asian patients were approximately 70% less likely to undergo immediate reconstruction, compared to white patients, for both DCIS and invasive disease (ORDCIS, 0.27; 95% CI, 0.16-0.44; ORinv 0.35, 95% CI, 0.28-0.42).

Conclusions: There are several factors associated with postmastectomy reconstruction rates which vary according to diagnosis: DCIS versus invasive carcinoma. The proportion of patients undergoing immediate reconstruction after mastectomy for DCIS is twice that of invasive breast cancer. Insurance status, age, type of hospital, and race appear to be significant factors limiting the use of reconstruction for both DCIS and invasive carcinoma.

1710

Does Duration to Ipsilateral Breast Tumor Recurrence (IBTR) Affect the Success or Failure of Reoperative Sentinel Lymph Node Biopsy?

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Objective: Five to ten percent of patients with prior breast cancer treated with BCT will develop IBTR, requiring a reoperative SLNB. Several patients will then present with history of prior axillary surgery, which could be an ALND or SLNB. Prior number of LN removed has been reported for success of reoperative SLNB, but duration to IBTR has not been studied.

Methods: We did a 3-year retrospective review of 28 patients and categorized as Prior ALND (>10 lymph nodes, N = 14), PriorSLNB (<10 LN removed, N = 10) and Unknown number of LN removed (N = 4). We also evaluated duration (<10 yrs [N = 13] vs >10 yrs [N = 10]) to IBTR in 23 of the 28 patients toward success or failure of reoperative SLNB.

Results: Reoperative SLNB was successful in 17 of 28 (60.71%) patients. In patients with prior ALND and SLNB, the success rate was 5/14 (36%) and 7/10 (70%), respectively (p = 0.098). Unknown group, success was 3 of 4 (75%) and was not included in the statistics above. Regarding duration to recurrence known in 23 of the 28 patients, reoperative SLNB was successful in 7/13 (54%) and 6/10 (60%) patients with duration to IBTR <10 yrs and >10 yrs, respectively (p = 1.0).

Conclusions: Reoperative SLNB is successful in 61% of our patients. Neither duration to IBTR nor prior number of lymph nodes removed influenced the success of the reoperative SLNB in our study. Lack of significance in these findings may be related to small sample size. Large, randomized controlled trials are needed to further assess the success rate of reoperative SLNB.

1733

Sentinel Lymph Node Biopsy in Prophylactic Mastectomy---Are We Overtreating? Experience at a Community Hospital

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Objective: The routine use of sentinel lymph node biopsy (SLNB) at the time of prophylactic mastectomy is controversial. This retrospective study was undertaken to determine the use of SLNB at the time of contralateral prophylactic mastectomy (CPM) at a community hospital.

Methods: Between 2007 and 2009, 170 patients underwent CPM at a suburban, tertiary care facility. The CPM was either immediate, delayed, or for recurrent breast cancer. Thirty-seven (21.8%) patients had SLNB performed at the time of CPM. The mastectomy specimens underwent standard pathologic evaluation. The SLN was evaluated intraoperatively with touch prep cytology and postoperatively with H&E and immunohistochemistry.

Results: Thirty-seven (21.8%) had SLNB and none were positive on touch prep or final H&E (0/37 = 0%). Fourteen patients (8.2%) had additional nodes identified in the specimen. These were either axillary tail nodes or intramammary nodes (non-SLN). The median number of SLN removed was 2 (range, 1-5), none of these were positive. There were three incidental cancers diagnosed on final pathology. Two were invasive and one was DCIS. SLNB was only performed on the patient with DCIS. The invasive cancers were T1a and grade I and did not have SLNB. A subsequent ALND was not performed in these invasive cancers. Only 3 of 170 (1.76%) patients undergoing CPM had findings on final pathology that would have justified the axillary staging. This correlates with other published data regarding SLNB in CPM.

Conclusions: Currently SLNB is performed in 21.8% of patients undergoing CPM in a community hospital. In this retrospective study, SLNB in CPM would have added staging information in only 1.76% of the patients. Guidelines for SLNB in prophylactic mastectomy need to be established in order to avoid overtreatment.

1728

Breast Cancer in Southern Chinese: A Population Study by The Hong Kong Cancer Registry From 1996-2001

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Objective: Breast cancer is the most common cancer in women in Hong Kong. The incidence is 1 in 20 and is increasing. For reasons still unclear, this increase is more noticeble in the younger age group. It has been suggested that the more Westernized lifestyle may play a part to contribute to this increase. Understanding the epidemiological characteristics, disease pattern, treatment and its outcome of breast cancer patients in Chinese residing in Asia, based on population-based data will be useful to provide a baseline study cohort for comparative studies that of Asian Chinese in the West. This is the first comprehensive population-based breast cancer study performed using the national database of the Hong Kong Cancer Registry.

Methods: A retrospective review of medical records of subjects who are diagnosed with breast cancer between January 1, 1997, and December 31, 2001, was performed. All cases would be followed up to December 31, 2007, by matching with the Hong Kong Cancer Registry's database, death register, and Hospital Authority's data warehouse. Information to be obtained includes risk factors related to breast cancer, clinical management information, histological information of the breast cancer, date of diagnosis of breast cancer, last date seen and status last seen, and, if death, cause of death. Multivariate analysis, such as +/- tests, chi-square analysis, and Fisher's exact tests will be used to compare variables and find any association or difference among variables. Crude survival probabilities, such as overall survival, diseasefree survival and disease-specific survival, will be calculated using the life table Kaplan-Meier method.

Results: A total of 8,156 breast cancer patients' medical records and dataset were available during this period. Seven thousand six hundred thirty (94%) had invasive cancers and 526 (6%) were DCIS. Of the invasive cancers, 48% of our cohort were diagnosed with breast cancer age 49 years old and below. The mean age of diagnosis was 55.3 and median age 52 years old. Eighty-one percent had invasive ductal carcinomas and 3% had invasive lobular cancers. Of those known, 39.20%, 45.3%, and 15.6% had grade I, II, III cancer, respectively; 4.8%, 13%, 55.4, and 26.5% had stage 4, 3, 2, and 1 cancer, respectively; 61% had ER positive cancer; 44% had HER2 positive cancers; 13.3% of our cohort had triple-negative cancers; 55.8% had chemotherapy, 59% radiation therapy, and 86% of those who had an ER cancer took tamoxifen. The 5-year overall survival, relative survival, and cause-specific survival were 79.6%, 84%, and 85.2%, respectively. Compared with SEER database, the 5-year survival relative survival of 87.1% was similar to our cohort.

Conclusions: Cancer registries have been set up worldwide to provide information on cancers, such as breast cancer. This information has been published in many Western countries but is much lacking in Asia. We performed a first comprehensive population-based breast cancer epidemiology study in Southern China using the Hong Kong Cancer Registry database.

1651

Preoperative Localization and Surgical Removal of Rotter's Lymph Nodes in the Post-Neoadjuvant Breast Cancer Patient

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Objective: With the growing use of preoperative magnetic resonance imaging (MRI), identification of abnormal-appearing interpectoral or Rotter's nodes has increased. We describe the procedure of identifying and surgically removing metastatic Rotter's nodes in the post-neoadjuvant breast cancer patient at the time of definitive surgery.

Methods: This is a retrospective review of 215 breast cancer patients who received preoperative MRI at our institution between June 2008 and December 2009. Patients with suspicious Rotter's nodes on MRI subsequently had an ultrasound (US) guided needle biopsy of these suspicious nodes confirming metastatic disease. Percutaneous metallic clips were placed into the node at the time of biopsy. After neoadjuvant chemotherapy, all patients had CT-guided wire localization of the clipped Rotter's node perioperatively. Intraoperatively, wire-localized Rotter's nodes were identified, resected, and sent separately for pathological evaluation.

Results: Of 215 patients, 4 had a single abnormal Rotter's node identified on a pre-chemotherapy MRI and successfully underwent a diagnostic US-guided percutanous biopsy. Mean Rotter's node size on MRI was 1.5 cm (range, 1.2-2.3 cm); mean US size was 1.8 cm (range, 1.2-2.4 cm). Mean tumor size on MRI was 6.3 cm (range, 3.8-10.8 cm); three patients (75%) had evidence of pectoralis muscle involvement on MRI. All four patients had a modified radical mastectomy concurrent with wire localization of the interpectoral clip. Three patients had the wire-localized specimen taken separately. All patients had residual disease in both Rotter's and axillary nodes on surgical pathology. Mean number of Rotter's nodes removed was 1.5 (range, 1-2); mean node size was 0.8 cm (range, 0.1-1.5). Mean number of axillary nodes removed was 12.8 (range, 7-24); mean number of positive axillary nodes was 3.3 (range, 1-7). All four patients received postmastectomy radiation. There were no surgical complications

Conclusions: Preoperative diagnosis of Rotter's node involvement is technically feasible and facilitates surgical resection with no additional morbidity. The clinical impact of interpectoral nodal disease merits further study.

1641

Melanocyte Migration Can Result in Natural Pigmentation of Native Flap Nipple Reconstructions After Areola-Sparing Mastectomy

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Objective: Demonstration of spontaneous increased pigmentation in reconstructed nipples derived from native TRAM and latissimus flap tissue has been noted after utilizing areola-sparing mastectomy. This can result in an incredibly natural appearance of the reconstructed nipple and make intradermal tattooing unnecessary. Pathologic evaluation of donor site dermis, native areola, and reconstructed nipple that had undergone self-darkening was undertaken to attempt to account for the spontaneous color change of the tissue.

Methods: Punch biopsy samples from pre- and post-operative dermis were analyzed for qualitative pigment changes as well as quantitative increase in number of melanocytes. H&E staining provided qualitative measurement of pigment granules in the newly created nipple, compared with the native donor site. MART-1 antibody stains allowed for quantitative melanocyte comparison between the dermis of the reconstructed nipple, the adjacent spared areola tissue, and the original donor site as well.

Results: Dermatopathologic analysis showed an increase in pigmentation of the reconstructed nipple that was comparable to that of the adjacent areola tissue and much darker than its tissue of origin, dermis from the patients' back skin if latissimus dorsi was utilized, or abdominal skin if a TRAM flap served as a harvest site. The number of melanocytes was also significantly increased: 8 to 10 melanocytes per linear millimeter noted in the donor dermis, versus 50 to 60 melanocytes noted in areola dermis and the reconstructed nipple dermis postoperatively.

Conclusions: Evidence that color matching to the surrounding areola was due to melanocyte migration was demonstrated with pathologic evaluation of donor dermis, areolar tissue, and the reconstructed nipple tissue that had increased pigmentation postoperatively. This is most dramatic in individuals with darker pigmentation in general and resulted in improved cosmesis and negated the need for additional tattooing to improve the color match between the newly created nipple and the native areola.

1739

Palpable Breast Cancer in Screened Patients: A Sign of Aggressive Disease

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Objective: The United States Preventive Services Task Force (USPSTF) recently updated their recommendations regarding mammogram screening. Due to the subsequent controversy, we reviewed the presentation of all newly diagnosed breast cancer and ductal carcinoma in situ (DCIS) at our institution.

Methods: A retrospective review was performed from 2005-2009 with patients categorized according to age distribution recommendations from the USPSTF (<40, 40-49, 50-75, >75 yrs). The presentation characteristics evaluated include mammogram (mammo) detected versus palpable by self breast exam (SBE) or clinical breast exam (CBE) and time from previous mammo. Cancer characteristics were then analyzed. In addition, a separate analysis was performed on all screened patients (mammo <24 months). Statistical analysis was performed using a chi-square or two-sample *t* test.

Results: A total of 782 patients were identified. Patients <50 yrs had a greater likelihood of presenting with palpable disease compared to patients >50 yrs ($p < 0.0001$) with 75% of all patients having had a mammo within 24 months (see Table). When analyzing patients diagnosed by screening mammo, there were few differences in tumor characteristics between those patients who had a mammo <12 months (n = 118) vs >12-24 months (n = 261). Patients with a mammo <12 months had a higher incidence of Tis tumors (16% vs 9%) and lower incidence of T1 tumors (67% vs 81%), but no difference in T2 or T3 tumor incidence ($p = 0.009$). Other tumor characteristics were comparable between these two groups, including mean tumor size, tumor markers, and lymph node (LN) status. A similar analysis was performed between patients who presented by SBE/CBE and a mammo <12 months (n = 143) vs >12-24 months (n = 66), which did not reveal any difference in tumor characteristics between the groups. Screened patients were then compared by presentation: mammo <24 months (n = 379, 64%) vs SBE/CBE and mammo < 24 mths (n = 209, 36%). Patients who presented by SBE/CBE had larger mean tumor size (2.4 vs 1.3 cm), $p < 0.0001$; higher T stage, $p < 0.0001$; higher grade, $p = 0.01$; more ER- markers (29% vs 16%), $p = 0.0003$; triple-negative disease (21% vs 10%), $p = 0.0005$; and LN positivity (39% vs 17%), $p < 0.0001$. There was, however, no difference between the groups Her2 status. Lastly, tumor characteristics of patients who had analog (n = 881) vs digital (n = 149) mammography were compared. No difference in mean tumor size, T stage, or tumor markers was detected.

Conclusions: Three quarters of our breast cancer patients had undergone a mammo within 24 months. Even though the majority of patients presented with image-detected breast cancer, there is still a high percentage of patients who develop palpable disease. Those with palpable disease appear to be younger and present with more aggressive tumor characteristics. Until better imaging techniques are developed, SBE and CBE play an important role in breast cancer diagnosis.

Age Group	Mammo ≤ 12 mths	Mammo > 12-24 mths	Mammo > 24 mths	Other Imaging	SBE/CBE Mammo ≤ 12 mths	SBE/CBE Mammo > 12-24 mths	SBE/CBE Mammo > 24 mths
<40	2	2	0	3	16	0	3
N=26	(8%)	(8%)	(0%)	(12%)	(62%)	(0%)	(12%)
40-49	10	15	9	4	20	15	8
N=81	(12%)	(19%)	(11%)	(5%)	(25%)	(19%)	(10%)
50-75	82	182	72	21	84	43	34
N=518	(16 %)	(35%)	(14%)	(4%)	(16%)	(8%)	(7%)
>75	23	61	21	3	24	10	15
N=157	(15%)	(39%)	(13%)	(2%)	(15%)	(6%)	(10%)

1692

Yield of Selective MRI in Preoperative Assessment of Newly Diagnosed Breast Cancer Patients Planned for Breast-Conserving Surgery

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Objective: Routine use of preoperative MRI in candidates for breast-conserving surgery is currently being debated. When MRI is routinely used, other foci of cancer are found in 16% of patients, with 11% of patients undergoing more extensive surgery. In our center, preoperative MRI is selectively used in candidates for breast-conserving surgery. We examined the findings on MRI in this selective patient population and their impact on the surgical plan.

Methods: All newly diagnosed breast cancer patients (January 2007- June 2010, Tel Aviv Sourasky Medical Center) who were candidates for breast-conserving surgery and underwent MRI prior to surgery were included in this study. Patients who were first diagnosed by MRI or who underwent neoadjuvant treatment were excluded. Data collected included age, family history, delay between presentation and surgery, findings on imaging, indication for MRI, further work-up related to MRI findings, planned surgery, and actual surgery. Pathology results were reviewed as well. Patients were divided according to indication for MRI: young age (=<40), dense mammogram, extensive calcifications, lobular cancer, multifocal disease (diagnosed prior to MRI), and discordance between physical exam, mammography, and sonography. Rates of additional suspicious findings, additional positive and negative biopsies, and change in management were calculated per each indication. Change in management was defined as any change in the surgical plan, including a larger lumpectomy than originally planned. Institutional Review Board approval was received prior to commencement of the study.

Results: The study group included 106 women. Median age of the patients was 58 (range, 31-81). Mean delay between first presentation to the medical center and surgery in these patients was 50 days (range, 9-241). The most common indication for MRI was dense mammography, which was found in 51 patients (68%). Additional suspicious findings were seen on MRI in 48 (45%) of the patients and did not change significantly with the indication for MRI. Additional work-up, which included a negative biopsy, was done in 8 (7%) patients. Additional biopsy-proven malignancy was found in 18 (17%) of the patients. The highest rate of additional positive biopsies was found in patients with dense breasts (n = 14, 27%) and in young patients (n = 4, 27%). The additional suspicious findings on MRI prompted a change in the surgical plan in a third of the patients; 14 had a larger breast-conserving surgery, 14 had a mastectomy, and 6 had additional surgery on the contralateral breast. In 92 (86%) patients, clear margins were achieved.

Conclusions: In young patients, patients with dense mammograms, with extensive calcifications, with lobular cancer or discordant findings on exam and imaging, use of preoperative MRI is associated with a high rate of additional suspicious findings and a high rate of positive biopsies. Due to the small numbers in each subgroup and the overlap between the different groups, it is hard to make any meaningful comparisons. In this selected group of patients, the suspicious findings on MRI prompted a change in the surgical plan in a third.

Table 1: Findings on MRI according to indication for MRI

	Number (%)	Additional Suspicious Findings	Additional Biopsies--Negative	Additional Biopsies--Positive	Change in Surgery
Total	106	48 (45)	8 (7)	18 (17)	32 (31)
Age <=40 (total N=106) Yes	15 (14)	7 (47)	1 (7)	4 (27)	6 (40)
Family history (total N=76) Yes	36 (47)	18 (50)	3 (8)	7 (19)	15 (42)
Dense mammogram (total N=75) Yes	51 (68)	26 (51)	5 (10)	14 (27)	14 (27)
Mismatch* (total N=39) Yes	13 (33)	5 (38)	2 (15)	2 (15)	3 (23)
Lobular cancer (total N=104) Yes	21 (20)	9 (43)	0 (0)	2 (10)	5 (24)
DCIS (total N=89) Yes	57 (64)	26 (46)	5 (9)	13 (23)	19 (33)
Extensive calcifications (total N = 73) Yes	25 (34)	12 (48)	2 (8)	5 (20)	8 (32)
Multifocal disease** (total N = 80) Yes	40 (50)	21 (53)	3 (8)	5 (13)	16 (40)

*Mismatch included all cases where physical findings and imaging findings (before MRI) were not concordant.

**Multifocal disease included all cases with multifocal disease diagnosed prior to MRI study.

1706

Does Tumor Immunohistochemistry Discordance Between Core Needle Biopsy and Mastectomy Raise Concerns for Treatment Recommendations?

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Objective: In current practice, core needle biopsies of breast cancers undergo immunohistochemistry (IHC) testing and the results (ER, PR, HER2, and Ki67 expression) direct patient treatment. The purpose of this study was to compare pathology and IHC results from the core needle biopsy of the primary tumor with those of the surgically resected tumor and metastatic lymph nodes.

Methods: This study analyzed prospectively archived tissue. Patients who presented with a diagnosis of invasive breast carcinoma from 06/23/2010 to 10/1/2010 were chosen from a multicenter, IRB-approved tissue, blood, and data banking project. Core needle biopsy was performed and pathological analysis included tumor type and grade, and ER, PR, HER2, and Ki67 status by IHC. After definitive surgical resection of the tumor and lymph nodes, the specimens were examined by site pathology and sections sent to central pathology for independent analysis (pathology and IHC). A breast-only central pathology team supervised the project and ensured strict adherence to protocol, which included timed specimen removal, placement on ice to minimize anoxic tissue time, and standardized tissue processing. SAS Inc's JMP version 7 was used for statistical analysis.

Results: Samples from 26 patients were analyzed, including 12 patients with metastatic lymph nodes. There was excellent concordance of tumor type and substantial agreement in tumor grading between the core biopsy and the surgical resection ($\kappa = 0.71$). Only four of the samples differed but only by one grade level (three were intermediate vs high grade and one was well vs intermediate grade). There were moderate differences in ER-expression between the core biopsy and the surgical specimens ($\kappa = 0.44$). Most significantly, 15% of ER-positive samples on the core biopsy (n = 4) were ER-negative on the final surgical specimen as seen in Table 1. There was poorer agreement in Ki67 status between the core biopsy and the surgical samples ($\kappa = 0.28$). Of note, most of the core biopsies had higher Ki67 percentages, some dramatically higher than found in the surgical resection as shown in Figure 1. There was also good concordance of ER, PR, HER2, and Ki67 expression between the 12 surgical resections and their corresponding metastatic lymph nodes.

Conclusions: There was substantial concordance between tumor pathology (type and grade) of the core and surgical specimens and good concordance of IHC results between the surgical resections and their metastatic lymph nodes. Both the tumor and the lymph node surgical specimens were handled similarly and performed at the same time by the same laboratory. A trend toward lower IHC marker values was seen from core biopsy to surgical specimen and could be explained by differences in tissue volume, fixation, and process techniques, as well as anoxic tissue time. These data also raise concerns regarding ER and Ki67 discordance between core biopsy and final surgical resection and their relationship to long-term therapeutic management for patients. This may have potential implications for genomic expression profiles on surgical specimens used for patient decision-making.

Surgical resection ER-expression

Core Bx Specimens	High (≥ 50%)	Low (1-49%)	Neg (≤ 0.5%)	Total
High (≥ 50%)	18	1	**1**	20
Low (1-49%)	1	0	**3**	4
Neg (≤ 0.5%)	0	0	2	2
Total	19	1	6	26

Table 1: ER expression of core biopsy vs. surgical resection specimens. The inter-rater agreement statistic K= .44 (95% c.i. 0.18, 0.71)

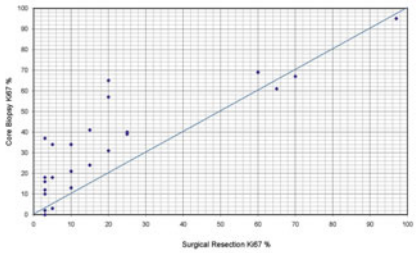

Figure 1: Ki67 % expression for core biopsy and surgical resection specimens. The majority of the values fall above the line indicating that there was generally higher Ki67% expression on core biopsy than on the surgical specimens.

1635

Breast MRI Predicts Invasion in Patients With DCIS: Implications for Biomarker Development

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Objective: As recently highlighted in the NIH Consensus and State of the Science Conference on Ductal Carcinoma In Situ (DCIS), characteristics to identify patients with low- and high-risk DCIS lesions are needed to better select patients for appropriate therapies [1]. We have determined that HER-2/neu overexpression is associated with invasion in patients with DCIS [2]. We investigated whether biomarkers could be developed to risk stratify DCIS patients using a combination of histologic tumor-associated receptors and findings of ductal enhancement on breast MRI.

Methods: Between March 2003 and June 2010, we identified 186 women with biopsy-proven DCIS. Of these, 108 women were ultimately included in our analysis as they had complete records of postbiopsy, presurgical MRIs and complete pathology, including estrogen receptors (ER), progesterone receptors (PR), HER-2/neu (HER-2) 2+ on at least 10% of the DCIS using HercepTest, grade, presence of comedonecrosis, and residual DCIS on final surgical pathology. MRI enhancement was defined as ductal enhancement or clumped regional enhancement in the area of DCIS. The association between MRI enhancement and patient and tumor characteristics, as well as the presence of invasive carcinoma on final surgical pathology, was tested.

Results: Eighty-six of 108 patients (79.6%) had suspicious MRI enhancement for DCIS. MRI enhancement was significantly associated with HER-2 status (71% HER-2neg vs 93% HER-2pos, OR = 5.5, p = 0.006), but not with ER, PR, grade, comedonecrosis, age, or race. Twenty-eight patients (26%) had invasive breast carcinoma on final surgical pathology. Invasion was significantly associated with MRI enhancement (0% in nonenhanced vs 33% in enhanced, OR = 14.6, p = 0.001) and HER-2 status (19% in HER-2neg vs 37% in HER-2pos, OR = 2.6, p = 0.04). In the 43 HER-2pos patients, MRI enhancement was not associated with invasion on final pathology, (0/3 in nonenhanced vs 16/24 (40%) in enhanced, OR = 4.7, p = 0.28), likely as a result of too few HER-2pos cases without enhancement. In the 58 ERpos HER-2neg patients, MRI enhancement was significantly associated with invasion (0% in nonenhanced vs 26% in enhanced, OR = 12.1, p = 0.025). By multivariable logistic regression analysis, invasion was significantly associated with MRI enhancement (adjusted OR = 11.7, p = 0.005) but HER-2 status was not an independent predictor after adjusting for MRI enhancement (adjusted OR = 1.9, p = 0.25).

Conclusions: Evidence of ductal enhancement on breast MRI is associated with the presence of early invasion. MRI enhancement of DCIS lesions may be used to identify biomarkers other than HER-2 for predicting women with low- and high-risk DCIS.

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1675

BRCA Gene Mutation Testing and Uptake of Risk Management Recommendations in a Minority Underinsured Population

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Objective: Despite the importance of prevention and detection for women at increased risk for breast and ovarian cancer, little empirical research is focused on cancer risk management among medically underserved populations. Our objective was to document rates of prophylactic breast surgery and surveillance practices among a sample of ethnically and socioeconomically diverse women seen for cancer genetic counseling.

Methods: We performed a retrospective chart review of women seen for breast/ovarian cancer genetic counseling in 2008 and 2009 at Parkland Hospital, the Dallas County health system for uninsured or underinsured patients.

Results: Medical records were reviewed for 195 female patients seen for breast/ovarian cancer genetic counseling (mean age = 43.3 years). Median follow-up time from genetic counseling to data abstraction was 16 months with a range of 6 to 29 months. The majority of patients were either Hispanic (43.5%) or African American (37.4%). Less than 30% had private insurance. Of the women in the sample, 72.3% had a previous diagnosis of breast cancer, 7.2% had been diagnosed with another form of cancer, and 20.5% had no prior cancer diagnosis. Of the 195 eligible women, 126 (64.6%) were tested for BRCA1/2 mutations; of those who were tested, 25 (19.9%) were found to be mutation carriers. Fourteen (7.2%) women had prophylactic mastectomies after genetic counseling. This included 6 (24%) BRCA gene mutation carriers 4 (4.2%) noncarriers, and 3 (4.3%) individuals not tested. One woman with a "variant of uncertain clinical significance" result also underwent prophylactic mastectomy. Of the 181 women who did not undergo prophylactic mastectomy, 114 (63%) had at least one mammogram or MRI for screening purposes during the median follow-up of 16 months. Those who had at least one screening mammogram or MRI included 68.4% of BRCA carriers, compared to 63.7% of noncarriers and 59.4% of women who were not tested.

Conclusions: In this ethnically diverse underinsured population, genetic counseling was most frequently performed after a cancer had already been diagnosed, limiting the potential impact of risk-reducing strategies. The uptake for breast cancer surveillance was disappointingly low, even among BRCA gene mutation carriers. Future efforts should focus on proactively identifying and counseling women with high-risk family histories before a cancer diagnosis and on identifying and addressing barriers to breast cancer surveillance.

1653

Reasons for Mastectomy After Neoadjuvant Chemotherapy

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Objective: Neoadjuvant chemotherapy for breast cancer has been found to downstage tumors to allow patients to be candidates for breast-conserving therapy. Previous experience at our institution has shown a 67% breast conservation rate after neoadjuvant chemotherapy and pretreatment tumor size of 4.5 cm. The goal of this study is to determine the reasons for mastectomy after neoadjuvant chemotherapy.

Methods: A retrospective review at a single institution of patients who underwent neoadjuvant chemotherapy followed by surgical treatment was performed. Patients presenting with multifocal/multicentric tumors, male patients, and recurrences were excluded. Tumor characteristics, chemotherapy regimens, and operative treatments including re-excisions and nodal evaluation were collected. Comparisons were made between patients who underwent breast conservation surgery and mastectomy. Reasons for mastectomy were assessed by chart review. Statistical analysis with *t* test and chi-square was performed.

Results: From February 2006 to August 2010, 149 patients underwent neoadjuvant chemotherapy followed by surgical procedure: 104 breast conservation (69%) and 47 mastectomy (31%). Two patients underwent bilateral mastectomies for bilateral cancer. There was no difference in age between the two groups. Tumor characteristics are shown in Table 1. Reasons for mastectomy are patient preference (42%), extent of disease based on clinical and surgical assessment (25%), BRCA positivity (19%), persistent positive margins (12%), and wound complication related to persistent sinus tract (2%).

Conclusions: Besides patient preference, the majority of reasons for undergoing mastectomy after neoadjuvant chemotherapy are related to tumor characteristics or BRCA status. In addition, larger preoperative tumor size may influence patient's decision to pursue mastectomy.

Table 1. Tumor characteristics

	n	Clinical T Category*	Lobular Carcinoma (percent)	Tumor Grade	Pathologic Tumor Size (cm)	ER + (percent)	Her 2 neu + (percent)	Avg # pos LN
Lumpectomy	104	2.13	5%	6.69	1.24	57%	27%	1.45
Mastectomy	47	2.39	24%	6.38	2.11	65%	14%	1.47
p value	0.19	***0.028***	***0.0002***	0.40	***0.02***	0.31	0.08	0.67

* T category prior to chemotherapy, ER = estrogen receptor, LN = lymph nodes.

1691

Impact of MRI on the Management of Breast Cancer

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Objective: Magnetic resonance imaging (MRI) is commonly used to evaluate breast cancer, often in an effort to define extent of disease and assess the contralateral breast. Additional biopsies and imaging studies are often performed. The goal of this study is to review the impact of MRI on clinical management after a diagnosis of breast cancer.

Methods: Retrospective review of patients diagnosed with breast cancer at a single institution. Patients were categorized according to whether or not MRI was performed during evaluation. Comparisons were made between the two groups, regarding patient demographics, tumor characteristics, and operative intervention. Information regarding second-look ultrasounds and additional biopsies were collected for the MRI group. Statistical analysis included *t* test, chi-square test, and multivariate logistic regression model.

Results: From November 2007 to June 2010, 386 eligible patients diagnosed with breast cancer were evaluated and treated. MRI was performed on 220 patients (57%). There was no difference in race or ethnicity, but patients who underwent MRI were on average younger (52 years vs 62 years, $p < 0.0001$). Tumor and treatment characteristics of the two groups are shown in Table 1. Patients who underwent neoadjuvant chemotherapy were more likely to have an MRI performed (87% vs 49%, $p < 0.0001$). In the MRI group, 80% of patients had a single MRI performed, and 97% were performed preoperatively. Of patients who underwent MRI, second-look ultrasound was performed on 61 (27%) patients and additional biopsies were performed on 53 (24%) patients. Sites of MRI-generated biopsy include additional sites in ipsilateral breast (n = 40), primary site (n = 2), axilla (n = 8), and contralateral breast (n = 3). Malignancy was found in 14 ipsilateral breast (35%), 7 axillary (88%), and none of the contralateral breast biopsies. On multivariate analysis, MRI was found to be an independent predictor of undergoing mastectomy (odds ratio, 2.842, confidence interval, 1.634 to 4.943, $p = 0.0002$).

Conclusions: Breast MRI is frequently utilized in younger patients with higher clinical stage and undergoing neoadjuvant chemotherapy. Those patients who undergo MRI are more likely to be treated with mastectomy.

Table 1: Tumor and treatment characteristics

	n	Clinical Stage 2 or Higher	Mastectomy	IDC	ILC	DCIS
MRI	220	44%	36%	79%	10%	11%
Non-MRI	166	17%	16%	75%	8%	17%
p value	-	***0.0001***	***0.0001***	NS	NS	NS

IDC = Invasive ductal carcinoma, ILC = invasive lobular carcinoma, DCIS = ductal carcinoma in situ, NS= not significant

1731

Cost-Effectiveness Analysis of Routine Frozen-Section Analysis of Breast Margins Compared With Reoperation for Positive Margins

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Objective: Negative margins are associated with decreased local recurrence after lumpectomy for breast cancer. A second operation for re-excision of positive margins after lumpectomy is required to achieve negative margins, with rates varying from 15-50%. At our institution we routinely use frozen-section analysis of all margins to minimize need for a second operation. Positive and close margins identified intraoperatively are re-excised at the initial operation, resulting in longer operating time; however, avoiding a second operative procedure. The aim of this study was to evaluate the cost benefit of routine frozen-section analysis to avoid reoperation for positive margins.

Methods: A decision tree was built to compare two strategies: (A) lumpectomy without frozen section and a second operation for positive margin(s) versus (B) lumpectomy with intraoperative frozen-section analysis. The rate of re-excision was varied with modeling to determine when the use of frozen section became cost saving over a second operation for margin re-excision. Costs included in the model were: operating room, anesthesia, surgical team, frozen and permanent section analysis. Operating room times were defined as duration between patient entering and exiting the room. The costs to our institution to provide the service (cost to provider) associated with these strategies were compared, as well as Medicare reimbursement data (cost to payor). For strategy A, we used an operating room time of 90 minutes for lumpectomy. The rate of positive margins and reoperation was varied from 15% to 50% in increments of five percentage points. For strategy B, we used an operating room time of 125 minutes for cases with initial negative margins and 145 minutes for cases with initial positive margins and a second operation rate of 1%. Review of our institutional experience has shown an intraoperative re-excision of at least one margin in 45% of cases.

Results: The cost to provider per patient resected to negative margins for strategy A ranged from $4,835 (15% reoperation rate) to $6,306 (50% reoperation rate). For strategy B the cost for cases with initial negative margins was $5,128 and for cases with initial positive margins was $5,951. Average weighted cost of strategy B was $5,523. Varying the rate of second operation in strategy A, analysis showed that strategy B was cheaper than strategy A when the reoperation rate was above 30%. The cost to payor for strategy A ranged from $3,110 (15% reoperation rate) to $4,665 (50% reoperation rate). For strategy B, the cost for cases with initial negative margins was $3,550 and for cases with initial positive margins was $4,186. Average weighted cost for Strategy B was $3,855. Use of frozen section was cheaper in all instances where the re-excision rate was greater than 25%.

Conclusions: Routine use of frozen-section analysis of lumpectomy margins decreases reoperation rates for margin control. Looking at cost to provider, frozen section is cost-effective when the margin re-excision rate is greater than 30% and for Medicare reimbursement, frozen section is cost-effective when margin re-excision rate is greater than 25%.

1698

Factors Associated With Malignancy on Ultrasound-Guided Axillary Core Needle Biopsy

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Objective: Lymph node status is a key factor in the surgical and medical management of breast cancer. Evaluation of the axilla by sentinel lymph node biopsy has become standard of care in clinically node-negative patients. Although sentinel lymph node biopsy is less invasive than axillary lymph node biopsy, surgical evaluation of lymph nodes is not without morbidity. Axillary ultrasound-directed percutaneous needle biopsy has been recently used and validated as a potentially valuable technique for identifying axillary metastasis. We sought to evaluate clinical and sonographic factors associated with malignant pathology obtained by axillary ultrasound-guided core needle biopsy.

Methods: A retrospective review was performed of sequential patients referred for axillary ultrasound-guided core needle biopsy between 2006 and 2010 at a single institution. Malignant and benign core needle biopsy results were compared by clinical and sonographic characteristics, including patient age, lymph node size, BI-RADS score, breast pathology, site of biopsy (axillary tail vs axilla), clinically suspicious lymphadenopathy, focal cortical thickening, irregular borders, solid mass lesion, vascularity, absence of a fatty hilum, and echogenicity.

Results: During the study period, of 95 axillary ultrasound-guided core needle biopsies performed, 50 (52.6%) were malignant and 45 (47.4%) were benign. The average patient age was 54.4 (range, 22-89). One third (33.7%) of patients had a known breast malignancy prior to axillary biopsy. Clinically suspicious lymphadenopathy was noted in 60.0% of patients. Average lymph node size was 22.5 mm (range, 9-54). Malignant pathology on axillary ultrasound-guided core needle biopsy was significantly associated with clinical suspicion ($p = 0.01$), patient age ($p = 0.007$), lymph node size ($p = 0.02$), BI-RADS score ($p < 0.001$), irregular borders ($p = 0.02$), echogenicity ($p < 0.05$), and breast pathology ($p < 0.001$). No association was found with biopsy year, site of biopsy (axillary tail vs axilla), known breast cancer diagnosis, focal cortical thickening, solid mass lesion, vascularity, or absence of a fatty hilum.

Conclusions: Malignant findings on axillary ultrasound-guided core needle biopsy are associated with the readily available clinical characteristics of suspicious adenopathy, patient age, breast pathology, and BI-RADS score, as well as sonographic factors of lymph node size, irregular borders, and echogenicity. Surgeons performing ultrasound-guided axillary core needle biopsies can easily interpret these findings to offer appropriate pre-procedure patient counseling.

1654

Outcome in Augmented Patients Who Subsequently Develop Breast Cancer

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Objective: It is commonly thought that augmentation mammoplasty interferes with our ability to diagnose breast cancer and that augmented women therefore have a worse prognosis should they develop breast cancer. We have reviewed our series of patients with breast cancer to determine whether the augmented patients presented with more advanced disease and therefore had a poorer prognosis.

Methods: A prospective breast cancer database was reviewed. Augmented patients were compared to nonaugmented patients by numerous factors, including but not limited to palpability, tumor size, nuclear grade, percent in situ, nodal positivity, lymphovascular invasion, and breast cancer specific survival (BCSS).

Results: Four thousand eight hundred ten nonaugmented women and 195 women who had previously undergone augmentation mammoplasty were treated for breast cancer. Prebiopsy mammography was performed in 121 of 132 augmented patients with palpable lesions. It failed to reveal an abnormality in 43, a false-negative rate of 36%. The table compares important tumor characteristics between the two groups. In addition, there was no significant difference in tumor size, nuclear grade, recurrence-free, and overall survival between the two groups.

Conclusions: The false-negative mammography rate is higher in augmented women than reported in the general population (15%). This is probably due to lower quality mammography secondary to the implant. MRI is an important tool for this subgroup of patients. Augmented patients were more likely to have palpable and, therefore, node-positive cancers. In spite of this, distant recurrence, breast cancer specific survival, and overall survival in augmented women were not statistically different from the nonaugmented population.

	Augmented	Non-Augmented	P value
No. Pts	195	4810	
% Palpable	68%	52%	0.001
% In situ	30%	33%	0.27
% + Nodes (Inv only)	46%	33%	0.005
% Mast (Inv only)	40%	48%	0.08
% LVI (Inv only)	28%	25%	0.42
10-Yr BCSS (Inv only)	83%	82%	0.80

1669

Palpability: A Poor Prognostic Finding in Patients With Invasive Breast Cancer

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Objective: Axillary lymph node status continues to be the single most important prognostic variable regarding breast cancer survival. A combination of tumor size and tumor palpability can be used to predict patients with a low probability of nodal positivity.

Methods: From 1979 through mid 2010, data from patients who underwent axillary intervention were concurrently entered in a prospective database.

Results: Three thousand seven hundred thirteen axillary node or sentinel node dissections were performed. Nodal positivity was analyzed by T category and whether the abnormality was clinically palpable. Nodes positive by immunohistochemistry only with foci of cancer cells equal or less than 0.2 mm or <200 cells (ITCs) were not counted as positive [N0(i+)]. Breast cancer-specific survival rates were calculated using the Kaplan-Meier Method. Probabilities were compared using the log rank test.

Conclusions: Palpability was a poor prognostic sign for all T categories other than Tis. There was a statistically significant increase in node-positivity when palpable T1a, T1b, T1c, T2, and T3 cancers were compared with nonpalpable cancers of similar size. Risk of node-positivity was greater in palpable than nonpalpable T1c cancers (p = 0.008). There was a highly significant survival advantage when breast cancers were found in subclinical vs clinical presentations.

	NONPALPABLE	PALPABLE	
T Category	Positive/Total (%)	Positive/Total (%)	P Value
Tis	3/644 (0.47%)	1/127 (0.79%)	NS
T1a	5/154 (3.25%)	6/63 (9.5%)	0.05
T1b	17/238 (7.1%)	41/213 (19.3%)	< 0.001
T1c	31/285 (10.9%)	242/772 (31.4%)	< 0.001
T2	29/100 (29%)	411/813 (50.6%)	< 0.001
T3	7/17 (50%)	137/205 (66.8%)	0.03
T4	None	64/77 (83%)	NA
TOTAL	**92/1438 (6.4%)**	**902/2270 (39.7%)**	**< 0.001**
15-yr BCSS	95%	75%	< 0.001
15-yr BCSS Inv Only	91%	73%	< 0.001

1676

Timing of Bilateral Metachronous Breast Cancer

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Objective: Some studies have suggested that bilateral breast cancer can occur in up to 20% of patients. Studies have looked at types of cancer, age of women, ER/PR and her2-neu status. However, no studies to date have looked at the timing of secondary presentation. We performed a chart review of bilateral breast cancer patients to determine the timing of the second primary tumor.

Methods: A retrospective chart review of all patients in the University Medical Center tumor registry diagnosed with breast cancer from the years 1995-2008 was performed. These charts were then reviewed to find those patients who were diagnosed as having bilateral disease. One thousand two hundred fifteen total cases of breast cancer were identified during this time period. These patients were then analyzed to determine timing of the contralateral presentation.

Results: A total of 1,215 cases of breast cancer were diagnosed between the years of 1995-2008. Of these patients, 61 cases (5%) were found to have a previous diagnosis of breast cancer or a bilateral synchronous presentation. In this study, synchronous presentation was defined as a contralateral breast cancer within 3 months from the initial diagnosis. Twenty-two cases (1.8%) presented with bilateral synchronous cancer and were excluded from the study. Thirty-nine cases were identified to be bilateral metachronous breast cancer presenters (3.2%). These cases were then analyzed to determine the timing of the contralateral breast cancer presentation. Three time periods were chosen: less than 2 years, between 2 and 5 years, and more than 5 years. Eleven cases (28.2%) were found to present within the first 2 years of the initial diagnosis. Five cases (12.8%) presented between 2-5 years. Twenty-three cases (59%) presented after 5 years of the initial diagnosis.

Conclusions: This study suggests there is a bimodal distribution for the timing in presentation of metachronous breast cancer. If bilateral synchronous breast cancer patients had been included, the bimodal distribution would have been more than pronounced. This raises questions about the biologic behavior of the tumors occurring less than 2 years and those occurring after 5 years of the initial diagnosis. Also, overall surveillance of breast cancer may be affected, with closer observation needed within the first 2 years and after 5 years.

1671

Feasibility of Nipple-Sparing Mastectomy in BRCA Mutation Carriers

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Objective: Use of nipple-sparing mastectomy (NSM) for breast cancer treatment and risk reduction is increasing. There are no formal studies looking at the oncologic safety in women with deleterious germline mutations in BRCA1 and BRCA2 and the use of nipple-sparing mastectomy. The aim of the present study was to perform comprehensive pathological evaluation of the nipple areolar complex (NAC) from women with BRCA mutations who underwent therapeutic mastectomy with or without contralateral prophylactic mastectomy (CPM) or bilateral prophylactic mastectomy (BPM) without preservation of the NAC.

Methods: This retrospective IRB-approved study evaluated the NAC of women with BRCA1 or BRCA2 mutation who underwent unilateral or bilateral mastectomy between March 1987 and June 2009 at a single institution. The entire NAC, including retroareolar tissue, was excised and evaluated by pathologic examination. The presence or absence of terminal duct lobular units (TDLUs) in the NAC was noted, as well as the prevalence of premalignant or malignant lesions.

Results: Sixty-two NACs from 33 women (25 BRCA1, 8 BRCA2) were studied. Twenty-eight women were diagnosed with cancer, 3 of whom had bilateral cancer. TDLUs were present in 15 (24%) NAC specimens. Among the 29 breasts with cancer and complete histological evaluation of the NAC, 2 (7%) had malignant findings in the NAC. One woman underwent bilateral mastectomy for bilateral invasive carcinoma; one nipple showed tumor within lymphatics and the contralateral nipple had atypical lobular hyperplasia. The second woman had ductal carcinoma in situ involving a major lactiferous duct. Twenty-three women underwent CPM and five women underwent BPM. No evidence of atypical hyperplasia, carcinoma in situ, or invasive carcinoma was found in any of the 33 prophylactic mastectomy specimens.

Conclusions: There is low probability of nipple involvement by premalignant or malignant lesions in the nipple areolar complex in BRCA mutation carriers at the time of therapeutic and/or prophylactic mastectomy. Nipple-sparing mastectomy may be appropriate and oncologically safe for women with BRCA mutations. However, TDLUs can be found in the NAC and are more likely at the base of the nipple; the significance of this on long-term risk is unknown.

1640

The Goldilocks Mastectomy: Our Experience in Utilization of Redundant Mastectomy Flap Tissue Only for Reconstruction in Women With Macromastia

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Objective: To reconstruct a breast mound from cutaneous mastectomy flap tissue alone, obviating the need for additional flap or implant techniques.

Methods: In large-breasted patients who decline traditional methods of breast reconstruction, we have preserved and de-epithelialized residual mastectomy flap tissue for placement under a standard Wise incision pattern. This has allowed the patient to have a complete and oncologically sound mastectomy with preservation of fullness, if not a re-creation of their original breast mound.

Results: Over an 18-month period, five women (seven breasts) with macromastia underwent mastectomy using this technique. All women have been very pleased with the overall cosmesis and have had no long-term complications, local recurrence, or problematic wound healing thus far. Focal areas of fat necrosis have been noted but have not been symptomatic or required any intervention.

Conclusions: We have observed a growing trend of patients with larger, more ptotic breasts. Some of these patients decline traditional methods of breast reconstruction altogether because they do not want additional surgery. Our method of "minimal reconstruction" provides several advantages over simple mastectomy without reconstruction. If the patient still requires prosthetics, the tissue mound helps prevent malposition of the bra. The procedure is performed in a single stage and does not require specialized closure by a reconstructive surgeon, although a team approach can improve overall aesthetics. It is cost effective and does not require implanted devices. Disadvantages include limited range of application as it applies to larger breasted patients whose upper pole must overlap the inframammary fold. It also creates asymmetry if the contralateral breast is left untouched. We have dubbed it the "Goldilocks" mastectomy because it allows the patient to have a more cosmetically pleasing outcome than simple mastectomy alone without additional effort, time, or cost associated with formal reconstruction.

1726

The Relationship Between ABO Blood Type/Ethnicity and Breast Cancer

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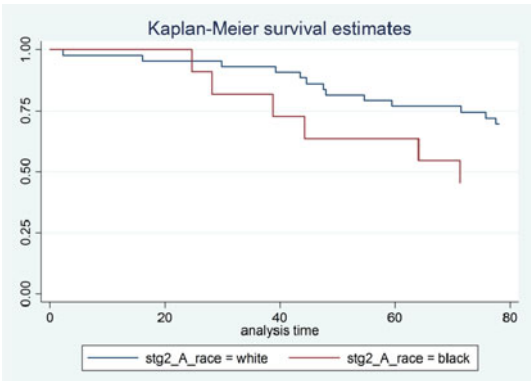
Objective: African American (AA) women have a lower rate of breast cancer diagnosis than Caucasian women in the United States, yet their mortality is higher than any other race or ethnic group. Even when poverty, access to healthcare, educational disparity, and socio-economic status are accounted for, AA women in general have poorer outcomes from breast cancer. Given the known differences in the distribution of blood types by race, we hypothesized that human ABO blood type plays a role in the decreased survival seen in AA diagnosed with breast cancer.

Methods: An IRB-approved retrospective study of breast cancer patients who also had blood typing was obtained from the cancer tumor registry between 1993 and 2000. The data was analyzed to stratify ABO blood types, Rh status, and racial and ethnic differences with respect to overall survival. Differences in clinicopathological variables and blood type were evaluated using Kaplan-Meier curves.

Results: Five hundred forty-one patients were evaluated. Average age was 54(±) years old. The worst prognosis was seen in patients with type AB (n = 17) when compared to all other blood types but was not different between races. Type A was six times more prevalent in Caucasian breast cancer patients than AA. For stage I, blood type A, AA were at 2.6 times increased risk of death compared to Caucasians. For stage II it was 1.7 times (see Figure). This difference in survival by race was not seen for type O, B, or AB. In the type A blood group, differences in survival in AA and Caucasians were not related to differences in receptor or Rh status

Conclusions: The etiology of the poorer prognosis of breast cancer in AA has not been explained. Our results are the first to suggest that only AA with blood type A have a worse prognosis when compared to Caucasians even for stage I and II disease and independent of Rh status and unrelated to differences in receptor status. Elucidation of the causal relationship between poorer breast cancer outcomes and blood type may lead to strategies for possible prevention and/or treatment.



1677

Rise in Concurrent Uterine and Breast Cancer and Economic Disparity: National Trends From 2000 to 2008

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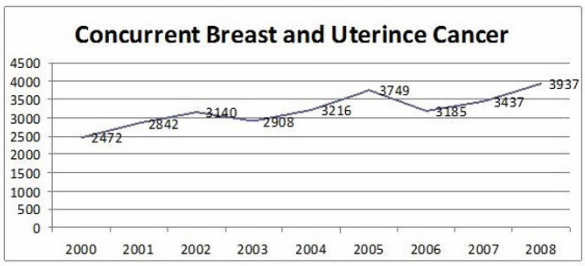
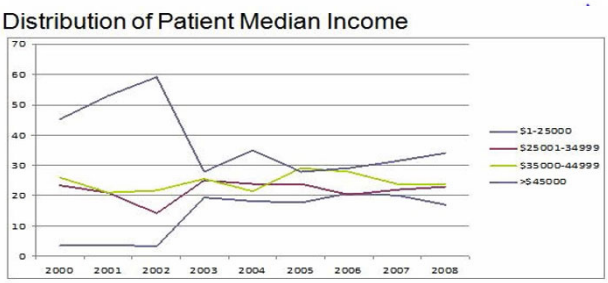
Objective: Risk factors for breast and uterine cancer have been well recognized in the literature. The purpose of this study was to analyze national trends in concurrent diagnoses of breast and uterine cancer from 2000 to 2008.

Methods: A retrospective analysis of the Nationwide Inpatient Sample (NIS) from 2000 to 2008 was performed. ICD9 codes were used to identify diagnoses, race, primary payer, and median income category. Using a coding algorithm, national trends were calculated. P values of <0.05 were considered statistically significant.

Results: During the study period, an estimated 28,925 inpatient discharges with concurrent breast and uterine cancer were identified. From 2000 to 2008, concurrent diagnoses increased 59.3%, from 2,472 to 3,937. Patients had a mean age of 69.5 years and the majority of patients were white (63.6%), with a significant number of blacks (6.7%) and Hispanics (3.3%). Primary payers were mostly Medicare (62.1%) and private, including HMO (31.9%). No significant changes in race and primary payer groups occurred during the study period. The distribution of patients from all four income brackets shows that the most significant increase occurred in the lowest median income group from 85 to 669, or 3.5% to 17.0% (P < 0.0001).

Conclusions: National trends indicate a rise in concurrent diagnoses of uterine and breast cancer. The lowest median income group experienced the most significant increase in concurrent diagnoses. Proportions of racial and primary payer groups remained stable during the study period. Further studies are needed to analyze access, screening, and awareness in the lowest income group.





1729

Comparison of Axillary Lymph Node Response After Neoadjuvant Chemotherapy Between Patients With Triple-Negative Breast Cancer and Receptor-Positive Disease

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Objective: Neoadjuvant chemotherapy (NAC) can provide eradication of axillary lymph node metastasis in a small number of patients with breast cancer. Triple-negative breast cancer (TNBC) tends to be relatively chemosensitive and have higher pathologic complete response rate. We questioned whether TNBC patients would be more likely to have eradication of their axillary lymph node metastasis after NAC. Therefore, we compared axillary lymph node response after NAC between patients with TNBC and receptor positive disease (NTNBC).

Methods: A retrospective review of the University of Florida Cancer Registry data was used to identify patients diagnosed with stage II and III breast cancer who had received neoadjuvant chemotherapy from Jan 2000 to Oct 2008. Patients with TNBC and those with any receptor-positive disease (ER, PR, or HER-2/neu positive) were identified. The two groups were compared on tumor characteristics, pre-chemotherapy axillary staging, type and duration of chemotherapy, type of surgical staging procedure, and postchemotherapy axillary lymph node response. Kaplan-Meier survival curves and hazard ratio were calculated to compare the event of death occurred between the two groups

Results: One hundred sixty-one patients with known tumor profile were treated with NAC. Forty-five patients (28%) had TNBC while 116 (72%) had NTNBC. Patients with TNBC were younger (median age 48 vs 56) and had worse prognosis (36% deceased vs 23%, p = 0.03) with larger tumors that were high grade (100% vs 82%). In the TNBC group, 68% had clinically positive nodes before chemotherapy (vs 85% NTNBC). However, more patients in the TNBC group converted to node-negative status after chemotherapy (42% TNBC vs 27% NTNBC). There was no significant difference in the number of patients who were downstaged (TNBC 27% vs NTNBC 32%). There was no difference in the rate of lumpectomy vs mastectomy, or sentinel node biopsy vs axillary node dissection between the two groups. Patients with TNBC mostly received triple-agent chemotherapy with TAC (44% vs 32%). NTNBC patients more commonly received dual-agent chemotherapy (51% vs 25%, p = 0.01). Survival was significantly shorter in TNBC patients who continued to have lymph node metastasis after NAC (19.6 months vs 24 months, p = 0.02). There was no survival difference in patients who converted to node-negative status. Overall, TNBC patients had shorter survival time (X2 = 5.11, p = 0.02) although the hazard ratio was not significantly different.

Conclusions: Patients with TNBC were more likely to achieve eradication of axillary lymph node metastasis after NAC. Axillary node conversion did not improve survival. However, lack of axillary node conversion had a significant adverse effect on survival in TNBC patients. These results may have implications regarding the use of sentinel lymph node biopsy after NAC in TNBC.

1755

Integration of the IBTR! Prediction Tool Into Surgical Decision-Making

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Objective: IBTR! was developed as a tool to predict the risk of ipsilateral breast tumor recurrence (IBTR) after breast-conserving surgery. This nomogram incorporates information regarding patient age, tumor size, tumor grade, margin status, lymphovascular invasion, and use of chemotherapy and hormonal therapy and was validated in a large study of women treated at the British Columbia Cancer Agency. While this tool was developed in order to better quantify the benefit of postsurgical radiation therapy, we sought to explore the potential use of this tool in preoperative surgical decision-making.

Methods: Our study included women who underwent definitive breast cancer surgery with breast-conserving technique at NYU Langone Medical Center between January and September 2010. Excluded from analysis were patients with pure DCIS, and those who underwent neoadjuvant chemotherapy. All patients were counseled as to their options for breast-conserving and mastectomy approaches. Patients were informed of the risk of IBTR, which was estimated at 10% for the purposes of preoperative discussion. In order to calculate the risk of IBTR using the current model, the plan for systemic therapy was utilized without consideration for the possibility of noncompliance with the recommended regimen. Analysis of variance (ANOVA) and descriptive analyses were used to evaluate the association between age and risk of IBTR.

Results: We had a total of 142 patients with a median age of 61 (range, 28-89 years). Regarding the variables contained in the IBTR risk model, all our patients had negative margins, 123 (87%) had no lymphovascular invasion, 73 (53%) had a tumor size ≤1 cm, and the majority (63%) had grade 2 tumors. The average predicted IBTR in our cohort was 5.7% (range, 1.3-26.7%). A majority of our patients ≥70 years (60%) had an IBTR risk <3%. There was a statistically significant difference in the IBTR risk scores for the different age groups ($p < 0.001$).

Conclusions: As patients consider their surgical options prior to definitive breast cancer surgery, the risk of IBTR is an important element in the discussion. In our study, the risk of IBTR predicted by the model is significantly less than the generally quoted risk. In the oldest age group, the low IBTR risk may suggest that these women may not benefit from radiation therapy. In the youngest age group, the predicted IBTR risk should be part of the discussion regarding surgical options. Although the IBTR! Model is difficult to utilize in a prospective manner, it may yield an approximate risk for IBTR assuming certain standard approaches to systemic treatment. This information may aid patients and physicians in making decisions regarding breast-conserving surgery using a more individualized approach to the risk of IBTR.

1746

Expression of ALDH1 As a Marker of Mammary Stem Cells in Benign and Malignant Breast Lesions

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Objective: Premenopausal breast cancer and tumors that are negative for the estrogen receptor, the progesterone receptor, and HER2/neu are substantially more common among African and African-American women compared to women of other racial/ethnic background, raising the question of whether African ancestry is associated with a heritable marker for these high-risk patterns of disease. The mammary stem cells, as identified by cells expressing the marker aldehyde dehydrogenase (ALDH1) appear to be correlated with malignant transformation of breast tissue and progression into the virulent "triple negative" phenotype. ALDH1-expression is found in a minority of breast specimens of white American and European-American women (<30%), but very little is known about the frequency of this marker in women of African descent, who are known to have an increased risk for triple-negative breast cancer. The aim of our study was to investigate the rate of expression of ALDH1 in both benign and malignant breast tissue among patients in the African population of Ghana.

Methods: We analyzed benign and malignant breast specimens from Ghanaian women through an international breast cancer research partnership established by the surgical breast oncology section of the University of Michigan and the Komfo Anoyke Teaching Hospital in Kumasi, Ghana. We looked for the frequency of mammary progenitor/stem cells by immunohistochemistry staining for ALDH1 within both stromal and epithelial tissue components of 208 formalin-fixed and paraffin-embedded breast specimens acquired between 2007 and 2009.

Results: Of the 208 samples examined, 104 were benign and 104 were malignant. Within the benign specimens, 55 showed ALDH1 expression (53%) and 49 (47%) did not. Among the malignant specimens, 75 (72%) showed ALDH1 expression and 29 did not (28%) ($p = 0.006$). When comparing the specimens that either showed no staining or weak staining to those that had moderate or strong staining, 79 (76%) within the benign group showed none or weak ALDH1 expression and 25 (24%) showed moderate or strong expression. In the malignant group, 54 (52%) showed none or weak expression and 50 (48%) showed moderate or strong expression ($p = 0.000$). These patterns did not appear to be explained by hormone receptor expression.

Conclusions: Our study indicates that there is a statistically significant difference between ALDH1 expression in malignant and benign breast lesions, and it furthermore suggests that mammary stem cells (as detected by ALDH1 expression) are more commonly present in the breast tissue of women from Ghana. These findings may be a factor in the known increased frequency of early-onset and triple-negative breast cancer of Ghanaian women. Further studies are necessary to confirm our findings and to fully understand their clinical significance regarding the biology of breast cancer in international populations. This work also demonstrates the value of international breast oncology collaborative efforts.

1737

Assessment of the Memorial Sloan-Kettering Cancer Center Nomogram for the Prediction of Positive Sentinel Lymph Nodes in Men With Breast Cancer

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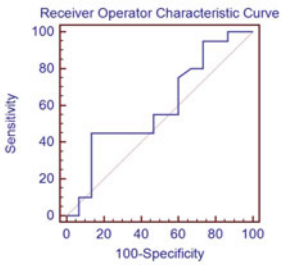
Objective: The Memorial Sloan-Kettering Cancer Center (MSKCC) nomogram to predict sentinel lymph node (SLN) metastasis was developed and validated predominantly in women; men comprised <1% of the study population. This nomogram is available to the general public as an online calculator and requires knowledge of nine clinicopathologic variables. The aim of this study was to assess the performance of the MSKCC nomogram to predict SLN metastasis in men with breast cancer.

Methods: With institutional review board approval all men treated for invasive breast cancer at Mayo Clinic, Rochester, MN, from 2000-2010 were identified. Medical records and specimen slides were examined to determine patient age, tumor size, type, grade, and location; presence of lymphovascular invasion (LVI) and multifocality, estrogen receptor (ER) and progesterone receptor (PR) status, and presence/absence of SLN metastasis. SLN metastasis was defined as in the MSKCC nomogram and included metastasis seen on hematoxylin and eosin staining and those seen by immunohistochemistry. A receiver operating characteristic (ROC) curve was constructed and the area under the curve was calculated based on the presence/absence of SLN metastasis and probability of SLN metastasis as predicted by the MSKCC nomogram.

Results: During the study period, 35 men were treated for breast cancer. Median age was 67 years (range, 44-85 years). All patients underwent mastectomy with SLN surgery. Axillary lymph node dissection was performed in all cases where the SLN was positive. All patients were diagnosed with invasive ductal carcinoma which was located in the subareolar/central region of the breast. Median tumor size was 2.1 cm (range, 0.7-8.0 cm). Nuclear grade 2 (of 3) was most common (69%). LVI and multifocality were present in 17% and 0% of patients, respectively. ER and PR were positive in 100% and 91% of patients, respectively. SLN metastases were present in 57% (20/35) of patients. Median predicted probability of SLN metastasis was 37% (range, 18-90%). Median predicted probability was 35% (range, 18-90%) for node-negative cases and 37% (range, 21-80%) for node-positive cases ($p = 0.4$). The area under the ROC curve was 0.595 (95% CI, 0.416-0.757). There was no distinct predicted probability above which all patients were found to have SLN metastasis. Conversely, there was no distinct predicted probability below which all patients did not have SLN metastasis.

Conclusions: Despite including men with breast cancer in the development and validation of the MSKCC nomogram to predict SLN metastasis, the nomogram was not able to discriminate which male patients had a high probability of having SLN metastasis. This nomogram should be used with caution when counseling men with breast cancer about their risk of SLN metastasis.



1700

Randomized Controlled Trial to Reduce Bacterial Colonization of Surgical Drains After Breast and Axillary Operations

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Objective: Surgical site infections (SSI) occur more frequently after breast and axillary operations than for other clean surgical procedures. Surgical drains have been implicated in SSI and are a potential source of bacterial entry into the wound environment. The aim of this study was to determine if bacterial colonization of drains could be reduced by simple and inexpensive local antiseptic interventions.

Methods: With institutional review board approval and patient consent, patients undergoing total mastectomy (TM) without reconstruction and/or axillary lymph node dissection (ALND) were randomized to standard drain care (control) or drain antisepsis (treated). Surgeons were blinded to an individual's assignment. Drain interventions were instituted and patients were instructed how to care for drains on postoperative day (POD) 1 by nurse study coordinators. Control patients cleaned the drain site twice daily with alcohol swabs. Treated patients performed antisepsis procedures until drain removal and included both (1) a chlorhexidine impregnated disk (BIOPATCH®, Johnson & Johnson Medical) placed at the drain exit site and changed every 3 days, and (2) drain bulb irrigation with dilute sodium hypochlorite solution (Dakin's solution 0.025%) twice daily. Semiquantitative aerobic and anaerobic cultures of drainage fluid were obtained sterilely for all patients at POD 6-8 and at time of drain removal if >POD 6-8. In most patients, a 5-cm portion of intracorporal drain, 1 cm proximal to the exit site, was also cultured at drain removal. Rates of drain fluid and tubing colonization (≥1+ growth and ≥50 CFU, respectively) between the control and treated groups were compared.

Results: Overall, 87 patients were enrolled and 76 patients with 96 drains completed the study: 40 patients (52 drains) were randomized to drain antisepsis and 36 patients (44 drains) to the control group. Antibiotics were administered to all patients prior to incision and discontinued within 24 hours. TM, ALND, and TM+ALND were performed in 49, 4, and 23 patients, respectively. Median duration of operation was 2 hr:20 min (range, 1:12-4:55). Median duration of drain use was 7 days (range, 5-23 days), with a median output of 23 ml (range, 3-95 ml) for the preceding 24 hours at POD 6-8. Cultures of drain bulb fluid at POD 6-8 were positive in 64% (28/44) of control drains and 23% of treated drains (12/52), ($p < 0.0001$). Drain tubing was cultured at time of drain removal from 52 patients (67 drains - 29 control and 38 antisepsis) and was positive in 21% (6/29) of control drains and 0% (0/38) of treated drains ($p = 0.005$). Among drains with positive bulb fluid cultures at the time of drain removal, the drain tubing also cultured positive in 32% (6/19) of controls versus 0% (0/7) in antisepsis drains ($p = 0.15$). SSI was diagnosed in four patients (5%): three patients in the control group and one patient in the treated group ($p = 0.34$) (see Table).

Conclusions: Simple and inexpensive local antiseptic interventions with a chlorhexidine disk and hypochlorite solution reduce bacterial colonization of drains. Based on these data, further study of drain antisepsis and its impact on SSI rate is warranted.

Table: Culture results for patients randomized to standard (control) vs antiseptic drain care

	Control % (N)	Drain Antisepsis % (N)	P value
Patients	47% (36)	53% (40)	
Drains	46% (44)	54% (52)	
Drain bulbs with positive fluid cultures at POD 6-8	64% (28)	23% (12)	<0.0001
Drain tubing with positive culture at removal	21% (6/29)	0% (0/38)	0.005
Surgical site infections	8% (3)	3% (1)	0.34

1717

Validity of "Additional Nodal Metastasis" Breast Cancer Nomogram of Memorial Sloan-Kettering Cancer Center in African American Women

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Objective: Memorial Sloan-Kettering Cancer Center (MSKCC) evolved the Additional Nodal Metastasis Nomogram to estimate further axillary nodal involvement. This nomogram has been validated in predominantly European American and European populations. The incidence of breast cancer in African American women (AAW) is less than that of European-derived women, but it presents earlier, possibly with a more aggressive tumor biology. The aim of this study is to assess the predictive accuracy of this nomogram in AAW with breast cancer, as these patients constitute 50% of our patient population.

Methods: In the retrospective review of medical charts, we identified 52 AAW who meet nomogram's criteria and underwent both sentinel node biopsy and ALND between 1998 and 2010. We extracted the pertinent data for the nomogram variables for each patient, and calculated the risk of further nodal metastasis per the nomogram (predictive probability). In analyzing this data, the receiver operating characteristics (ROC) curve was constructed to assess the predictive probability of additional axillary nodal involvement in discriminating the observed additional nodal status in our population. Given the greater identification of estrogen receptors in tumors of postmenopausal women, this data was also evaluated by menopausal status.

Results: The mean age of this population was 55 years, with 20 women younger than 50 years and 32 women older than 50 years. Of 52 patients with sentinel node involvement, 22 (42.3%) had further positive axillary nodes. Still, 71.1% of these tumors expressed estrogen receptor. In constructing the ROC, the area under the curve (AUC) was found to be 0.74 [95%CI, 0.60-0.89], close to that of MSKCC (0.78). In applying this nomogram to our patients, a predicted probability > 34% of further nonsentinel node involvement provides a 73.1% likelihood of correct classification, maximizing sensitivity (68.2%) and specificity (76.7%). There was no significant difference in the AUC between pre- and post-menopausal women. If we stratify our AAW among three risk classes--low <10%, intermediate 10-20%, and high risk >20%--our data indicates an incidence of 22.2% observed positive nonsentinel nodes in our low-risk group.

Conclusions: The MSKCC nomogram to predict additional nodal metastasis has been validated in our population of AAW, and can be used as a predictive tool. Given few women who qualify as low risk, this nomogram may not be as reliable a predictor for low risk in AAW as it is a predictor for high risk in our patients. A strong argument can be made for those patients at intermediate- or high-risk probability for completing the standard of ALND.

Table: Distribution of patients with non-sentinel lymph node involvement according to risk class of predicted probability with nomogram

Risk Class	No (%)	Positive Nonsentinel Nodes (%)
<10	9(17.30)	2 of 9(22.20)
10-20	12(23.08)	3 of 12(25.00)
>=20	31(59.62)	17 of 31(54.80)

1738

Elderly Breast Cancer Patients Survival: The Impact of Co-Morbidities

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Objective: Prior studies have identified invasive estrogen receptor positive (ER+) breast cancer in the elderly to have a good prognosis. High number of co-morbidities in this group may confound breast cancer prognosis. We sought to examine the overall prognosis in women above the age of 70 with newly diagnosed T1 ER+ breast cancer taking into consideration their co-morbidities.

Methods: IRB approval was obtained for this study. Data was generated from a prospective database of all women over 70 years old, ER+, HER2 negative, with tumors less than 2 cm who were surgically treated for breast cancer between 2005 and 2010. Kaplan Meier method was used to assess survival.

Results: Two hundred thirty women aged 70 and above who were ER+ and HER2 negative underwent surgical treatment. Most women presented with image-detected cancers (67%) and invasive ductal carcinoma (70%) compared to invasive lobular carcinoma (8%) and other ductal subtypes (22%). Mean tumor size was 1.1 cm. Angiolymphatic invasion was present in 6% (13 patients) and 13% (30) had multiple ipsilateral tumors. Positive lymph node involvement was found in 31 (14%) women. One hundred eighty-nine (84%) women underwent breast-conserving therapy, 33 (15%) mastectomy, and 4 (2%) mastectomy with reconstruction. A total of 64% underwent radiation therapy after BCT. Adjuvant endocrine therapy was given to the majority of women (70%), whereas only 3% received chemotherapy. Co-morbidities included hypertension, 56%; coronary artery disease, 14%; hyperlipidemia, 37%; COPD, 3%; renal insufficiency, 5%; and diabetes, 10%. Average BMI among patients was 27, with 63% having a BMI greater than 25. Average follow-up time was 25 months. The rate of local recurrence was 1% (3 women) and the rate of systemic recurrence was 1% (3), while overall survival was 89%. The rate of recurrence-free survival was 88%. When analyzing cause of death, 30% (6 patients) had breast cancer-related death vs 70% (22) who died from other causes, including 10 who died of other cancers.

Conclusions: In our medically compliant elderly population, we confirm that women who are diagnosed with T1 ER+ breast cancer have a good prognosis and that co-morbidities have a huge impact on overall survival. Even with a short follow-up, there were a significant number of deaths from other causes. This point needs to be taken into consideration by physicians and patients alike when they are making their treatment choices.

1652

Treatment of Ductal Carcinoma In Situ (DCIS) of the Breast Based Upon Individual University of Southern California/Van Nuys Prognostic Index (USC/VNPI) Scores: 1529 Patients With an Average Follow-Up of 84 Months

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Objective: The USC/VNPI is an algorithm, based on a rigid pathology protocol, which permits reproducible prospective quantification of measurable prognostic factors known to be important in predicting local recurrence in patients with DCIS. These include tumor size, margin width, nuclear grade, age, and comedonecrosis. When originally published (Cancer 1996;77:2267-74), the Index was based on 333 patients and treatment recommendations were grouped by scores: excision alone for those who scored 4-6; excision plus radiation therapy for those who scored 7-9; mastectomy for those who scored 10-12. With four and a half times as many patients and nearly twice the follow-up since originally developed, sufficient numbers now exist for analysis by individual score (4-12), stratified by margin width, rather than by groups of scores. Since current NCCN Treatment Guidelines have been amended to include excision alone as an acceptable alternative but without listing any selection criteria, analysis by USC/VNPI score has become increasingly valuable.

Methods: One thousand five hundred ten patients with pure DCIS, with 84 months of follow-up were analyzed by: (1) individual USC/VNPI scores (4 through 12), (2) multiple margin widths (1, 3, 5, and 10 mm), (3) treatment (excision plus radiation therapy versus excision alone), and (4) treatment needed to achieve a local recurrence probability of less than 10%, 15%, 20%, or 25% at 12 years.

Results: The table illustrates the treatment and margin width necessary to achieve a probability of local recurrence of less than 20% at 12 years and was derived using the Kaplan-Meier method. As the acceptable local recurrence probability is adjusted up or down, the treatment recommendations change.

Conclusions: With more than four and a half times as many patients as originally published, the USC/VNPI can be more finely tuned to aid in the treatment decision-making process. To achieve a local recurrence probability of less than 20% at 12 years, these data support excision alone for all patients scoring 4, 5 or 6, regardless of margin width and patients who score 7 but have margin widths ≥3 mm. Excision plus RT is appropriate for patients who score 7 and have margins <3 mm, for patients who score 8 and have margins ≥3 mm, and for patients who score 9 and have margins ≥5 mm. Mastectomy is appropriate for patients who score 8 and have margins <3 mm, who score 9 and have margins <5 mm and for all patients who score 10, 11, or 12, regardless of margin width. The value of the USC/VNPI has been confirmed by numerous studies and is the only tool currently available to aid in the treatment decision-making process. The current recommendations represent substantial changes from those previously published and permit greater flexibility in treatment decision-making.

USC/VNPI Score	No. Pts 1529	TREATMENT Needed	12-Year Recurrence
All 4, 5 or 6	380	Excision alone	≤ 6%
7, Margins ≥ 3 mm	170	Excision alone	16%
7, Margins < 3 mm	115	Excision + radiation	14%
8, Margins ≥ 3 mm	111	Excision + radiation	15%
8, Margins < 3 mm	172	Mastectomy	0%
9, Margins ≥ 5 mm	36	Excision + radiation	19%
9, Margins < 5 mm	188	Mastectomy	0%
All 10	196	Mastectomy	7%
All 11 or 12	161	Mastectomy	10%

1750

Improved Positive Margin Rate Found in a Prospective, Multicenter, Randomized, Double-Arm Study Using a Novel Intraoperative Margin Assessment Device

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Objective: Positive margins following BCS are a significant problem, frequently leading to further surgery. Detection of involved margins from pre- and intra-operative data remains challenging. We sought to determine if the rate of patients with postoperative positive margins could be decreased using a novel device (MarginProbe™, Dune Medical Devices, Framingham, MA), which uses dielectric spectroscopy to capture the properties of the target tissue, compare them to predefined criteria, and classify them as normal or malignant.

Methods: Six hundred sixty-four consented patients were enrolled in a multicenter (n = 21), prospective, randomized trial. Inclusion criteria included women with nonpalpable, histologically diagnosed carcinoma of the breast, requiring image-guided localization, undergoing lumpectomy. After removal and specimen orientation, patients were randomized intraoperatively to device arm or standard of care (SOC). In the device arm, the probe was used to measure 5-8 points per margin, covering the specimen in 3-5 minutes. A positive reading required immediate shaving of additional tissue from the breast cavity corresponding to that margin (device was not used on cavity or re-shaved margins). Following device use (or SOC), specimens were inked, sent for intraoperative specimen imaging (with corresponding clinically indicated shavings taken), and sent for routine pathology. The primary endpoint was complete surgical resection (CSR), the rate of patients with a histologically positive margin (≤ 1 mm) on specimen in whom all positive margins were re-excised (accounting for deep margins to fascia or anterior margins to skin for which no further tissue could be excised). Additionally, margin-level device performance was assessed.

Results: Five hundred ninety-six patients were randomized, while 68 patients (selected at consent) were used as device training cases. Analyses were performed on randomized patients. As expected, the rate of main specimens with positive margins was similar in each group (54.7% [163/298] for device vs 49.3% [147/298] for control; P = 0.19). The rate of patients with positive margins after the primary surgery was 30.9% (92/298) for device vs 41.6% (124/298) for control (P = 0.008). Sources of positive margins were (1) incomplete removal of all main specimen positive margins, 20.8% (62/298) for device vs 38.3% (114/298) for control (P < 0.0001), or (2) positive new margins from cavity re-excisions, 10.1% (30/298) for device vs 3.3% (10/298) for control (P = 0.002). In the device arm, the rate of CSR was 71.2% (N = 116/163), vs 22.4% (N = 33/147) for control (P < 0.0001) for patients with positive specimens. The rate of patients returning for re-lumpectomies due to incomplete removal was 11.0% (33/298) for device vs 20.8% (62/298) for control (P = 0.001). The average total tissue volume removed from all lumpectomies was 93 cc for device vs 85 cc for control. The average total tissue volume removed, normalized to breast volume (average volume of specified cup size), was 15.0% for device vs 12.5% for control.

Conclusions: This study, using a novel device to assess margins intraoperatively on lumpectomy specimens of patients undergoing BCS, successfully achieved a lower positive margin rate and reduced number of re-lumpectomy procedures. In addition, use of the device led to minimal additional breast tissue removed.

1680

Clinical Utility and Therapeutic Implications of Oncotype Analysis in Patients With Breast Cancer

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Objective: Oncotype DX is a gene expression assay used for patients with early-stage, estrogen receptor positive breast cancer. It identifies the molecular signature of a patient's breast cancer by analyzing 21 genes within a surgical specimen. This information is used to determine a "recurrence score" which estimates the tumor's response to chemotherapy and the likelihood of recurrence at 10 years. Physicians may then use these results to guide their treatment recommendations. This study investigates the effect of Oncotype DX results on the clinical management of breast cancer patients at our institution. It also evaluates how accurate physicians were at estimating recurrence scores.

Methods: Clinic notes and pathology reports were gathered for 63 patients who had undergone oncotype analysis between January 2004 and June 2009. The patients were presented to seven breast cancer specialists, including two surgical oncologists, three medical oncologists, and two radiation oncologists. Information provided included patient age, race, menopausal status, pertinent medical and family history, tumor size, nuclear grade, histopathology, estrogen, progesterone and Her2-neu receptor status, margin status, and presence of axillary micrometastases. For each case, panel members were asked to individually estimate the Oncotype DX recurrence risk (low, low intermediate, high intermediate, high) based on the information provided. The group recommended appropriate adjuvant therapy both before and after the "recurrence score" was revealed. Changes in recommended therapy were then evaluated.

Results: Upon learning the recurrence score, panel members changed their treatment recommendation in 27 of 63 (43%) cases. Nineteen patients (30%) who were initially recommended chemotherapy were found to have a low risk of recurrence, resulting in a group recommendation of hormonal therapy alone. Eight patients (13%) were initially recommended hormonal therapy alone, but intermediate or high recurrence scores resulted in a change to hormonal therapy plus chemotherapy. Thirty-six patients (57%) had no change in their treatment recommendation. Recurrence risk was estimated correctly in 44.4% of cases. The surgical oncologists were correct in 46.8% of cases, the radiation oncologists in 42.9%, and the medical oncologists in 43.9%. These differences were not found to be statistically significant.

Conclusions: The results of Oncotype DX testing changed management in a significant proportion of patient compared to traditional guidelines alone. Physicians, regardless of specialty, were able to estimate the recurrence score in less than half of the patients. Oncotype DX assay should be used in eligible patients to ensure that the appropriate adjuvant therapy is recommended.

1735

Breast Care Ecuador: A Model to Expand Access in Underserved Areas

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Objective: Tremendous disparities in breast cancer mortality exist worldwide. The WHO and international coalitions have designed resource-specific guidelines for early detection and treatment. Strategies to eliminate disparities must focus on providing patients in the field with resources already available within a country's infrastructure. We designed a culturally sensitive and cost-effective model to enhance breast care in Ecuador. The goal was to create screening and referral mechanisms for women from the remote village of Gualaceo, which would promote early diagnosis and enhance their understanding of treatment options in the nearby city of Cuenca.

Methods: We identified a developing country with resources for cancer care and where female average life expectancy is over 70 years. Our team consisted of four residents, seven medical students, two nurses and a surgeon, anesthesiologist, physician assistant, and translator. The program was self-sufficient through fundraising and donated medical supplies. We filmed a local promotional advertisement and collaborated with journalists, politicians, medical providers, and religious leaders. Patients viewed an educational video developed within Ecuador prior to clinical encounters. Palpable masses were evaluated clinically and by ultrasound. Fine needle aspirations (FNAs)/core biopsieswere performed. Mammograms and pathology reviews were obtained on patients referred for surgery.

Results: In 7 days we examined approximately 30% of the population of women over the age of 40 in Gualaceo (843 of 2,454). Patient characteristics were as follows (median): age, 46.2 years; age of first childbirth, 20.8; age of menarche, 13; monthly spending, $300. Their estimated literacy rate was 80%. Seven hundred patients (83%) had normal breast exams. Of those, 368 patients (53%) were referred for screening mammograms based on age. We evaluated 147 patients with palpable findings (17%) and performed 40 FNAs, 13 core needle biopsies, and 4 operations. We diagnosed 35 benign lesions (4 with atypia and 1 with papilloma). In this limited timeframe, we detected 5 cases of carcinoma in contrast to the 18 cases reported in Gualaceo between 1996 and 2004.

Conclusions: During our week of medical intervention, we bridged gaps in education and expanded access to breast care by over 30%. Furthermore, five new cases of breast cancer were diagnosed. This approach using minimal resources in a restricted timeframe demonstrated a highly effective model for improving breast health in an underserved area. Future study will assess patient outcomes and the reproducibility of ourstrategy in other settings.

Patient characteristics		
Age	**Finding**	**Intervention**
49	Papilloma	Duct excision
40	2-cm carcinoma	Opted for private treatment
30	Inflammatory breast cancer	Referrals to medical oncology
39	2 cm carcinoma vs atypical fibroadenoma	Lumpectomy, SLN
69	1.5 cm carcinoma with diffuse microcalcifications	Simple mastectomy, SLN
85	Fungating breast mass	MRM for palliation
22, 23, 49, 49,51	Atypia	Mammogram and follow-up with medical director

1730

Malignant Phyllodes Tumors of the Breast and Impact of Race: 25-Year Experience in an Integrated Community Hospital System

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Objective: Many have studied the impact of race on outcome of women diagnosed with epithelial breast tumors, with mixed results but overall consensus that black women have a worse outcome, either due to more aggressive tumor biology or lower socioeconomic status. We sought to determine whether race/ethnicity has a similar impact in black women diagnosed with mesenchymal breast tumors, ie, malignant phyllodes tumors (PTs).

Methods: Retrospective review of an integrated community hospital system's breast cancer cases was performed, querying for malignant PTs of the breast. Histology was reviewed by a fellowship-trained breast pathologist. Statistical analyses were conducted to identify differences between black and non-black women with regard to patient, pathologic, and treatment characteristics and outcomes of recurrence or survival.

Results: Thirty-seven cases of borderline or malignant PTs were identified in the Cancer Registry database between 1985 and 2010. Two cases were excluded from analysis, as not all slides were available for histological review to distinguish between the diagnoses of malignant PT versus metaplastic carcinoma. Of the 35 patients remaining for analyses, 20 tumors represented borderline PTs (i.e., low-grade malignant PT) and 15 represented malignant PTs (ie, high-grade malignant PT), distributed equally amongst all races ($p = 0.67$). Borderline PTs were diagnosed in 16 Caucasians, 3 Blacks, 1 Asian. Malignant PTs were diagnosed in 12 Caucasians, 3 Blacks. Median follow-up for all patients was 120 months (range, 1-295). Median age at diagnosis for all was 53 years (range, 21-85); for Blacks, 47.3 years (range, 22-70); and for non-Blacks, 54 years (range, 21-85) ($p = 0.46$). Median survival after diagnosis of the entire group was 60.5 months (range, 1-295 months); for Blacks, 131.5 months (range, 19-295); and for non-Blacks, 60.5 months (range, 1-287) ($p = 0.43$). Median tumor size for the entire group was 43 mm, for Blacks 41 mm (range, 20-188); and for non-Blacks, 43 mm (range, 8-215) ($p = 0.78$). All but one patient underwent surgery (partial mastectomy, 18; total mastectomy, 16; no surgery as first course, 1) ($p = 0.54$). Four patients (1 Black, 3 non-Black) received radiation for documented reasons of either malignant histology, large tumor size, or close margins. Two patients (both non-Black) received first course chemotherapy. Recurrence developed in six patients (two locally, four distant), and was not influenced by race ($p = 0.54$). While disease-related survival was statistically associated with radiation delivered as part of first-course treatment ($p = 0.0001$), it was not influenced by race/ethnicity ($p = 0.43$).

Conclusions: Race does not influence tumor size, surgery type, recurrence or overall survival after a diagnosis of either borderline or malignant PT.

1709

Predictors of Quality of Life 6 Months Into Treatment for Breast Cancer

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Objective: To investigate the predictive value of measures of psychological, emotional, and spiritual well-being and cognitive performance on quality of life (QoL) 6 months into the treatment of women diagnosed with breast cancer.

Methods: Participants were initially evaluated following a breast cancer diagnosis for emotional and spiritual well-being, quality of life, social support, sleep quality, and cognitive performance on computerized attention, memory, and learning tasks. Within 6 months of diagnosis, women were reevaluated. Breast cancer patients were matched to control women with a benign breast biopsy based on age, race, education, income level, and menopausal status. Predictor variable measurements included the State-Trait Anxiety Inventory (STAI-short form), Patient Health Questionnaire (PHQ-9) for depression, National Comprehensive Cancer Network Distress Management Screening Measure (NCCN-DMSM), Spiritual Involvement & Beliefs Scale (SIBS), Bottomley Cancer Social Support Scale, Quality of Sleep scale, and the Cogstate computerized test battery for neuropsychological performance. The QoL outcome was measured using the HOPE Quality of Life Cancer Survivors Scale (QoL) total score and subscale scores (physical QoL, psychological QoL, social QoL, and spiritual QoL). Multiple regression analysis in SPSS version 18 was used to evaluate the relationship between the predictor assessments following diagnosis, and the QoL outcome measures within 6 months of diagnosis. Age, education, and income were included as a priori variables.

Results: Eighty-four women newly diagnosed with breast cancer (mean age, 54.8 yrs, SD = 8.7) and 69 benign controls (mean age, 56.7; SD = 8.7) participated. Thirty-two of the 84 cancer patients underwent chemotherapy. Within 6 months following diagnosis, women who underwent chemotherapy had lower overall QoL than breast cancer patients not receiving chemotherapy ($P = .001$). Non-chemotherapy breast cancer patients also had lower overall QoL than benign controls, though not significant except for physical and social QoL. Overall QoL 6 months after diagnosis was significantly predicted by the following measures assessed at diagnosis: better social support ($P < .001$), less distress ($P = .005$), greater age ($P = .014$), and stronger self-rating on cognitive performance on a set of computerized memory and learning tasks ($P = 0.056$). The multiple regression model for these predictors accounted for 44% of the variance ($R2 = 0.44$) of the overall QoL outcome score ($P < .0001$). In terms of specific QoL domains, chemotherapy was associated with poorer physical ($P < .001$) and social QoL ($P < .001$), while at the same time being significantly related to stronger spiritual QoL ($P = .003$).

Conclusions: Younger breast cancer patients and those with higher levels of distress following diagnosis have significantly poorer QoL within 6 months of diagnosis, especially those receiving chemotherapy. Social support and spiritual well-being may be important modifiers of this relationship, and should be considered in guiding the interventions that can help sustain QoL throughout the treatment and recovery phases in women with breast cancer.

1663

Complications of Immediate Breast Reconstruction Do Not Cause Treatment Delays

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Objective: Immediate breast reconstruction following breast cancer surgery may not be offered to patients due to concerns regarding potential adjuvant treatment delays resulting from surgical complications. We sought to determine delays in time to adjuvant radiation and systemic therapy associated with surgical complications for patients undergoing concurrent breast oncologic and reconstructive procedures.

Methods: A retrospective review was performed of sequential patients undergoing combined oncologic and plastic surgical procedures for in situ or invasive carcinoma between January 2005 and June 2010 who were treated with adjuvant systemic and/or radiation therapy at a single institution. Patients were compared for time from surgery to initial adjuvant systemic or radiation therapy by surgical complications (infection, hematoma, seroma, lymphedema, fat necrosis, flap necrosis, implant extrusion and/or removal, mastectomy skin loss, full or partial nipple areolar complex ischemia). Patients were excluded from analysis if they had recurrent disease, or if they received preoperative systemic or radiation therapy.

Results: During the study period, 61 patients were identified. The average age was 56.8 years (range, 26-82) and median follow-up was 239 days (range, 32-1028). Pathologic diagnoses included invasive ductal carcinoma (77.1%), ductal carcinoma in situ (19.7%), and invasive lobular carcinoma (3.3%). Patients presented with stage I disease in 51.7% of cases; stage II, in 22.4%; stage 0, in 20.7%; and stage III, in 5.2%. Patients underwent immediate reconstruction of a partial mastectomy defect in 41.0% and total mastectomy defect in 69.0% of cases. Bilateral reconstruction was performed in 67.2% of cases. Type of plastic surgical reconstruction was autologous tissue in 65.0% of cases; tissue expander/implant, in 26.7%; or both, in 8.3%. A total of 58 (95.1%) patients received systemic therapy alone or prior to initiation of radiation and 12 (19.7%) patients received radiation therapy alone or prior to initiation of systemic therapy. The median length of time from date of surgery to date of initiation of systemic therapy was 53.5 days (11-463), and the median length of time to initiation of radiation therapy was 41.5 days (8-237). One half of patients (50.8.%) had a postoperative complication. When stratified by complication, there were no significant differences in time to initial systemic therapy or radiation therapy (see table).

Conclusions: In the current series, complications from concurrent oncologic and reconstructive breast surgery were not associated with adverse delays in initiation of adjuvant systemic or radiation therapy. Although further improvement in overall complication rates and time to adjuvant therapy is warranted, women undergoing breast cancer surgery can safely be offered immediate reconstruction of partial or total mastectomy defects.

	Complication	No Complication	p value
Median time to systemic therapy	60 d (N=30)	51 d (N=28)	0.4
Median time to radiation therapy	36 d (N=4)	48 d (N=8)	0.2

1673

Factors Predicting the Non-Sentinel Lymph Node Metastasis in Breast Cancer Patients With Sentinel Lymph Node Micrometastasis

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Objective: In a significant proportion of patients, the sentinel lymph node (SLN) is the only involved axillary node. Scoring systems using clinicopathological characteristics have been developed to predict the probability of non-SLN metastases among those patients with a positive SLN. The goal of the present study was to identify factors associated with a positive SLN biopsy and the metastatic involvement of non-SLNs to define a subgroup of patients in whom axillary dissection may be omitted.

Methods: Data was reviewed for 353 patients diagnosed with clinical operable T1-3 N0 invasive breast cancer who underwent SLN biopsy with or without axillary dissection in a single institution between July 2000 and May 2010. All the sentinel lymph nodes were examined by serial sectioning (50 μm) of the entire lymph node and H&E staining, and by cytokeratin immunostaining in suspicious cases.

Results: The SLN were found to be involved with tumor cells in 147 patients (41.6%). Of those, 39 patients (26.5%) had micrometastases (tumor size: ≤ 2 mm) whereas 89 patients (60.5%) were found to have macrometastases (> 2 mm). Nineteen patients (13%) had isolated tumor cells (ITC) detected by H&E staining or immunohistochemistry (≤ 0.2 mm). Factors predicting a positive sentinel lymph node biopsy were tumor size more than 2 cm (OR = 2.7; 95% CI, 1.5-4.7, p = 0.001) and presence of lymphovascular invasion (OR = 7.5, 95% CI, 4.3-13) in both univariate and multivariate analyses. However, finding of ITC or micrometastasis in sentinel lymph nodes was the only predicting factor of not having a non-sentinel lymph node metastasis in both univariate and multivariate analysis (OR = 0.24; 95% CI, 0.09-0.65). In subgroup analysis of patients with ITC or micrometastases, patients with T1 tumors were less likely to have nonsentinel lymph node metastasis than the patients with T2-3 (T1, 4.8% vs T2-3, 29.4%; OR = 1.8; 95% CI, 0.88-3.84).

Conclusions: These findings indicate that size of metastasis is the strongest predictor of the presence of nonsentinel lymph node metastasis. Our results suggest further axillary surgery can best be omitted in patients with small size tumors among those with ITC or micrometastasis in SLN. Therefore, validation of nomograms including different clinicopathological factors or biological markers should better be studied in patients with ITC or micrometastasis in SLN.

1644

Predicting Axillary Nodal Positivity Using Clinical Exam, Mammography, Ultrasonography, and MRI

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Objective: Axillary lymph node status continues to be the single most important prognostic variable regarding breast cancer survival. We were interested in our ability to predict axillary nodal involvement using clinical examination and standard breast imaging studies.

Methods: Two hundred nine consecutive patients with invasive breast carcinoma who underwent clinical examination of the axilla, mammography, axillary ultrasound, MRI, and histopathologic evaluation of one or more axillary nodes were included.

Results: Fifty-five of 209 (26%) patients had positive N1-3 axillary nodes. Ten patients with isolated tumor cells (less than 200 tumor cells), N0(i+), were considered node negative and included in the node-negative group. Using all modalities combined, the true positive rate was only 56% and the false-positive rate was 14%. Sensitivity was 51% and specificity was 88%. If all four modalities were negative, 85% of patients has histologically negative nodes and 15% were node positive.

Conclusions: Imaging and clinical examination, alone or in combination, while extremely helpful for treatment planning, are poor predictors of axillary lymph node involvement.

	Node Positive	Node Negative	P Value
N	55	154	
Suspicious by:			
Clinical exam	19 (35%)	5 (3%)	<0.0001
Mammography	10 (18%)	5 (3%)	<0.0002
Ultrasound	24 (44%)	11 (7%)	<0.0001
MRI	21 (38%)	13 (7%)	<0.0001

1642

Difference in Recurrence Patterns by Treatment in Patients With DCIS

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Objective: Ductal carcinoma in situ (DCIS) is commonly treated using wide local excision with or without postoperative radiation therapy. Radiation therapy is known to reduce the local recurrence rate by a relative 50%. We were interested in whether the pattern of local recurrence (invasive versus noninvasive, quadrant of recurrence, time to recurrence) and breast cancer specific survival changed with the addition of radiation therapy.

Methods: Using a prospective database, 1,000 patients with pure DCIS who underwent breast-conserving surgery were analyzed for type of local recurrence (invasive versus DCIS), median time to recurrence, quadrant of recurrence (same or different), and breast cancer specific survival. Probabilities of local recurrence were derived using the Kaplan-Meier method. Probabilities were compared using the log-rank test.

Results: Radiated patients had a significantly lower 10-year probability of recurrence but a higher rate of invasive recurrences, longer time to diagnosis of recurrence, and a slightly lower but significant 10-year breast cancer specific survival when compared to patients not treated with radiation.

Conclusions: Our data confirm an approximate 50% reduction in local recurrence if radiation therapy is given and are consistent with the published prospective randomized data, but the pattern of recurrence in irradiated patients differs significantly from excision-only patients. Twenty-six percent of postirradiation recurrences were in different quadrants, in essence, new cancers, compared with only 9% for excision-only patients. Irradiated patients who recurred took about twice as long to recur. This was true for both invasive and DCIS recurrences. When irradiated patients recurred, they had a higher percentage of invasive recurrences. This resulted in a statistically significant lower 10-yr breast cancer specific survival.

Table.

	Excision Alone	Excision Plus Radiation Therapy	P Value
Number of patients	644	356	
Average follow-up	72 mo	109 mo	<0.001
10-yr P=probability any local recurrence	30%	17%	0.0067
% Invasive local recurrence	37%	57%	0.009
10-yr prob invasive local recurrence	12.5%	9.5%	0.85(NS)
Median time to any local recurrence	34 mo	72 mo	<0.001
Median time local recurrence same quadrant	31 mo	57 mo	<0.001
Median time local recurrence different quadrant	55 mo	144 mo	<0.001
# Recurrences same quadrant	102/112 (91%)	48/65 (74%)	0.002
Median time to DCIS recurrence	23 mo	48 mo	<0.001
Median time to invasive recurrence	52 mo	108 mo	<0.001
10-yr breast cancer specific Survival	99.7%	98.3%	0.02

1643

Predicting Breast Cancer Outcome and Nodal Metastasis by Routine Histopathology Compared to Hormonal Receptor Status and HER2 Overexpression

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Objective: Nuclear grade, histologic grade, and mitotic grade are routinely determined during histopathologic examination of breast cancer, unlike sophisticated immunohistochemical staining or molecular subtyping. We were interested in using histologic grading to predict nodal positivity and breast cancer specific survival and comparing the predictability of histologic grading with more costly examinations.

Methods: A prospective breast cancer database was reviewed. One thousand six hundred patients with infiltrating ductal carcinoma were evaluated. All had nuclear grade, histologic grade, and mitotic grade. One thousand two hundred ninety-nine of these patients had estrogen receptor and progesterone receptor status and 902 of these patients had HER2 status.

Results: Nuclear grade, histologic grade, and mitotic grade were able to predict nodal positivity and breast cancer specific survival. All differences were statistically significant. Estrogen receptor, progesterone receptor, and HER2 status were able to predict breast cancer specific survival but not nodal positivity.

Conclusions: Easily obtainable histopathologic data, such as nuclear grade, histologic grade, and mitotic grade, are excellent predictors of both nodal positivity and breast cancer specific survival, whereas more costly tests such as estrogen receptor, progesterone receptor, and HER2 status were able to predict breast cancer specific survival but not nodal positivity. This suggests that the mechanism by which molecular markers affect survival is independent of nodal positivity.

Table:

Histologic Grade	# Positive Nodes/Total (%)	Breast Cancer Specific Survival at 12 years
1	42/227 (18)	96%
p-value	< 0.0001	0.007
2	199/595 (33)	89%
p-value	< 0.0001	0.0004
3	345/778 (44)	81%
Nuclear Grade		
1	13/136 (9)	98%
p-value	< 0.0001	0.02
2	244/771 (32)	91%
p-value	< 0.0001	0.00001
3	329/693 (47)	81%
Mitotic Grade		
1	269/931 (29)	93%
p-value	< 0.0001	0.00001
2	168/372 (45)	82%
p-value	0.19	0.002
3	149/297 (50)	70%
ER		
Positive	380/986 (38)	87%
p-value	0.12	0.0002
Negative	121/313 (39)	79%
PR		
Positive	317/863 (37)	87%
p-value	0.08	0.007
Negative	184/436 (42)	82%
HER 2		
Positive	87/200 (43)	76%
p-value	0.06	0.0005
Negative	258/702 (37)	93%

1722

Encysted and Solid Papillary Carcinomas of the Breast

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Objective: Encysted and solid papillary carcinomas (PC) of breast make up about 0.5-1% of all breast cancers. There is some lack of consensus within expert pathologists as to the exact nomenclature of these lesions, as well as regards presence and size of invasion. This would obviously create treatment dilemmas for adjuvant treatment. There is only one meta-analysis study of 907 cases recently published concluding that patients with encysted PC having a favorable outcomes. Most other studies have been single institutional studies looking at 40 or fewer cases. The aim of this study was to review current management and treatment outcomes in patient with papillary cancers diagnosed and treated at a single large community hospital.

Methods: This is a retrospective chart review study of 36 patients, diagnosed at our institution with either encysted (n = 28) or solid papillary carcinoma (n = 8), in the period from 2002 to 2010. We have, for purpose of this study, grouped both entities together under a common term "papillary carcinoma (PC)." We arbitrarily classified these patients into three different subgroups: pure papillary carcinoma (PC), PC with adjacent nonpapillary ductal carcinoma in situ (PC-DCIS), and PC with invasive carcinoma (PC-IC). PC-DCIS was put as a separate category as there was DCIS beyond the perimeter of the PC, and we wanted to examine if this affected outcome. The patients groups were statistically analyzed.

Results: In our study, 10 patients had pure PC, 9 had PC-DCIS, and 17 had PC-IC. The mean age at presentation was 67 years (range, 40-92 years). There is a trend toward presenting as palpable mass and a larger size in patients with PC-IC. Twenty-three cases had papillary architecture detectable in the diagnostic biopsy. Nine cases diagnosed as PC without invasion on core biopsy, had IC detected on resection. We had a mean follow-up of 2.81 years (range, 4 months-8 years). All patients underwent either breast conservation surgery and/or mastectomy. Chemotherapy was given to 4 patients only, and 19 patients received radiation following surgery. None of the cases with pure PC had recurrence. One case of PC-DCIS had local recurrence. Two patients of PC-IC had distant metastases, and one additional case had chest wall recurrence.

Conclusions: At our institution, the diagnosis of papillary cancer remains a relatively rare occurrence. The overall findings suggest a favorable prognosis, similar to that reported in literature.

1724

The Effect of Preoperative Breast MRI Use on Mastectomy Rate

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Objective: MRI in the preoperative management of breast cancer has increased dramatically. Coincidently, the rate of mastectomy for breast cancer treatment has also increased. The aim of this study was to evaluate the impact of preoperative MR use on surgical treatment for breast cancer in relation to the publication of the results of ACRIN 6667 in March 2007, the randomized trial supporting preoperative breast MR use.

Methods: A retrospective chart review of all female breast cancer patients diagnosed at our institution between 1/2005 and 5/2008 was performed. Patients were divided into three time periods based on the timing of publication of ACRIN 6667 trial: Pre-MR (1/2005-1/2006), Transition (2/2006-2/2007), and Post-MR (5/2007-5/2008). Breast MR was routinely ordered as part of the preoperative evaluation of breast cancer patients beginning March 2007. Charts were evaluated for demographic data, breast MR use and results, breast cancer characteristics and surgical treatment, including reason for selecting mastectomy. Differences in each time period and between the pre-MR and post-MR time periods were compared using Pearson chi-square and Fisher's exact tests.

Results: Charts were reviewed for 476 patients divided into 130, 181, and 165 in the pre-MR, transition, and post-MR classifications, respectively. There was no difference in patient age, tumor size, AJCC staging, and family history for the three time periods. MR use significantly increased from 20% in the pre-MR group to 70% in the post-MR group ($p < 0.05$). There was no statistically significant change in the initial use of unilateral mastectomy and mastectomy because of positive tumor margins (pre-MR: 18%, 4%; post-MR: 20%, 2%). There was a dramatic increase in use of bilateral mastectomy in the initial treatment of breast cancer with 3% (4) of patients selecting this option in the pre-MR period and 9% (14) in the post-MR period ($p < 0.05$). The most frequent reason for selecting bilateral mastectomy was patient preference (3 patients in the pre-MR group and 10 in the post-MR group). Preoperative breast MR identified four occult contralateral cancers in the post-MR group.

Conclusions: The use of breast MRI in the initial workup of breast cancer patients has markedly increased at our institution. The increase in preoperative breast MR was not associated with a significant increase in unilateral mastectomy or mastectomy because of positive tumor margins. The increase in bilateral mastectomy is secondary to patient preference.

1659

3D-MRI and 3D-CT Mammary Lymphography Can Predict the Sentinel Node Metastasis.

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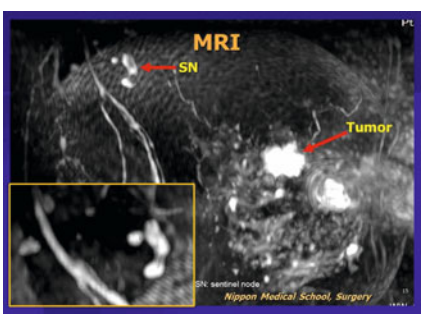
Objective: 3D-CT lymphography (LG) can show the detailed lymphatic network of the breast and the axilla, and can contribute to more accurate sentinel node (SN) biopsy. We reported the effectiveness of SPECT-fused 3D-CT LG for surgery at the last meeting. Now, we applied 3-tesra-MRI to enhance SN and to match with the SN detected by 3D-CT LG. It shows the typical shape of the metastasized lymph node. We tried to predict the SN metastasis before surgery by the enhanced pattern of SN.

Methods: 3D-CT LG was performed to mark SN on the skin before surgery. Above the tumor and near the areola, 2 ml of Iopamidol 300 was injected subcutaneously. Images of CT scan were taken at 1 and 3 min after injection to produce a 3D image of lymph ducts and nodes. The dynamic contrast-enhanced MRI of the breast was performed using 3T MRI by bolus injection of gadolinium. T1-weighted fat-suppressed images were reconstructed to 3D images to show the shape of SN. SN biopsy was performed by dye and RI method using the endoscopic technique. The skin incision was made 1-cm long in the axilla on the marked position.

Results: We have performed 3D-CT LG on 180 patients and evaluated SN in 3D-MRI on 50 patients. The average age was 55.1 years old. The average tumor size was 2.4 cm. The average sampled number of SN was 2.3. SN metastasis was observed on 16 patients and not on 34 patients. Only sentinel node metastasis was on 10 patients (62.5%). There was no false-negative study. We performed mastectomy on 8 patients, and the video-assisted breast-conserving surgery on 42 patients. The comparison of 3D-CT LG and 3D-MRI shows the incompatible enhancement on 18 patients. Eight were metastasized among them. The enhanced shapes of SN were classified to three patterns. Whole enhanced pattern was observed on 34, partial enhanced pattern was on 10, and nonenhanced pattern was on 6. 3D-MRI was more sensitive to metastasis by the differentiation of the enhanced patterns of SN. 3D-MRI with 3D-CT LG will become to be more predictive for metastasis than only 3D-CT LG.

Conclusions: 3D-MRI can show the sensitive enhancement of SN guided with 3D-CT LG. The precisely detected SN of 3D-CT LG will be predictable for metastasis by the incompatibility of the enhanced pattern of SN with 3D-MRI. They will help the accurate SN biopsy and will be the indication tools to decide the axillary surgery: SN biopsy or axillary preservation.



1694

Modified Round Block Technique for Breast-Conserving Surgery

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Objective: In breast-conserving surgery (BCS), periareolar incisions are frequently employed for superior aesthetic outcomes. However, it is usually difficult to access distant located tumors from the areola, and also difficult to resect a tumor when a size of the areola is small. We developed round block technique as those countermeasures, and report our experience of BCS using new modified round block technique (MRBT).

Methods: A circumferential periareolar incision was made along the outer wedge of the areola, and deep subcutaneous dissection was extended to the entire breast. The nipple areola complex (NAC) was completely detached from the sounding skin flap. The round wound was widen by being applied a wound retractor, and could be moved over the distant tumor location because the skin flap was widely separated from the breast parenchyma. Then the lesion around the tumor was well visualized, and wide excision was easily performed directly beneath the wound. Partial mastectomy defect was also easily repaired by mobilizing and suturing the well-dissected surrounding breast parenchyma.

Results: Twenty cases of BCS with MRBT were performed during a 24-month period. All patients have small to medium breasts. The mean size of the areola was 3.5 cm in diameter, and eight patients have the smaller areolas less than 3 cm in diameter. The mean tumor size was 2.3 cm, and the mean distance between the nipple and the tumor was 6.0 cm. Morbidity included only one postoperative hematoma treated conservatively. Cosmetic results were mostly satisfactory with minimal scar formation around the NAC. There is one positive margin, and no local recurrence so far.

Conclusions: Although a follow-up period is short, MRBT may be useful and easy technique in BCS for patients who have distant located tumors from the NAC, or who have small areolas.