2022 ANNUAL MEETING

OFFICIAL PROCEEDINGS, Volume XXIII

Scientific Session Abstracts

Scientific Session Awards

Abstracts presented at the Society's virtual scientific session will be considered for the following awards:

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

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

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

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

- The **Best Poster Award** recognizes the best poster presentation in the top ten poster category. The recipient of the award, selected by audience vote, is honored with a plaque.

All awards are supported by The American Society of Breast Surgeons Foundation.

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Contents

Scientific Oral Presentations I

Friday, April 8, 2022 2:30 pm–3:45 pm
Moderators: Sarah Blair, MD, FACS; Elizabeth Shaughnessy, MD, PhD, FACS, FSSO

1148608 - Oncotype Dx scores and nodal status in patients over 70 years old – Continue to Choose Wisely

Kyra Nicholson[1], Anna Chichura[2], Kristine Kuchta[3], Catherine Pesce[1], Katherine Kopkash[1], Katharine Yao[3]
[1]NorthShore University HealthSystem & University of Chicago, Evanston, IL, [2]University Of Chicago, Chicago, IL, [3]NorthShore University HealthSystem, Evanston, IL

Background/Objective: According to Choosing Wisely Guidelines, women ≥70 years old with clinically node-negative, hormone receptor-positive (HR+) American Joint Committee on Cancer (AJCC) clinical Stage I breast cancer do not need axillary sentinel node biopsy routinely. However, some clinicians may want nodal staging information for adjuvant therapy decisions. The Oncotype Dx breast recurrence score was developed to assess the need for adjuvant chemotherapy in addition to hormonal therapy. The objective of this study was to examine the distribution of the Oncotype Dx breast recurrence scores in women ≥70 years old with HR+ AJCC clinical Stage I breast cancers and identify clinical factors associated with a high recurrence score in this patient population.

Methods: Using the National Cancer Database, we examined patients ≥70 years old treated for HR+, HER2- breast cancers from 2010-2018. We dichotomized the Oncotype Dx scores into <26 and ≥26 based on prospective studies demonstrating benefit for adjuvant chemotherapy for scores ≥26 in this patient population. We compared the distribution of Oncotype scores between pathologically node-positive and node-negative patients. Multivariable logistic regression adjusting for patient and tumor and factors was used to determine factors associated with an Oncotype Dx score ≥26 for pathologically node-negative and node-positive patients.

Results: Of 28,338 patients, 5,640 (19.9%) were node-positive, and 22,698 (80.1%) were node-negative on pathology. Overall, the proportion of patients with an Oncotype Dx score ≥26 was 3,330 (13.1%) for node-negative patients and 740 (14.7%) for node-positive patients. Between 2010 and 2018, the proportion of patients with Oncotype Dx scores ≥26 remained stable at 13.1% in 2010 and 13.5% in 2018 but decreased from 20.0% in 2010 to 15.2% in 2018 for node-positive patients. The strongest independent factor associated with an Oncotype Dx score ≥26 was tumor grade 3 for both node-positive (OR 12.71 [95% CI 9.27-17.44], p<0.0001) and node-negative (OR 18.00 [95% CI 15.57-20.81], p<0.0001) patients (Table). The second strongest factor was negative progesterone receptor status (OR 6.20 [95% CI 4.98-7.71, p<0.0001] node positive vs. OR 7.19 [95% CI 6.51-7.93, p<0.0001] node-negative). Patients with larger tumors (>2cm) and those on Medicaid were also more likely to have an Oncotype DX score ≥26. Hispanic patients were less likely to have an Oncotype DX score ≥26 compared to other minority patients (Black and Asian), (OR 0.65 [95% CI 0.38-1.09, p 0.1038] Hispanic vs (OR 1.01 [95% CI 0.74-1.39, p 0.1593] Black vs (OR 0.86 [95% CI 0.50-1.49, p 0.5951] Asian node-positive patients.

Conclusions: A similar proportion of women ≥ 70 with AJCC Stage I HR+, HER2- breast cancer have Oncotype DX scores ≥26 regardless of their nodal status. These findings suggest that sentinel node

biopsy may not be helpful for adjuvant chemotherapy decisions in this patient population, but certain tumor factors may be more helpful.

Table. Oncotype Dx scores and nodal status in patients over 70 years old – Continue to Choose Wisely

	Node Positive		**Node Negative**	
	OR (95% CI)	p-value	OR (95% CI)	p-value
Age, per year increase	1.02 (0.99-1.04)	0.1593	1.01 (1.00-1.02)	0.0916
Race				
Black vs. White	1.01 (0.74-1.39)	0.9317	1.04 (0.89-1.22)	0.6214
Hispanic vs. White	0.65 (0.38-1.09)	0.1038	0.76 (0.59-0.98)	**0.0337**
Asian/Pacific Islander vs. White	0.86 (0.50-1.49)	0.5951	0.83 (0.63-1.11)	0.2200
Other/Unknown vs. White	0.88 (0.40-1.92)	0.7435	0.92 (0.62-1.36)	0.6771
Insurance				
Medicare vs. Private	1.29 (0.94-1.79)	0.1157	0.96 (0.83-1.10)	0.5456
Medicaid/Other Government vs. Private	1.67 (0.86-3.24)	0.1270	1.45 (1.04-2.03)	**0.0279**
Unknown/Uninsured vs. Private	0.88 (0.34-2.26)	0.7940	0.70 (0.45-1.09)	0.1179
Tumor Grade				
2 vs. 1	2.15 (1.59-2.91)	**<.0001**	2.64 (2.30-3.02)	**<.0001**
3 vs. 1	12.71 (9.27-17.44)	**<.0001**	18.00 (15.57-20.81)	**<.0001**
Unknown vs. 1	3.57 (2.16-5.91)	**<.0001**	2.09 (1.55-2.82)	**<.0001**
Tumor Size, ≥ 2 cm vs. < 2 cm	1.64 (1.38-1.96)	**<.0001**	1.11 (1.01-1.21)	**0.0237**
PR Status, Negative vs. Positive	6.20 (4.98-7.71)	**<.0001**	7.19 (6.51-7.93)	**<.0001**

1148238 - Margin management and adjuvant therapy for phyllodes tumors: Practice patterns of the American Society of Breast Surgeons members

Emilia Diego, MD[1], Laura Rosenberger[2], Kandace McGuire[3]
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Background/Objective: Phyllodes tumors (PT) are rare breast neoplasms, categorized as benign, borderline, or malignant, with variable clinical behavior. Histologic overlap exists with fibroadenomas, and diagnosis is often confirmed after excision. Consensus guidelines for management generally encompass all subtypes of PT without consideration for differences in recurrence patterns. We intended to characterize contemporary practice patterns of surgeons for all PT subtypes.

Methods: A 21-question online survey was sent to practicing ASBrS members in the United States. Demographics, practice type, and percentage of dedicated breast work were collected. Survey questions included practice patterns surrounding margin status and re-excision, axillary staging, radiation, and surveillance. Results were summarized and reported.

Results: The survey response rate was 18% with 493 respondents: 45% with no fellowship training and 44% with accredited breast or surgical oncology fellowship training. Most respondents (66%) are "breast-only" surgeons, 30% practicing in academia, and 43% have been practicing for >20 years. The majority of surgeons (66.6%) perform >150 breast procedures/year. Respondents reported a surgical margin INTENT of 25% enucleation, 31% 1-2mm, 32% 2-10mm, and 12% >10mm when they had clinical

suspicion for phyllodes tumor (but no tissue diagnosis) vs. 18% enucleation, 32% 1-2mm, 34% 2-10mm, 16% >10mm, when core biopsy suggested PT. For benign PT, most (52%) surgeons responded they would accept a final surgical margin of <1mm, although only 47% stated they would re-excise a positive margin. There were 84% who responded they would never refer a patient with benign PT for radiation therapy (Table). The majority of surgeons (83%) follow benign PT with a clinical breast exam and/or imaging for up to 5 years. For borderline/malignant PT with positive margins, 72% aim for widely negative (5-10mm). There were 96% of respondents who stated they would re-excise a positive margin for a borderline/malignant PT. Only 10% of surgeons would never refer a patient with borderline/malignant PT for radiation (Table). Nearly all surgeons (97%) follow borderline/malignant PT with a clinical breast exam and/or imaging for up to 5 years. Axillary staging is not performed by 97% of respondents for any PT and performed by 2% of respondents for malignant PT only.

Conclusions: This study demonstrates wide variability in practice among US surgeons managing PT. Thresholds for margin width, decision to re-excise, referral for radiation, and follow-up is proportionally higher in borderline /malignant PT compared to benign PT. This variability in practice suggests a need for more specific guidelines for PT based upon histologic subtype.

Table. Final margin comfort and radiation referral patterns by histologic subtype of phyllodes tumors

	Benign Respondents	Borderline/Malignant Respondents
Acceptable Final Margin Status	N (%)	N (%)
Positive	89 (19%)	17 (4%)
<1mm	247 (52%)	115 (24%)
2-5mm	107 (22%)	0 (0%)
5-10mm	33 (7%)	343 (72%)
Positive Margin Management		
Re-excision	227 (47%)	458 (96%)
No re-excision	248 (53%)	17 (4%)
Radiation Referral		
Never	395 (84%)	46 (10%)
If tumor board recommends	93 (20%)	169 (36%)
If final margin positive	20 (4%)	63 (13%)
If treated with breast conservation	N/A	121 (26%)
Always	6 (1%)	151 (32%)

1138938 - Text-based intervention increases mammography uptake among overdue patients at an urban safety-net hospital

Asha Nanda[1], Kayla Reifel[1], Melissa Mann[2], Miranda Lyman-Hager[2], Kelly Overman[1], An-Lin Cheng[1], Jill Moormeier[1], Nasim Ahmadiyeh[1]
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Background/Objective: We have previously shown that patients diagnosed and treated with breast cancer at our urban safety-net hospital (SNH) are significantly more likely to be diagnosed at later stages, and that this late-stage-at-diagnosis is associated with lack of screening mammogram. We further showed that a 2-part intervention - phone call and assistance with scheduling - significantly increased mammography uptake by 12% among our safety-net population, and showed scheduling to be critical to mammography uptake, with phone calls alone (without scheduling) being no better than usual care. Implementing this finding system-wide proved challenging and resource heavy. Prior studies have shown success with text messaging in increasing mammography uptake among low-income populations, but none evaluated the utility of scheduling by text. Here, we seek to determine whether a text-based intervention with reminder and scheduling components could increase mammography uptake at 3 months compared with usual care. Secondary outcome measures include whether uptake differed by type of text (specific vs. open-ended scheduling prompts), rate of interaction with the platform, rate of scheduling, compliance with scheduling, and whether outcomes differed by clinic.

Methods: A randomized controlled study included 843 women aged 50-65 who had not had a screening or diagnostic mammogram in the past 2 years but had established care at a primary care clinic within our SNH. One-third of the participants were randomly assigned to each of the following groups: intervention 1 (text reminder with specific scheduling options), intervention 2 (text reminder with open-ended scheduling options), and usual-care control. Participants in both intervention groups could engage in 2-way texting, and up to 3 texts were sent to each patient. Differences in percent mammography uptake at 3 months were compared between intervention and control groups using a two-tailed chi-square.

Results: Patients receiving a text-based reminder and scheduling opportunity were significantly more likely to get mammograms within 3 months than those in the usual care control group (10.2% and 6.2%, respectively; chi2 = 5.6279, $p<0.017$). Within our safety-net population, 14.8% of participants responded to text message. There were 9% of participants who scheduled an appointment for mammogram via text, of which 63% received mammogram. Lastly, mammography compliance did not differ by type of scheduling offered (specific vs general) or by primary care clinic.

Conclusions: Reminders and scheduling through 2-way text-messaging is effective in increasing mammography uptake among primary care clinic patients in an urban safety-net setting. Compliance increased significantly if the patient responding to text scheduled an appointment at that time. Thus, scheduling was a key feature in the overall success of the intervention. This text-based intervention reduces the burden on human resources that a phone-based intervention requires. However, it is less effective than phone-based intervention in this safety-net population (4% absolute increase vs. 12% absolute increase, respectively). The safety-net is a diverse and hard-to-reach population; it likely requires a more complex and personalized approach to increasing mammography uptake. Future studies will be directed to combine different types of interventions to design a multi-pronged approach that is tailored to this population with unique needs.

1148196 - Economic impact of reducing re-excision rates after breast-conserving surgery in a large, integrated health system

Jeffery Chakedis[1], Annie Tang[2], Alison Savitz[3], Liisa Lyon[4], Patricia Palacios[5], Benjamin Raber[6], Brooke Vuong[6], Maihgan Kavanagh[6], Gillian Kuehner[6], Sharon Chang[6]
[1]The Permanente Medical Group, Lafayette, CA, [2]Department of Surgery, University of California San Francisco, East Bay - Highland Hospital, Oakland, CA, [3]The Permanente Medical Group, Walnut Creek, CA, [4]Kaiser Permanente Division of Research, Oakland, CA, [5]Enterprise Business Services Kaiser Foundation Health Plan, Oakland, CA, [6]The Permanente Medical Group, Oakland, CA

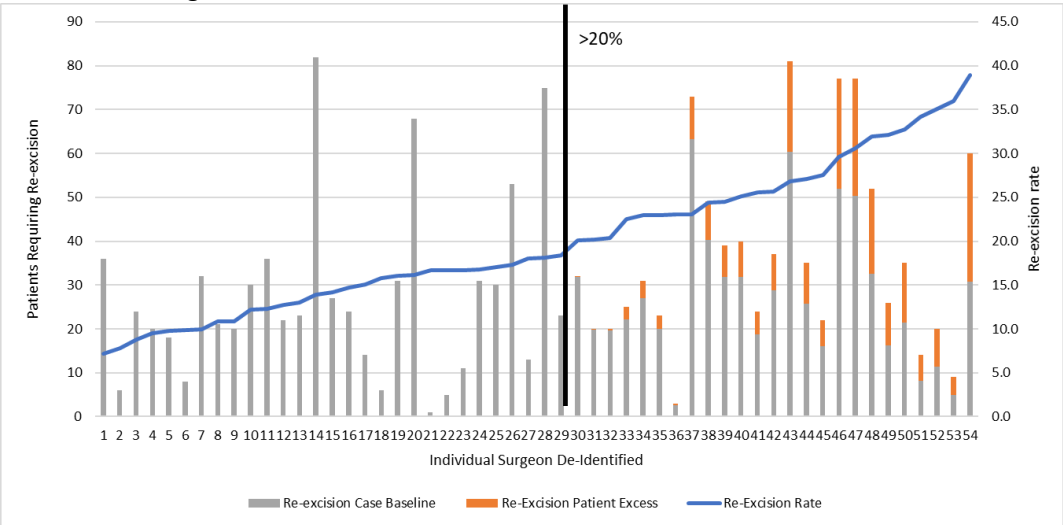
Background/Objective: Re-excision after breast-conserving surgery (BCS) is costly for patients and the health care system, but high-level data capturing these costs are limited. A toolbox of methods for reducing re-excision rates have previously been implemented by the American Society of Breast Surgeons. We quantified the association of re-excision after BCS with both direct operating room (OR) costs and utilization of OR time to model expected savings of a re-excision reduction initiative.

Methods: Using institutional databases and the electronic medical record, we performed a retrospective cohort review of all breast cancer patients with BCS between January 1, 2016 and December 31, 2020. Re-excision was defined as an ipsilateral breast operation within 6 months after initial BCS and included both margin re-excision and completion mastectomy. Operating room costs of disposable supplies and implants as well as operative time were calculated. A model was created to simulate a quality improvement program that would decrease the re-excision rate of all surgeons to 20%.

Results: Over the 5-year period, 8,804 patients were treated with BCS, and 1,628 (18.5%) required re-excision. The patients who required re-excision compared to those who did not were similar in age (61 vs. 64 years, p<0.001) but were more likely to have ductal carcinoma in situ (23.7% vs. 15.2%, p<0.001) and had larger tumors (T1+T2 73.2% vs. 83.1%, p<0.001). The 1,828 re-excision procedures included 1,434 (78%) margin re-excisions and 394 (22%) mastectomies. Re-excision costs represented 39% of total OR costs (re-excision -$1,762,193, all procedures - $4,506,519). The cost per patient to complete breast surgery was 4-fold higher for patients requiring re-excision ($1,374 vs. $316, p=0.001). The additional OR costs for margin re-excision ($503, 42% increase) and mastectomy without reconstruction ($657, 125% increase) were lower compared to mastectomy with reconstruction ($8,447, 29x increase). Operative times for the initial lumpectomy were longer in cases that required re-excision (77 vs. 72 minutes, p<0.001). Re-excision operations totaled 1,848 hours and comprised 14% of total OR time (13,030 hours). Margin re-excision were an average 41 minutes (n= 1434) and an average 132 minutes (n=394) for each re-excision mastectomy. The re-excision rate for 54 surgeons varied from 7.2%-39.0%, with 46% (n=25) having a re-excision rate over 20%. Surgeon-specific average costs for each operation varied (BCS $108-$726 and re-excision $116-$4,817) however, and were not associated with surgeon re-excision rates. A model to simulate improving re-excision rates to less than 20% for all surgeons yielded an improved average re-excision rate of 16.2% and would save 236 patients a re-excision. This model predicted a decrease in re-excision operations by 18% (327 operations), OR costs by 14% ($287,534), and OR time by 11% (204 hours).

Conclusions: Re-excision after BCS represents 39% of direct OR costs and 14% of OR time, which has a significant impact on health system economics. Our health system has initiated a margin re-excision reduction project utilizing routine cavity shave margins. Modest reductions in surgeon re-excision rates may lead to significant OR cost and time savings.

Figure. A model depicting individual surgeon re-excision rate and re-excision operations saved by lowering rate to 20% for all surgeons



1147919 - Breast-specific sensuality in breast cancer survivors: Sexually active or not

Hannah Peifer[1], Christina Raker[2], Sarah Pesek[3], David Edmonson[2], Ashley Stuckey[2], Jennifer Gass[2]
[1]Alpert Medical School of Brown University, Boston, MA, [2]Women and Infants Hospital, Providence, RI, [3]St. Peter's Hospital, St. Peter's Health Partners Medical Associates, Albany, NY,

Background/Objective: Sexual dysfunction is well described in breast cancer survivors. The Female Sexual Function Index (FSFI) is one of the most utilized measures of female sexual function. The FSFI scoring system is not validated in women who have been sexually inactive for 4 weeks. Given sexual intimacy extends beyond the evaluable FSFI domains, we sought to better understand breast-specific sensuality (BSS) in breast cancer survivors who are sexually inactive.

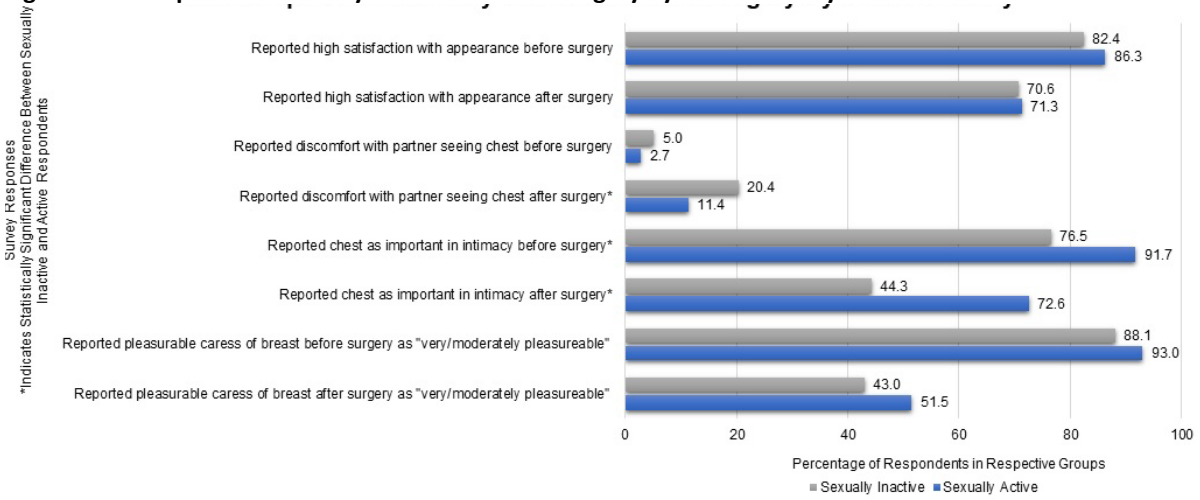
Methods: We surveyed a convenience sample of breast cancer survivors between 2014 and 2016 during routine cancer surveillance appointments. The anonymous cross-sectional survey included the FSFI and demographic and treatment history questions. Sexual inactivity was defined as no sexual activity in the 4 weeks prior to survey completion. Categorical data was analyzed with Fisher's exact test. Multiple logistic regression adjusted for age and menopausal status. Firth's bias correction accommodated sparse data. Penalized likelihood 95% confidence intervals were calculated. BSS questions were categorized using 3- and 5-point Likert scales.

Results: Demographics and treatment history: Of 585 respondents, most were between ages 40 and 70, with 305 (53.1%) age 40 to 59 and 241 (42.0%) age 60 to 79 at survey completion. Of these respondents, 427 (73.0%) were post-menopausal, 285 (48.7%) were sexually inactive, and 300 (51.3%) were sexually active. Sexual inactivity was associated with increased age ($p<0.001$). Most respondents, 406 (69.4%), underwent lumpectomy, and 179 (30.6%) underwent mastectomy with most having reconstruction, n=129 (72.1%) versus no reconstruction, n=50 (27.9%). Radiation therapy was reported by 450 (77.3%), 276 (47.2%) reported having received chemotherapy, and 313 (54.7%) reported oral endocrine therapy use. Breast-specific sensuality: Favorable post-treatment appearance satisfaction was reported by most

respondents, n=413 (71.0%) with no significant difference between sexually inactive and active respondents. While there was no significant difference reported between sexually inactive and active respondents prior to surgery, sexually inactive respondents were more likely to score discomfort with partner seeing their chest after surgery compared to sexually active respondents, 41 (20.4%) versus 34 (11.4%) respectively ($p = 0.002$). Still, both sexually inactive and sexually active respondents reported that their chest was important in intimacy after surgery but at significantly different rates, 117 (44.3%) and 217 (72.6%), respectively ($p < 0.001$). Finally, sexually inactive or active, 176 (53.0%) respondents rated that the pleasurable caress of the breast was the same before and after treatment, and 152 (45.8%) respondents rated the pleasurable caress of the breast as worse after treatment (less pleasurable).

Conclusions: Even after adjusting for age and menopausal status, there was a significant positive correlation between sexual inactivity and discomfort being seen undressed by one's partner after surgery. More than half of all respondents, including more than 40% of sexually inactive respondents, reported that their chest was important in intimacy after surgery. Our findings suggest that BSS is important to survivors, regardless of whether they report being sexually active. Further, intimacy extends beyond the domains captured in the FSFI. The important role of breasts in sexual function and intimacy merits the attention of researchers and surgeons.

Figure. Breast-specific sensuality before and after surgery by sexual activity



1148301 - Survival outcomes in patients following locoregional treatment for DCIS: Analysis of the NCDB DCIS Special Study cohort

Sabrina Wang[1], Yi Ren[2], Terry Hsylop[2], Thomas Lynch[3], Marc Ryser[4], Amanda Francescatti[5], Anne McCarthy[5], Shelley Hwang[6]
[1]Duke University School of Medicine, Durham, NC, [2]Duke University Medical Center Department of Biostatistics and Bioinformatics, Duke Cancer Institute, Durham, NC, [3]Department of Surgery, Duke University Medical Center, Durham, NC, [4]Department of Population Health Sciences, Department of Mathematics, Duke University, Durham, NC, [5]American College of Surgeons, Chicago, IL, [6]Duke University, Durham, NC

Background/Objective: Ductal carcinoma in situ (DCIS) is a preinvasive diagnosis for which breast conserving surgery (BCS), breast conserving surgery with adjuvant radiation (BCS+RT), and mastectomy are all approved to be guideline-concordant locoregional treatments. BCS without RT has been the least utilized treatment, due in part to concerns regarding potential reduction in breast cancer mortality with this option. Survival endpoints for DCIS have largely been reported from national cancer registries, with important limitations inherent in incomplete or inaccurate data collection. To address these issues, we partnered with the American College of Surgeons Commission on Cancer (CoC) to use primary source documentation as the definitive data source at each site, in order to compare survival outcomes in patients treated for DCIS.

Methods: In this CoC Special Study, a treatment-stratified random sample of patients diagnosed with screen-detected DCIS was selected from the National Cancer Database (NCDB) at 1,330 CoC accredited facilities. A CoC registrar at each site reviewed the original source documentation for each case, for up to 20 cases per site. Detailed diagnosis, treatment, pathology, and follow up information were abstracted and centrally collected. Differences between treatment groups were assessed using the Chi-square test or Kruskal-Wallis test for categorical or continuous variables, respectively. After inverse probability weighting (IPW), a Cox Proportional Hazards model was used to estimate the differences in breast cancer mortality and overall mortality between BCS, BCS+RT, and mastectomy groups.

Results: The final study cohort included 18,983 patients diagnosed with biopsy-confirmed DCIS between 2008 and 2014. Locoregional treatment for DCIS consisted of BCS alone (n=4,236; 22.4%), BCS-RT (n=10,051; 52.9%), or mastectomy (n=4,696; 24.7%). Significant differences between treatment groups included age ($p<0.001$), race ($p=0.0011$), DCIS grade ($p<0.001$), Charlson comorbidity ($p<0.0001$), hormone receptor status ($p<0.001$), use of endocrine therapy ($p<0.001$), insurance ($p<0.001$), facility type and location ($p<0.0001$), and DCIS detection method ($p<0.0001$), and comedonecrosis ($p<0.0001$). After IPW of variables, a multivariable analysis showed overall survival to be best in BCS+RT [BCS HR 3.38 (2.79-4.09); mastectomy HR 1.39 (1.13 -1.72)]. Importantly however, the multivariable analysis showed no significant differences in breast cancer mortality between treatment groups when compared to BCS+RT [BCS HR 1.87 (0.57-6.10); mastectomy HR 2.60 (0.93 -7.27)].

Conclusions: In a large, well curated dataset of patients treated for DCIS, we found no difference in breast cancer mortality between women treated with BCS, BCS-RT or mastectomy. These results should provide confidence in offering individualized locoregional treatment, including BCS alone, without fear of compromising breast cancer survival.

Scientific Oral Presentations II

Saturday, April 9, 2022 1:45 pm – 3:00 pm
Moderators: Oluwadamilola "Lola" Fayanju, MD, MA, MPHS, FACS; Mediget Teshome, MD, MPH, FACS

1146997 - Nodal pathologic complete response rates in luminal breast cancer vary by genomic risk and age

Judy Boughey, Tanya Hoskin, Courtney Day, Matthew Goetz
Mayo Clinic, Rochester, MN

Background/Objective: Chemotherapy is a standard administered in the neoadjuvant setting (NAC) for triple-negative breast cancer (TNBC) and HER2+ breast cancer. However, for hormone receptor-positive, HER2-negative (HR+, HER2-) breast cancer, chemotherapy decision-making is mostly deferred until after surgery, and decisions are based on multi-gene tests. While a major advantage of NAC is downstaging of axillary disease to permit omission of axillary lymph node dissection, nodal pathologic complete response (pCR) rates are much lower for HR+/HER2- (HR+, HER2-) breast cancer compared to TNBC and HER2-positive (HER2+) breast cancer. The goal of this study was to evaluate the association of genomic risk with nodal pCR in HR+, HER2- breast cancer patients treated with NAC.

Methods: The National Cancer Database was queried to identify all patients with HR+, HER2- node-positive breast cancer (Stage I-III) treated with NAC followed by surgery between 2010 and 2018. Low genomic risk patients were classified as OncotypeDx Recurrence Score from 0-25 or OncotypeDx category coded as Low Risk, or Mammaprint risk category coded as Low. High genomic risk included patients with OncotypeDx Recurrence Score >25, OncotypeDx category coded as High Risk, or Mammaprint risk category coded as High. Patients with a tumor coded as Intermediate Risk (without a numeric OncotypeDx Recurrence Score) were excluded since we could not assign them as 0-25 vs >25. Rates of nodal pCR were evaluated by low versus high genomic risk and compared using chi-square tests.

Results: Of 15,566 patients with Stage I-III HR+/HER2- cN+ breast cancer treated with NAC during 2010-2018, genomic risk testing was performed and classification available on 681/15,566 (4.4%). The percent of patients with high genomic risk was similar between patients age<50 vs 50+ (51.5% vs 57.0%, p=0.17). Nodal pCR was higher in patients with high genomic risk (25.1%) compared to those with low genomic risk (10.3%, p<0.001) overall. This higher nodal pCR rate with high genomic risk was seen both in those age<50 and age 50+ considered separately (each p<0.01), and was most striking in patients age <50 with nodal pCR rate of 29.9% in those with high genomic risk, compared to 9.2% in those with low genomic risk (p<0.001). Rate of breast pCR were also significantly higher with high genomic risk compared to low genomic risk.

Conclusions: For patients with HR+, HER2- breast cancer treated with NAC, nodal downstaging was most likely in younger patients with tumor with high genomic risk. In contrast, nodal pCR rates were low in patients with low genomic risk tumors, regardless of age. Patients with low genomic risk tumors are unlikely to have negative nodes on sentinel node surgery/targeted axillary dissection, and thus omission

of axillary dissection due to eradication of disease is unlikely. This information can be helpful in preoperative counselling for patients regarding axillary management.

Table. Nodal and breast and overall pathologic complete response rates by genomic risk and patient age

	All patients	All ages			Age<50			Age ≥ 50		
	N=15,566	Genomic Risk Not Assessed	Genomic Risk Low	Genomic Risk High	Genomic Risk Not Assessed	Genomic Risk Low	Genomic Risk High	Genomic Risk Not Assessed	Genomic Risk Low	Genomic Risk High
Nodal pCR										
No	11,595 (78.2%)	11,065 (78.0%)	262 (89.7%)	268 (74.9%)	4,267 (74.5%)	99 (90.8%)	82 (70.1%)	6,798 (80.4%)	163 (89.1%)	186 (77.2%)
Yes	3,232 (21.8%)	3,112 (22.0%)	30 (10.3%)	90 (25.1%)	1,457 (25.5%)	10 (9.2%)	35 (29.9%)	1,655 (19.6%)	20 (10.9%)	55 (22.8%)
Missing	739	708	14	17	282	NR	NR	426	NR	11
Breast pCR										
No	12,968 (88.9%)	12,374 (88.7%)	284 (96.9%)	310 (87.8%)	4,843 (86.3%)	102 (94.4%)	96 (84.2%)	7,531 (90.4%)	182 (98.4%)	214 (89.5%)
Yes	1,624 (11.1%)	1,572 (11.3%)	NR (3.1%)	43 (12.2%)	769 (13.7%)	NR (5.6%)	18 (15.8%)	803 (9.6%)	NR (1.6%)	25 (10.5%)
Missing	974	939	13	22	394	NR	NR	545	NR	13
Nodal and Breast pCR										
No	13,749 (92.8%)	13,131 (92.7%)	289 (98.6%)	329 (91.6%)	5,174 (90.8%)	107 (99.1%)	104 (88.9%)	7,957 (94.1%)	182 (98.4%)	225 (93.0%)
Yes	1,062 (7.2%)	1,028 (7.3%)	NR (1.4%)	30 (8.4%)	527 (9.2%)	NR (0.9%)	13 (11.1%)	501 (5.9%)	NR (1.6%)	17 (7.0%)
Missing	755	726	13	16	305	NR	NR	421	NR	10

NR=not reported per NCDB data use agreement which prohibits reporting cell counts with<10 patients

1147147 - Is nodal clipping beneficial for patients receiving neoadjuvant chemotherapy?

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Background/Objective: Prospective multicenter studies have demonstrated false-negative rates of <10% for sentinel lymph node biopsy (SLNB) performed after neoadjuvant chemotherapy (NAC) when ≥3 sentinel lymph nodes (SLNs) are retrieved. In spite of this, nodal clipping has become routine based on reports showing that the cancer-containing clipped node is not a SLN 23-35% of the time. However, the added value of retrieving the clipped node when ≥3 SLNs are removed is unknown. We sought to determine how often the clipped node is a SLN when dual tracer is used and ≥3 SLNs are retrieved.

Methods: From 2017-2021, we identified patients with cT1-3N1 breast cancer with a clipped metastatic lymph node (LN) rendered cN0 with NAC. SLNB was performed with a standardized approach of dual tracer mapping and retrieval of ≥3 SLNs. X-rays of the SLNs were obtained intra-operatively to determine the location of the clip. In cases of residual nodal disease or retrieval of <3 SLNs, axillary lymph node dissection (ALND) was performed. Failure to retrieve the clipped node did not impact surgical decision-making. Clinicopathological features associated with the clipped node being a SLN were examined using Wilcoxon rank-sum test, Chi square, or Fisher's exact tests.

Results: A total of 269 patients with a nodal clip were included; 251 (93.3%) had ≥3 SLNs identified and represent our study cohort. Median age was 51 years, the majority (92%) had ductal histology, and 46% were HR+HER2-. The median number of sentinel nodes removed was 4 (IQR 3-5). Overall, the clipped

node was retrieved in 92.8% (233/251) of cases. The clipped node was a sentinel node in 88% (220/251) of cases. Of these cases, 55% (121/220) had ≥1 positive LN. In 40 cases in which only 1 positive SLN was found, 35 had the clipped SLN as the positive node, 3 patients had a positive SLN that was not the clipped node, and in 2 patients, the pathology report did not specify the clip location. Of the 31 cases in which the clipped node was not a SLN, 13/31 (42%) patients had a positive SLN mandating ALND, and the clip was identified in the ALND specimen. In the remaining 18/31 (58%) cases, where ≥3 negative SLNs were retrieved and an ALND was not performed, the clip was not retrieved. There have been no axillary failures in this group at a median follow-up of 17.5 months. There were no clinicopathologic features associated with failure to retrieve the clipped node during the SLN procedure (Table).

Conclusions: When the SLNB procedure is optimized with dual tracer and retrieval of ≥3 SLNs, and ALND is performed when clinically indicated, the clipped node is recovered in 92% of cases, suggesting that nodal clipping and localization, procedures which are uncomfortable for patients and increase costs, are unlikely to change outcomes and can be avoided.

Table. Clinicopathological characteristics

	Overall cohort (n=251)	**Clip in the sentinel node** (n=220)	**Clip not in the sentinel node** (n=31)	**P-value**
Age, years	51 (41,58)	50 (41, 59)	53 (42, 57)	0.7
BMI, Kg/m^2	27 (23, 31)	27 (23, 31)	26 (21, 30)	0.3
Clinical T stage at presentation				0.8
1	54 (22)	49 (22)	5 (16)	
2	135 (54)	118 (54)	17 (55)	
3	55 (22)	47 (21)	8 (26)	
X	7 (2.8)	6 (2.7)	1 (3.2)	
Palpable node at presentation				0.3
Yes	191 (76)	170 (77)	21 (68)	
Borderline	6 (2.4)	6 (2.7)	0 (0)	
no	54 (22)	44 (20)	10 (32)	
Number of abnormal nodes on ultrasound at presentation				0.8
1	168 (67%)	146 (66)	22 (71)	
≥ 2	83 (33%)	74 (34)	9 (29)	
Type of surgery				0.2
Mastectomy	133 (53)	113 (51)	20 (65)	
BCT	111(44)	101 (46)	10 (32)	
No breast surgery	7 (2.8)	6 (2.7)	1 (3.2)	
Number of sentinel nodes removed	4 (3,5)	4 (3,5)	4 (3,5)	0.8
ypN stage				0.3
0	117 (47)	99 (45)	18 (58)	
1	91 (36)	84 (38)	7 (23)	
2	32 (13)	28 (13)	4 (13)	
3	11 (4.4)	9 (4.1)	2 (6.5)	
Breast pCR[†]				0.8
yes	81 (33)	72 (34)	9 (30)	
LVI[††]				0.2
yes	82 (33)	68 (31)	14 (45)	
Histology				0.6
Ductal	231 (92)	201 (91)	30 (97)	
Lobular or mixed	11 (4.4)	11 (5)	0 (0)	
Other	9 (3.6)	8 (3.6)	8 (3.6)	
Differentiation				0.9
Well	1 (0.4)	1 (0.5)	0 (0)	
Moderately	77 (31)	67 (31)	10 (33)	
Poorly	168 (68)	148 (69)	20 (67)	
Unknown	5	4	1	
Subtype				0.8
HR+HER2-	116 (46)	100 (45)	16 (52)	
HER2+	83 (33)	74 (34)	9 (29)	
HR-HER2-	52 (21)	46 (21)	6 (19)	

Frequency (row percent) reported for categorical variables and median (IQR) reported for continuous variables.
[†] Applies to non-occult cases only
[††] LVI was present on core biopsy or final pathology

1148226 - Intervention to hepatic and pulmonary METastases in breast cancer patients: Prospective, multi-institutional registry study-IMET; Protocol MF 14-02

Atilla Soran[1], Serdar Ozbas[2], Beyza Ozcinar[3], Arda Isik[4], Lutfi Dogan[5], Kazim Senol[6], Ahmet Dag[7], Hasan Karanlik[8], Ozgur Aytac[9], Guldeniz Karadeniz Cakmak[10], Kubilay Dalci[11], Mutlu Dogan[5], Yavuz Atakan Sezer[12], Mustafa Sehsuvar Gokgoz[6], Enis Ozyar[13], Efe Sezgin[14], Breast Health Working Group International.

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Background/Objective: One-fourth of early-stage breast cancer (BC) becomes metastatic at follow-up. Limited metastases represents a clinical state of metastatic disease that is limited in the number of metastatic sites and extent of disease, and amenable to metastasis-directed intervention. The aim of this prospective study is to evaluate intervention to limited metastases in lung and/or liver.

Methods: Luminal A/B and/or HER-2 neu (+) patients with operable lung and/or liver metastases in follow-up after primary BC treatment is completed, and patients who were diagnosed with metastasis after 2014 were included in the study. Demographic, clinical, tumor-specific data, and metastasis detection-free interval (MDFI) were collected. Bone metastasis, in addition to lung and liver metastases, were also included the analysis. Patients were divided into 2 groups according to the treatment modality to metastases - either systemic therapy only (ST) or intervention (IT). The characteristics of the patients were compared with X2 test. Overall survival curves were calculated according to the Kaplan-Meier (KM) (log-rank) method. A multivariable analysis was performed by Cox regression. Statistical significance was defined as a p-value <0.05.

Results: Two hundred patients were enrolled until June 2020. Demographic data were similar between the groups; median follow-up time was 77 (range:55-107) months in IT group (n= 119; 59.5%) and 57 (range:39-84) months in ST group (n=81; 40.5%). Median MDFI was 40 (range:23-70) months and 35 (range:13-61) months, respectively in IT and ST groups (p=0.47). The groups had similar primary tumor and axillary surgery; the majority of them (74%) had axillary lymph node dissection. The majority of the patients had liver metastasis (n=116, 58.0%), and 101 (50.5%) of patients had lung metastases; 17 (8.5%) patients had both lung and liver metastases. Primary tumor was ER/ PR (+) in 150 (75.0%) patients and 64 (32.0%) patients had HER2 neu (+) tumors. Metastatic site surgical resection was done in 64 (32.0%) patients, and 55 (27.5%) patients underwent metastatic ablative interventions. In KM survival analysis, hazard of death (HoD) was 56% lower in the IT group than ST group (HR 0.44: 95% CI 0.44; 0.26-0.72; p=0.001). The HoD was lower in the IT group than ST group regarding age <55 (HR 0.32: 95% CI 0.17-0.62; p=0.0007). In the multivariable cox regression model, HoD was significantly lower in patients who underwent intervention to metastases and who had MDFI >24 months compared to no intervention group and shorter MDFI, but having liver metastases increases the HoD 2 times compared to lung metastases (Table).

Conclusions: Metastasis-directed interventions have reduced the risk of death in patients with limited lung/liver metastases who are amenable to interventions after primary cancer treatment is completed. In the selected group of patients such as luminal A/B, HER2 neu (+) BC, younger than 55 years old, limited metastases to lung and/or liver, and MDFI >24 months, surgical or ablative therapy to metastases should be considered and discussed in the tumor boards.

Table. Univariate and multivariable Cox models for overall survival.

Parameter	HR (95%CI)	p		HR_{adj} (95%CI)	p_{adj}
Metastasis intervention	0.44 (0.26-0.72)	0.001		0.39 (0.23-0.67)	0.0007
MDFI>24 months	0.20 (0.10-0.37)	<0.0001		0.17 (0.09-0.34)	<0.0001
Age ≤55	0.92 (0.55-1.56)	0.77		—	—
Pre-menopause	1.09 (0.64-1.77)	0.80		—	—
ER/PR (+)	1.46 (0.74-2.88)	0.28		—	—
Her2 neu (+)	0.94 (0.54-1.65)	0.84		—	—
Primary Breast surgery					
Segmental mastectomy	REF	—			
Mastectomy	0.98 (0.58-1.65)	0.94		—	—
Metastasized site					
Lung	REF	—		REF	—
Liver	1.98 (1.03-3.83)	0.04		2.07 (1.05-4.06)	0.03
Lung+ Bone	1.11 (0.26-4.83)	0.89		1.16 (0.27-5.10)	0.84
Liver+Bone	2.14 (1.08-4.22)	0.03		2.26 (1.12-4.57)	0.02
Multiple	1.01 (0.40-2.55)	0.98		0.80 (0.31-2.07)	0.64
Lymph Node status					
N0	REF	—			
N1	0.63 (0.31-1.28)	0.21		—	—
N2	1.11 (0.54-2.33)	0.76		—	—
N3	1.59 (0.76-3.32)	0.22		—	—

HR_{adj}: Adjusted for variables that are significant in univariate models, MDFI: metastasis detection free interval

1138722 - A DCIS biosignature with a novel residual risk subtype identifies patients with varying risk and RT benefit among younger and high-grade DCIS patients

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Background/Objective: High nuclear grade and young age (<50 years) are 2 clinicopathologic factors commonly used to make treatment decisions in patients with DCIS. However, randomized studies have failed to identify low-risk patients who did not benefit from radiation therapy (RT) after breast-

conserving surgery (BCS) and those at elevated-risk despite RT, potentially leading to over- or under-treatment of DCIS. Here we validated DCISionRT and our novel integrated residual risk subtype (RRt) biosignature (PreludeDx, Laguna Hills, CA) to assess 10-year risk of ipsilateral breast recurrences (IBR) in patients with grade 3 disease and/or young age (<50 years) treated with definitive BCS with or without RT.

Methods: The integrated DCISionRT+RRt biosignature was evaluated in women diagnosed with DCIS (no microinvasive disease) from 4 multinational cohorts: Uppsala University Hospital, Sweden (1986-2004), University of Massachusetts, Worcester, MA (1999-2008), Kaiser Permanente Northwest, Portland, OR (1990-2007), and Royal Melbourne Hospital, Australia (2006-2011). Patients were treated with BCS with and without RT. A central pathology review and biosignature testing was performed on formalin-fixed paraffin embedded tissue at a CLIA-certified lab (Laguna Hills, CA). The biosignature reported a "decision score" (DS+) and RRt status. Individual patient outcome and biosignature results were analyzed independently (McCloud Consulting). The clinical utility of the integrated biosignature was assessed in 3 groups of patients: a) Low Risk (DS+≤2.8), b) Elevated Risk (DS+>2.8 without RRt) and c) Residual Risk (RR) (DS+>2.8 with RRt).

Results: Of 926 patients, 471 were either grade 3 and/or young (<50 years) and were the focus of this analysis. For this subgroup, the integrated biosignature classified patients into Low Risk (n=148, 31%), Elevated Risk (n=167, 35%), and Residual Risk (n=156, 33%) groups, Table 1. The 10-year total IBR risk for women in the Low Risk group without RT (all Grade 3 and/or <50 years) was only 4.4% and there was no significant improvement with adjuvant RT (Δ=1.4%, p=.70). In contrast, the Elevated Risk group had elevated 10-year IBR risk (26.7%) and benefited significantly from RT (Δ=23.1%, p<0.001). Both the Elevated Risk and the Residual Risk groups benefited significantly from RT (p<0.001), but there was higher IBR risk after RT in the Residual Risk group (13.7% vs. 3.6%, p=0.006).

Conclusions: The integrated biosignature demonstrated prognostic and predictive RT response among women with grade 3 disease and/or young age (<50) and reclassified them into three distinct groups: (1) Low Risk with a 10-year total IBR risk of only 4.4% with BCS without RT with no significant RT benefit; (2) Elevated Risk with a 10-year IBR risk of 26.7% without RT, reduced to 3.6% with RT; and (3) Residual Risk with the highest risk without RT and elevated residual 10-year risk of 13.7% after RT. When using grade or age alone, one-third of patients were overtreated with RT. These findings are consistent with the results from the whole cohort analysis (n=926), illustrating that neither high-grade DCIS nor young age were significant risk factors after accounting for biosignature results.

Table 1. 10-Year IBR Rates in Patients Treated with BCS with and without Adjuvant RT

14.1

1148215 - Impact of loco-regional treatment on survival in young patients with operable breast cancer

	Grade 3 and/or Age Under 50; n=471				All Patients; n=926		
	Low Risk Group ($DS^+ \leq 2.8$)	**Elevated Risk Group** ($DS^+ > 2.8$ without RRt)	**RR Group** ($DS^+ > 2.8$ with RRt)		**Low Risk Group** ($DS^+ \leq 2.8$)	**Elevated Risk Group** ($DS^+ > 2.8$ without RRt)	**RR Group** ($DS^+ > 2.8$ with RRt)
Number of Patients	148	167	156		338	399	189
% Nuclear Grade 3	51%	73%	93%		22%	31%	77%
% Age <50	65%	48%	34%		26%	19%	26%
No Radition	4.4% (1.1-16.6%)	26.7% (15.4-43.6%)	49.2% (28.1-75.1%)		5.6% (2.5-12.1%)	20.6% (13.7-30.3%)	42.1% (25.9-63.0%)
Radiaton	3.0% (1.0-9.0%)	3.6% (1.4-9.5%)	13.7% (7.9-23.3%)		4.8% (2.5-9.1%)	4.9% (2.8-8.6%)	14.7% (8.8-24.1%)
Absolute Risk Reduction	1.4% (-5.4 -8.3%)	23.1% (9.9-37.8%)	35.5% (17.6-66.2%)		0.8% (-4.6-6.2%)	15.7% (7.0-24.3%)	27.4% (7.0-47.7%)
p value	0.70	<0.001	<0.001		0.78	<0.001	<0.001

Javier Orozco[1], Jennifer Keller[1], Shu-Ching Chang[2], Crystal Fancher[1], Janie Grumley[1]
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Background/Objective: Randomized controlled trials comparing breast-conserving therapy (BCT) with mastectomy have demonstrated equivalent overall survival (OS), but recent retrospective studies have shown improved OS in patients undergoing BCT. These studies provided limited data in young patients, who are traditionally offered mastectomy due to perceived higher disease risk. This study examines the OS in a contemporary series of young women with operable breast cancer undergoing BCT compared to mastectomy.

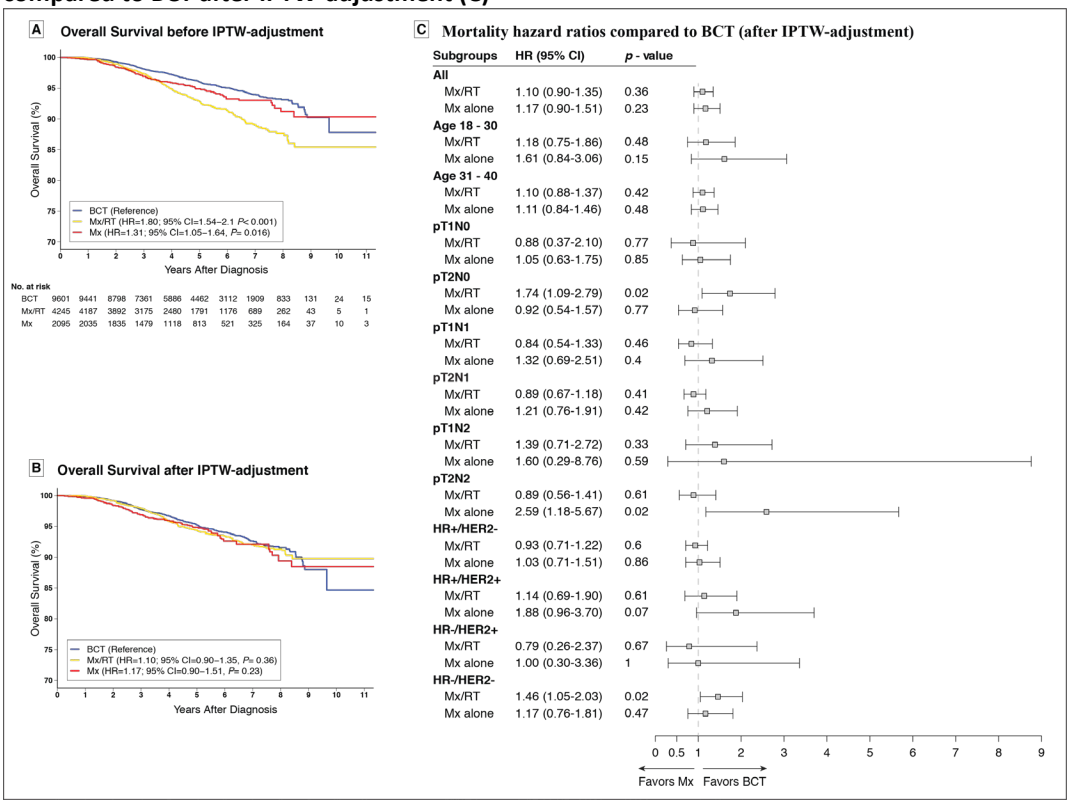
Methods: Women ≤40 years, with primary invasive T1-T2, N0-N2 breast cancer were identified from the National Cancer Database (NCDB) between 2006 and 2016. Three cohorts were selected based on the type of local therapy: BCT, mastectomy alone (Mx), and mastectomy with radiotherapy (Mx/RT). Kaplan-Meier method followed by Cox proportional-hazards regression with inverse probability of treatment weighting (IPTW) using propensity score method was performed to account for treatment selection bias effects in OS. The stabilized inverse probability weights were derived from the GBM-ATE (average treatment effect) predicted probabilities on age, race/ethnicity, insurance, income, education, comorbidities, facility type, city type, histology, tumor grade, lymph-vascular invasion (LVI), breast cancer clinically-relevant subtypes (based on hormone receptor and HER2 statuses), American Joint Committee on Cancer clinical and pathological stages, tumor size, lymph-node status, and adjuvant

systemic therapy. Multivariable logistic regression, adjusting for the same clinical variables, was performed to predict the likelihood of the receipt of mastectomy.

Results: Of the 15,941 patients who met the study criteria, 9,601 patients (60.2%) had BCT, 4,245 (26.6%) had Mx/RT, and 2,095 (13.2%) had Mx alone. The median follow-up was 4.6 years (IQR range 3.0 - 6.4). The greatest independent predictors for receipt of mastectomy were the presence of LVI (OR: 2.17, 95% CI: 2.01-2.34, p<0.001) and initial clinical Stage IIIA (OR: 5.02, 95% CI: 3.98-6.60, p<0.001). Unadjusted analyses showed that BCT cohort was associated with an OS advantage (Figure A). However, in the Kaplan-Meier survival analyses with IPTW adjustments, the 5-year OS was similar for BCT (95%), Mx (95%), and Mx/RT (94%). Additionally, in the Cox proportional-hazards regression analyses with IPTW, there was no significant difference in hazard of death in Mx (HR=1.17, 95% CI: 0.90-1.51) and Mx/RT (HR=1.10, 95% CI 0.90-1.35) compared to BCT (Figure B). In the subgroup analysis stratified by age categories, pathological stages, and by clinically relevant breast cancer subtypes, Mx/RT was associated with decreased survival in patients with T2N0 (HR=1.74, 95% CI: 1.09-2.79, p=0.02) or triple-negative breast cancer (HR=1.46, 95% CI=1.05-2.03, p=0.02, Figure C).

Conclusions: Among young patients with operable breast cancer, OS was equivalent regardless of the loco-regional approach. Despite the clinical tendency to offer mastectomy in young patients, BCT remains a safe option in young women, and the recommendation for mastectomy as the primary surgical option should not be based on young age alone.

Figure. Overall survival before (A) and after IPTW-adjustment (B). Subgroup analysis of mortality hazard ratios compared to BCT after IPTW-adjustment (C)



1131785 - The Male WhySurg Study: Patient and surgeon experience

Anna Chichura[1], Kristine Kuchta[2], Kyra Nicholson[1], Deanna Attai[3], Katharine Yao[2]
[1]NorthShore University Health System & University of Chicago, Evanston, IL, [2]NorthShore University HealthSystem, Evanston, IL, [3]David Geffen School of Medicine at UCLA, Burbank, CA

Background/Objective: Little is known about the male breast cancer (MBC) experience from the patient perspective, and many breast surgeons have limited experience treating MBC. The objective of this study was to assess MBC patient opinions and perspectives about the surgical approach for their breast cancer and compare their experiences with surgeon recommendations for MBC.

Methods: Two concurrent online surveys (22 items each) were developed after review by 15 breast surgeons and administered via social media to MBC patients who had previously undergone breast surgery and to members of the American Society of Breast Surgeons. Surveys were distributed from August 2020 to October 2020. MBC patients were asked about the level of information they received about surgical choices and comfort with the appearance of their chest wall and scar after surgery. Surgeons were asked for recommendations for breast-conserving surgery (BCS), mastectomy, and bilateral mastectomy based on a clinical scenario.

Results: A total of 63 MBC patients responded to the online survey. Mean age was 62 years (range 31 - 79). The majority reported Stage I, II, or III (88.9%) disease at diagnosis. Fifty-eight (92%) patients

reported it had been less than 10 years since diagnosis. Almost all, 60 (95.2%), had genetic testing and 11 (18.3%) reported having an abnormal gene. An overwhelming majority of MBC patients either felt they had a choice in the decision for surgery 51 (81.0%) or had all the information needed to make a decision (94.0%) for surgery (multiple responses permitted). Five (7.9%) of MBC patients stated that their surgeon recommended BCS; however, all but 1 of the survey respondents underwent unilateral (85.7%) or bilateral (15.9%) mastectomy. Most 60 (96.8%) had no reconstruction. Approximately one-third (34.9%) of patients felt very comfortable with their appearance after surgery, but a similar number reported feeling somewhat or very uncomfortable. Of 31 men who provided open-ended comments, common themes expressed were feeling "unbalanced" or asymmetric (29%), feeling self-conscious about looking "abnormal" (29%), feeling their chest was "flat, caved, or indented" (16.1%), having discomfort or skin tightness (16.1%), or having concerns about their scar (6.5%) or lack of nipple (6.5%). The response rate was 16.5% (438/2650) for surgeons. The majority of surgeons were female 298 (73.3%), 215 (51.7%) were fellowship trained, and 24 (58.9%) were in practice ≥16 years. Despite the fact that 207 (47.7%) of surgeons stated there was weak evidence to support BCS for MBC, 259 (59.1%) of surgeons reported routinely offering BCS to eligible men and 180 (41.3%) stated they had performed BCS on a MBC patient. Eighty-nine (20.8%) surgeons stated they routinely offer reconstruction to MBC patients, 87 (20.3%) do not offer reconstruction at all, 96 (22.4%) only offer it if the patient requests it, and 157 (36.6%) never considered it as an option.

Conclusions: MBC patients undergoing mastectomy without reconstruction are often dissatisfied with their cosmetic outcomes; however, surgeons expressed a willingness to perform BCS and offer reconstruction to these patients. These data present an opportunity to optimize the MBC patient experience.

Quickshot Presentations

Friday, April 8, 2022 5:30 pm–6:30 pm
Moderators: Daniel Leff, FRCS, MS (Hons), PhD; Tracy-Ann Moo, MD, FACS

1145066 - Does breast-conserving surgery with radiotherapy have a better survival than mastectomy? A meta-analysis of more than 1,500,000 patients

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Background/Objective: There have been conflicting studies reporting on survival advantages between breast-conserving surgery (BCS) with radiotherapy in comparison to mastectomy. Our aim was to compare the efficacy of BCS+RT and mastectomy in terms of overall survival (OS) comparing all past published studies.

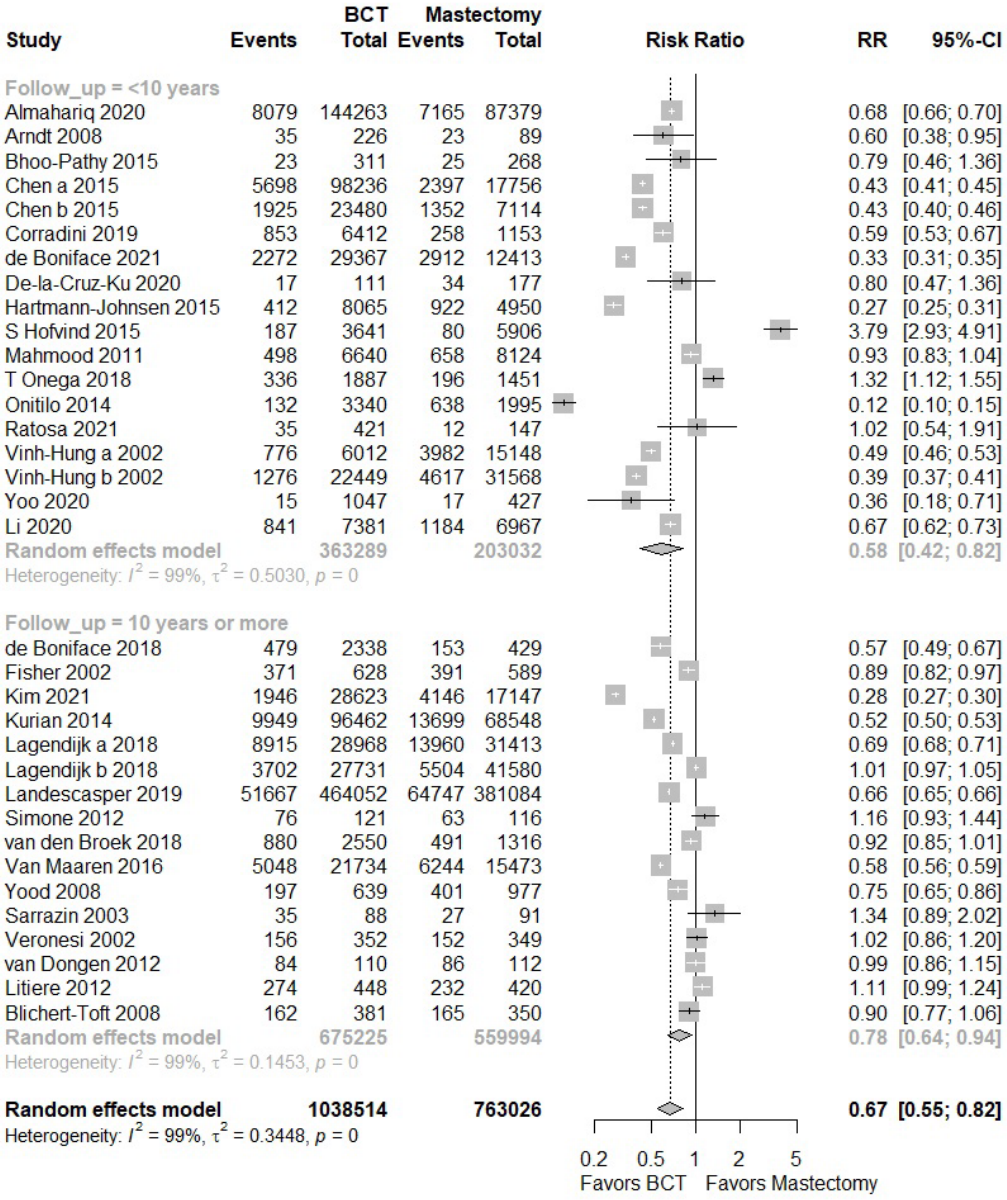
Methods: We performed a comprehensive review of literature through October 2021 in PubMed, Scopus, and EMBASE. The studies included were randomized controlled trials (RCT), cohorts, case control studies, and database analysis that compare BCT with radiotherapy versus mastectomy. We excluded studies that included male sex, Stage 0, IIIB, IIIC and IV, bilateral synchronous cancer, neoadjuvant radiation or chemotherapy, and articles without available hazard ratio (HR) or incomplete data. We performed a meta-analysis following the random-effect model with the inverse variance method.

Results: From 18,997 publications, we excluded 11,732 for duplicates; 7,179 for not meeting the inclusion criteria, and 54 for incomplete data. A total of 32 studies were included in the final analysis - 6 studies were randomized trials, and 26 were retrospective cohorts or multi-institutional databases. A total of 1,801,586 patients with a range follow-up of 4 to 20 years were included, 1,038,536 and 763,050 underwent BCS+RT and mastectomy, respectively. Among all the population, BCS+RT showed to improve the OS compared to mastectomy (HR: 0.67, 95%CI: 0.55-0.82) (See Figure). This effect was similar when the analysis was performed in cohorts and multi-institutional databases (HR: 0.61, 95%CI: 0.49-0.77). Furthermore, the benefit of BCS-RT was stronger in patients who had less than 10 years of follow-up (HR: 0.58, 95%CI: 0.42-0.82), in comparison to the population who had 10 or more years of follow-up (HR: 0.78, 95%CI: 0.64-0.94).

Conclusions: Patients who underwent BCS+RT had better OS compared to mastectomy. Regardless of the follow-up period, the benefit of BCS+RT remained significant in both groups; however, the impact effect was higher in studies that had less than 10 years of follow-up. Such results depicting survival

advantage, especially using such a large sample of patients, may need to be included in the shared surgical decision-making when discussing breast cancer treatment with patients.

Table. Meta-analysis of breast-conserving surgery versus mastectomy according to the median follow-up of patients



1142315 - A prospective clinical trial of immediate breast reconstruction following pre-mastectomy radiotherapy for operable breast cancer

Puneet Singh, Karen Hoffman, Benjamin Smith, Mark Clemens, Richard Ehlers, II, Carrie Chu, David Adelman, Mark Villa, Henry Kuerer, Mark Schaverien
UT MD Anderson Cancer Center, Houston, TX

Background/Objective: Many women with breast cancer who undergo mastectomy desire immediate breast reconstruction (IBR); however, this is not usually an option for those who also need postmastectomy radiotherapy, with temporary tissue expander placement or delayed reconstruction performed instead. This is the first prospective pilot study in the US of patients undergoing premastectomy radiotherapy to facilitate IBR.

Methods: This is a single-institution, prospective clinical trial embedded in a randomized clinical trial of hypofractionated versus conventionally fractionated regional nodal irradiation (RNI; NCT02912312). An additional 5 patients preferred to proceed with this treatment off protocol and were included in this analysis. Adult females with cT1-4 N0-3 requiring both mastectomy and radiotherapy and desiring IBR were eligible and enrolled from 2018-2021. Patients with inflammatory breast cancer, Stage IV, or prior breast cancer were excluded. Descriptive statistics and Fisher's exact test were performed to analyze data.

Results: There were 34 patients included in this analysis, with a median age of 49 years (range 31-66) and median follow-up time of 10 months (0-39). Two patients had bilateral breast cancer. The majority of tumors were of ductal histology (91%), and 74% were hormone receptor-positive/HER2-negative [Table]. Thirty-one (91%) received neoadjuvant systemic therapy followed by premastectomy radiotherapy, with 53% receiving the hypofractionated regimen. Mastectomy with IBR was performed at a median of 23 days (range 14-42) after radiation. Thirty-one patients had skin-sparing mastectomy, and 3 had nipple-sparing mastectomy, including 12 patients who had a bilateral procedure. Axillary lymph node dissection was done in 74%. Twenty-eight had free autologous flap reconstruction, 3 underwent latissimus dorsi flap reconstruction with prosthesis, and 3 had tissue expander placement. There were no complete flap losses, and 3 major surgical complications occurred. Two patients with tissue expanders underwent unplanned reoperation: in 1 patient, the expander was explanted, and the other underwent successful salvage. In the patients who underwent free flaps, 1 patient had partial flap loss necessitating reoperation. There was a statistically significant difference in major complications between TE (67%) and free flap (3%) reconstruction ($p<0.05$). In 1 patient, the recipient internal mammary vessels could not be used for microsurgical breast reconstruction, and the axillary vessels were used successfully. Mastectomy skin flap necrosis occurred in 3 patients, and only 1 required debridement, which was performed in the clinic. One patient who had autologous reconstruction developed a seroma requiring non-operative intervention. Six patients achieved breast and axillary pathologic complete response, and there was no evidence of recurrence with relatively short follow-up.

Conclusions: Premastectomy radiotherapy to facilitate IBR using autologous flaps is a feasible treatment sequence, and larger studies with longer follow-up time are warranted.

Table. Clinical staging and tumor characteristics of enrolled patients (N = 34)

	n (%)
Histology	
Ductal	31 (91)
Lobular	1 (3)
Mixed ductal/lobular	2 (6)
Clinical T-stage	
T1	2 (6)
T2	14 (41)
T3	16 (47)
T4b	2 (6)
Clinical N-stage	
N0	3 (9)
N1	29 (85)
N2	2 (6)
Multifocal and/or multicentric	25 (74)
ER status	
Positive	28 (82)
Negative	6 (18)
PR status	
Positive	24 (71)
Negative	10 (29)
Her2 status	
Positive	7 (21)
Negative	27 (79)

1147981 - The effect of lymphatic microsurgical preventive healing approach (LYMPHA) on the development of upper-extremity lymphedema following axillary lymph node dissection in breast cancer patients

Omar Qutob, Sanjay Rama, Lisa Black, Michele Zubalik, Jessica Bensenhaver, Lindsay Petersen, Saul D. Nathanson, Donna Tepper, Daniel Yoho, Maristella Evangelista, Dunya Atisha
Henry Ford Health System, Detroit, MI

Background/Objective: Lymphedema following axillary lymph node dissection (ALND) is a common complication that can negatively impact quality of life as it reduces the functional capacity of the affected arm. It can also predispose patients to serious infectious complications such as limb cellulitis and development of malignancy. The lymphatic microsurgical preventive healing approach (LYMPHA procedure) involves the creation of a lymphatic-to-venous bypass at the time of axillary lymph node dissection (ALND) as a means of preventing lymphedema. The goal of our study is to assess the effect of LYMPHA on the development of clinical and subjective post-operative lymphedema.

Methods: This is a prospective longitudinal study in patients with breast cancer who underwent ALND with or without LYMPHA. The incidence of lymphedema was compared between ALND alone and ALND with LYMPHA using descriptive statistics. Limb circumference of both affected and unaffected limbs were measured and used to calculate limb volume by using an equation that converts limb circumference (cm) to volume (cc). Lymphedema was defined as a volume difference of ≥10% between the affected and unaffected limb. Patient symptoms were also assessed and compared between the 2 groups. Patient demographics including age, preoperative body mass index (BMI), smoking history, comorbidities, receipt of neoadjuvant or adjuvant chemotherapy, and receipt of adjuvant radiation were compared between the groups.

Results: In our cohort of 139 patients, 104 underwent ALND with LYMPHA, while 35 underwent ALND alone. Of these, 52.5% of patients had documented interlimb circumference measurements. The mean age was 52.6 years old, mean BMI was 30.16 kg/m2, 4 patients (2.9%) had pre-operative radiation, 102 patients (73.4 %) had post-operative radiation, 86 patients (61.9 %) had neoadjuvant chemotherapy,

and 58 patients (41.7 %) had adjuvant chemotherapy. There were no significant differences between the 2 groups in the above demographics and treatment variables, except those who underwent ALND alone had a significantly higher incidence of diabetes mellitus (25.7% patients with ALND alone vs 11.5% LYMPHA patients (p=0.043)). Based on patient reported symptoms and the need to initiate complete decongestive therapy, 57.1% (n=20) of patients who underwent ALND alone developed lymphedema compared to 26.9% (n=28 patients) of those who had ALND with LYMPHA (p=0.0011). When comparing the relative volume difference, 57.1% (n=8) of ALND alone patients developed lymphedema versus 20.3% (n=12) of LYMPHA patients (p=0.0055).

Conclusions: Our data support the universal use of LYMPHA at the time of ALND as a means of preventing upper extremity lymphedema. Further studies are needed to evaluate quality of life and functional differences between those who had LYMPHA and those who did not.

1148562 - Axillary node positivity among suspicious but FNA-negative nodes

Thomas Robbins[1], Tanya Hoskin[1], Courtney Day[1], Mary Mrdutt[1], Tina Hieken[1], James Jakub[2], Judy Boughey[1], Amy Degnim[1]
[1]Mayo Clinic, Rochester, MN, [2]Mayo Clinic Florida, Jacksonville, FL

Background/Objective: In the evaluation of breast cancer, fine needle aspiration (FNA) of sonographically suspicious axillary lymph nodes is helpful to clinically stage patients and guide consideration of neoadjuvant therapy. However, data are limited on pathology findings at definitive surgery in lymph nodes that are suspicious on axillary ultrasound (AUS) but FNA-negative. The primary objective of this study is to compare the frequency of SLN positivity between patients with negative AUS versus patients with suspicious AUS but negative FNA.

Methods: With IRB approval, we identified a consecutive series of clinically node-negative (cN0) patients with invasive breast cancer treated with upfront surgery at our tertiary care center between 2016-2021. A prospectively collected clinical registry data source was utilized, with additional retrospective review of medical records for clinical and pathologic features. Groups were compared using chi-square tests for nominal variables and Wilcoxon rank-sum tests for ordinal and continuous variables.

Results: A total of 1,668 cN0 patients with invasive breast cancer were analyzed, including 341 with a suspicious AUS and negative FNA (FNAneg group) and 1,327 with negative AUS and no FNA performed (AUSneg group). The FNAneg group was younger (median 60 vs 65 years, p<0.001), had a higher cT stage (27.3% vs 18.7% with cT2-cT4 disease, p=0.001), and were more likely to have non-luminal biologic subtype (9.7% HER2+ and 7.0% TNBC vs 6.0% HER2+ and 5.1% TNBC, p=0.02). AUSneg patients were more likely to have no surgical axillary staging (12.4%) compared to FNAneg patients (7.6%, p=0.01). Among the 1477 with surgical axillary staging, the number of sentinel lymph nodes (SLNs) removed and identified pathologically were significantly higher in FNAneg vs AUSneg patients (mean 2.4 vs 2.2, p=0.002, and mean 2.8 vs 2.6, p=0.006) (see Table). Final axillary pathologic node positivity did not differ significantly between the FNAneg and AUSneg groups (18.7% vs 15.9%, p=0.23), nor did the number of SLNs positive, SLN metastasis size, likelihood of axillary dissection and associated additional disease, and final pathology N category. Among FNAneg patients, 59/341 (17.3%) had a clip placed, with clipped node retrieved in 27/59 (45.8%), not retrieved in 10/59 (16.9%), and retrieval unknown in 22/59 (37.3%). A total of 26/27 retrieved clipped nodes were also SLNs (hot +/- blue), and 7/27 (25.9%) were positive

(metastasis size >0.2mm). One patient's clipped node did not map as a SLN and was not removed at time of lumpectomy; she returned to OR with seed localization to retrieve the clipped node, which was positive (in addition to 2 positive nodes from first surgery). Another patient's clipped SLN was negative but had another SLN that was positive. Final pathologic nodal status (pN+%) did not differ between patients with clipped node retrieved versus not (29.6% versus 14.8%, p=0.19).

Conclusions: Patients with a suspicious AUS and negative FNA can be reassured that they have a similarly low chance of positive nodes as women whose AUS shows no suspicious nodes. Further research is needed to determine the utility of targeted axillary surgery with localization and excision of clipped nodes that are FNA negative.

IMAGE 1: Comparison of features between cN0-FNA negative and cN0-AUS negative groups

Axillary Node Positivity Among Suspicious but FNA Negative Nodes

	cN0-FNA Negative (N=315)	cN0-AUS Negative (N=1162)	p value
Number of SLNs harvested by surgeon			0.002
Mean (SD)	2.4 (1.0)	2.2 (1.0)	
Median (Range)	2 (0-6)	2 (0-7)	
Number of SLNs seen histologically			0.006
Mean (SD)	2.8 (1.3)	2.6 (1.2)	
Median (Range)	3 (0-8)	2 (0-8)	
Pathologic N status			0.23
pN0	256 (81.3%)	977 (84.1%)	
pN+	59 (18.7%)	185 (15.9%)	
Number of positive SLNs category			0.20
Failed mapping	1 (0.3%)	3 (0.3%)	
0 SLNs Positive	256 (81.3%)	978 (84.2%)	
1-2 SLNs Positive	54 (17.1%)	171 (14.7%)	
>2 SLNs Positive	4 (1.3%)	10 (0.9%)	
Size of largest SLN metastasis, mm (among those with +SLNs)			0.51
Mean (SD)	4.5 (3.7)	5.3 (5.0)	
Median (Range)	3.0 (0.3-15)	4.0 (0.3-30)	
Axillary surgery			0.70
SLN	296 (94.0%)	1085 (93.4%)	
SLN & cALND	19 (6.0%)	77 (6.6%)	
Additional axillary disease in cALND			0.94
No	13 (68.4%)	52 (67.5%)	
Yes	6 (31.6%)	25 (32.5%)	
Pathologic N category			0.33
pN0	256 (81.3%)	977 (84.1%)	
pN1mi	18 (5.7%)	56 (4.8%)	
pN1a-c	39 (12.4%)	116 (10.0%)	
pN2-pN3	2 (0.6%)	13 (1.1%)	

1148252 - Accuracy of mammography, ultrasound, contrast-enhanced digital mammography, and MRI on the evaluation of residual in-breast disease after neoadjuvant endocrine therapy

Chi Zhang[1], Heidi Kosiorek[2], Bhavika Patel[1], Sarwat Ahmad[2], Barbara Pockaj[2], Patricia Cronin[2]
[1]Mayo Clinic, Scottsdale, AZ, [2]Mayo Clinic, Phoenix, AZ

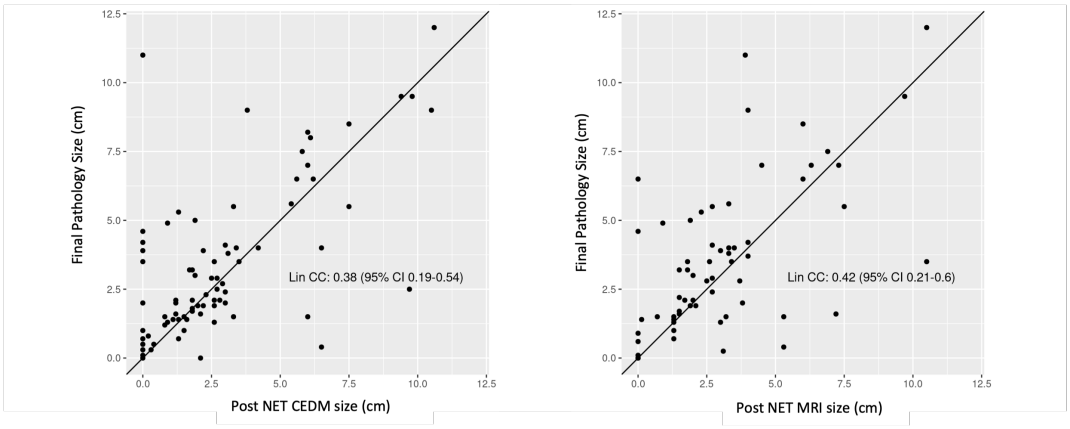
Background/Objective: Imaging plays an important role in monitoring tumor response to systemic therapy. It is also useful in determining suitability for breast conservation or mastectomy. The aim of this study was to assess the accuracy of different imaging techniques including mammography, ultrasound (US), magnetic resonance imaging (MRI), and contrast-enhanced digital mammography (CEDM) in breast cancer that has been treated with neoadjuvant endocrine therapy (NET) in predicting tumor response.

Methods: Patients undergoing surgery after NET from 2013 to 2021 were identified in a prospective database. The size of residual malignancy was defined as the maximal tumor dimension by each imaging modality. Pathologic tumor size was recorded as the maximal tumor dimension on final pathology reports. Lin's concordance coefficient for agreement as well as Spearman's correlation coefficient were used to assess agreement between imaging and final pathology.

Results: A total of 144 patients were identified with pathologically confirmed invasive breast cancer who underwent NET and had post treatment imaging. Five additional patients were diagnosed with DCIS and also received NET. In our cohort, 81 had CEDM, 63 had MRI, 115 had US, and 91 had mammography. Forty-one patients had all 4 imaging modalities between completing NET and proceeding to surgery. The mean age was 60 years (range 28-86), 102 (69%) patients were post-menopausal, and 73 (54%) were noted to have dense breasts. Eighty percent of the patients received endocrine therapy alone. Premenopausal patients received ovarian suppression if treated with an aromatase inhibitor. Invasive ductal carcinoma (IDC) was the most common histology (74%). Eighteen percent had invasive lobular carcinoma (ILC), and the remainder were ductal carcinoma in situ, mixed IDC/ILC or invasive mammary carcinoma. The mean tumor size on final pathology was 3.2cm with a range of 0 to 22.5cm. When comparing post-treatment imaging to pathological size, CEDM predicted the tumor size within 1cm 61% of the time. MRI was accurate within 1cm 57% of the time, US 57%, and mammography 50%. The average difference in size comparing CEDM to final pathology was 0.8cm (standard deviation, SD 3.7), MRI: 0.7cm (SD 3), US: 0.4cm (SD 3), and mammogram: 0.6cm (SD 4). Post-treatment imaging size with CEDM was moderately correlated to pathological size with a correlation coefficient (r) of 0.51. MRI size showed moderate correlation to pathological size with r=0.51. US size was also moderately correlated to final pathology size with r= 0.46. Mammography had the weakest correlation to final pathology size with r = 0.23.

Conclusions: CEDM and MRI were more frequently accurate in estimating final tumor size after NET compared to mammography or US. In estimating final pathological size, CEDM, MRI, and US were comparable with moderate accuracy. Contrast enhanced imaging with CEDM or MRI after NET provides reliable data for assessing tumor response and surgical planning.

Figure. Lin's Concordance Correlation Coefficient: Comparing estimated tumor size on imaging to final pathological tumor size


Final Pathology Size (cm)
Post NET CEDM size (cm)
Lin CC: 0.38 (95% CI 0.19-0.54)
Post NET MRI size (cm)
Lin CC: 0.42 (95% CI 0.21-0.6)

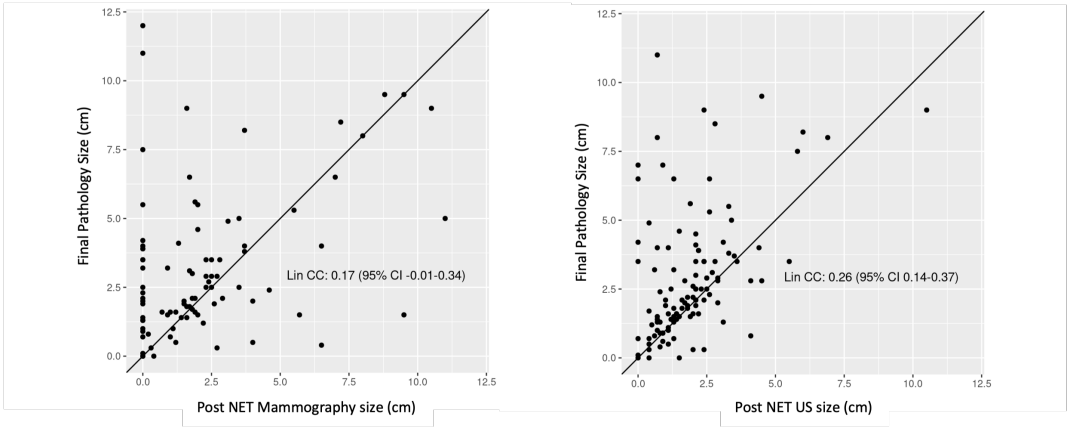

Final Pathology Size (cm)
Post NET Mammography size (cm)
Lin CC: 0.17 (95% CI -0.01-0.34)
Post NET US size (cm)
Lin CC: 0.26 (95% CI 0.14-0.37)

Table. Axillary node positivity among suspicious but FNA-negative nodes

	cN0-FNA Negative (N=315)	cN0-AUS Negative (N=1162)	p value
Number of SLNs harvested by surgeon			0.002
Mean (SD)	2.4 (1.0)	2.2 (1.0)	
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Number of SLNs seen histologically			0.006
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pN2-pN3	2 (0.6%)	13 (1.1%)	

1148289 - Young women with breast cancer: Does surgical approach impact overall survival?

Christine Pestana[1], Sally Trufan[2], Courtney Schepel[2], Terry Sarantou[2], Richard White[2], Lejla Hadzikadic-Gusic[2]
[1]Atrium Health, Levine Cancer Institute, Winston Salem, NC, [2]Atrium Health, Charlotte, NC

Background/Objective: Young women with breast cancer can often present with advanced disease when compared to their older counterparts. Outcome disparities persist between the 2 groups. Mastectomy rates are increasing in younger patients despite lack of data supporting improved survival. This study investigates the association between surgical approach and survival in young patients with breast cancer.

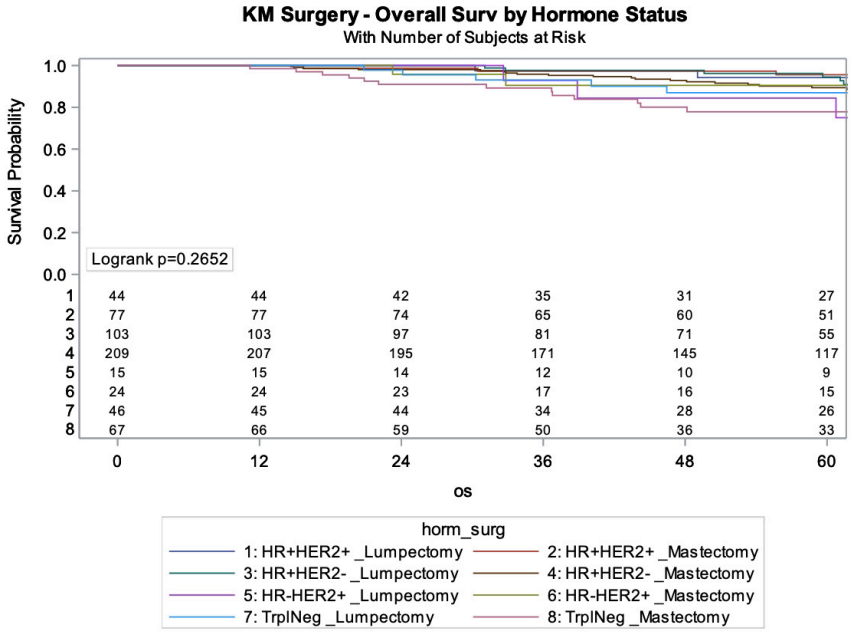
Methods: We performed a retrospective chart review of 885 women <40 years old included in the Young Women's Database at a single institution. There were 294 subjects excluded due to missing data. A total of 591 subjects with non-metastatic invasive breast cancer between 2010 and 2019 who received

surgical intervention were included in the analysis. Details regarding patient demographics, tumor characteristics, molecular subtype, and treatment were collected. Patients were stratified based upon molecular subtype, and descriptive statistics were performed. Univariable and multivariable Cox proportional hazard analyses were performed to determine if patient, disease, or treatment factors were associated with an increased risk of death. Significance was set at $p<0.05$.

Results: The median age for the cohort was 37 years (IQR 34-39), and time to follow-up was 67 months (IQR 41-98). Overall, 12% of patients died (n=72). Molecular subtypes included: HR+/HER2- (n=315, 53.3%), HR+/HER2+ (n=123, 20.8%), triple-negative (n=114, 19.3%), and HR-/HER2+ (n=39, 6.6%). Variables assessed for association with overall survival included age, race, BMI, disease stage, grade, presence of lymphovascular space-invasion, extranodal extension, extent of surgery (breast conservation vs mastectomy), presence and timing of chemotherapy (neoadjuvant, adjuvant, none), and presence of hormonal therapy (when appropriate). A total of 85.4% of the HR+/HER2- group took antiestrogen therapy. On multivariable analyses in this group, only an absence of hormone therapy was significant, with a 2.9 increased risk of death for patients who did not take hormone therapy when compared to those using it (p=0.02). On univariate analysis, black race was associated with an increased risk of death in all molecular subtype categories. However, on multivariate analysis, this only held true in the triple-negative group, where black race was associated with a 5.7 times increased risk of death (p=0.005) even after accounting for all other risk factors. No associations of note were seen for the HR+/HER2+ or HR-/HER2+ groups. The use of mastectomy versus breast conservation did not impact overall survival in any of the molecular subtypes.

Conclusions: Overall survival does not differ based upon type of surgery in younger patients with breast cancer. Counseling regarding outcomes is important, especially in reducing unnecessary morbidity from surgical procedures that are not indicated given the increased use of mastectomy in this age group.

Figure. Overall survival by molecular subtype



1147481 - Practice of antibiotic prophylaxis in patients undergoing mastectomy with or without immediate reconstruction: A Survey of ASBrS members

Abida Sattar[1], Farin Amersi[2], Hania Shahzad[3], Nida zahid[1], Taleaa Masroor[1]
[1]The Aga Khan University Hospital, Karachi, Sindh, Pakistan, [2]Cedars Sinai, Los Angeles, CA, [3]Ohio State University, Columbus, OH

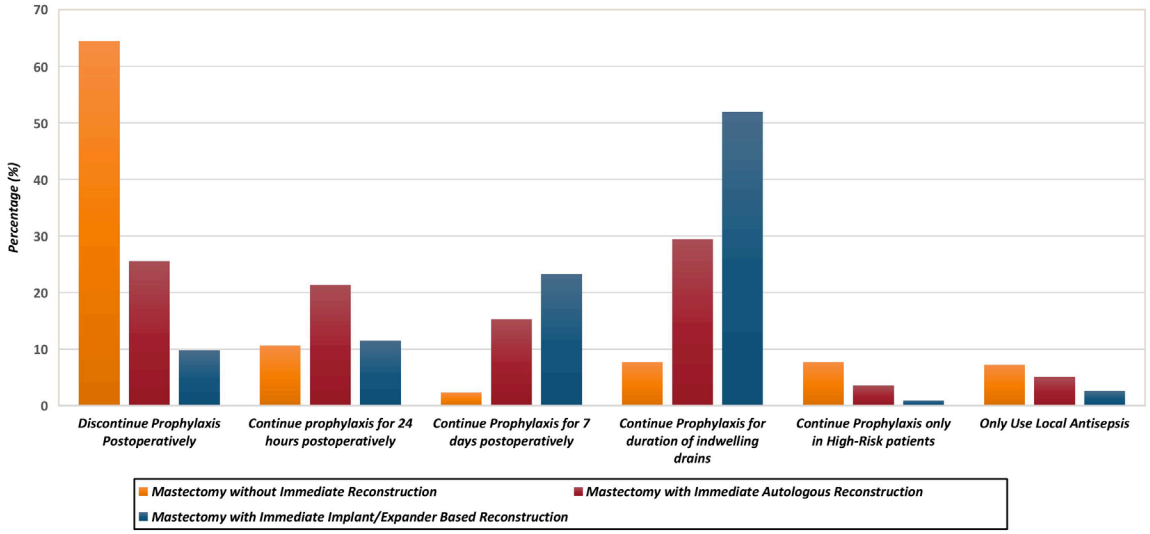
Background/Objective: Surgical site infections (SSI) after breast surgery range from 1-26%, which is high for surgeries considered "clean procedures." Both the American Society of Breast Surgeons (ASBrS) and the American Association of Plastic Surgeons guidelines lack clarity on the use of antibiotic prophylaxis in the post-operative setting, especially with the use of drains. The ASBrS membership was surveyed to understand current practice patterns of antibiotic prophylaxis in mastectomy, with or without reconstruction. In addition, their familiarity with current ASBrS guidelines where decisions are left to their discretion were assessed.

Methods: A validated 19-question survey was sent to all 2,934 ASBrS members. A total of 613 (20.9%) members responded; however those in training/"others" (n=21) and those who skipped certain questions were excluded, leaving 592 responses for analysis. Information was obtained on the participants' training, region, experience as surgeons, familiarity with ASBrS guidelines on antibiotic prophylaxis, and their practice of prescribing peri-operative antibiotic prophylaxis with/without reconstruction with indwelling drains.

Results: Most of the respondents were general surgeons (49.7%) or fellowship-trained breast/surgical oncologists (49.8%), with 55.8% having spent >15 years in practice, 61% with a dedicated breast-only practice, and 67% in community/private practice. Although ASBrS includes international members, 91.6% practiced in the US. Only (299/553) 54% were familiar with ASBrS guidelines for preoperative antibiotic prophylaxis, of which 67.9% (202/299) had a 100% dedicated breast practice ($p<0.005$). Though 93.7% would "always" place a drain after mastectomy, only 41% would allow patients with drains to shower the day after surgery. Ninety-two percent would "always" prescribe preoperative antibiotic prophylaxis. Reasons for discontinuing prophylaxis postoperatively (after a single preop dose), varied within the 3 categories of mastectomy (Figure), with those in an academic practice more likely to discontinue antibiotics in the non-reconstructed breast ($p<0.005$). Similarly, preference to continue antibiotics while drains were in place varied as follows: 7.7% with no reconstruction, 29% with autologous-only, and 51.9% in implant-based reconstructions, with no differences seen based on type of practice or years of experience.

Conclusions: Surgeons uniformly adhere to ASBrS guidelines for preoperative antibiotic prophylaxis. However, there is a wide variation in surgeon comfort with discontinuation of antibiotics post-operatively in patients with or without reconstruction, and in those with indwelling drains. Though guidelines discourage the continuation of postoperative antibiotics, there appears to be a need to familiarize the ASBrS membership on the existing guidelines. Randomized control trials may be necessary to establish evidence-based guidelines to achieve uniformity in practice.

Figure. Use of prophylactic antibiotics in patients undergoing mastectomy with or without immediate reconstruction: A survey of American Society of Breast Surgeon members



Poster Session and Reception

Friday, April 8, 2022, 6:15 pm–7:30 pm

Top Ten

1148595 - Patterns of non-adherence to evidence-based, treatment guidelines for nonmetastatic invasive breast cancer and impact on long-term outcomes

Fernando A. Angarita, Adriana Ordonez, Amanda K. Arrington, Helmi S. Khadra, Kelvin C. Allenson, Nestor F. Esnaola
Houston Methodist Hospital, Houston, TX

Background/Objective: Evidence-based, treatment guidelines (EBTG) for locoregional therapy (LRT), chemotherapy (CT), and endocrine therapy (ET) in nonmetastatic invasive breast cancer (NIBC) have been well-defined. Although a growing body of work suggests that adherence to these national guidelines remains woefully inconsistent across the United States (particularly in patients from at-risk, sociodemographic strata), there is a paucity of data regarding the impact of non-adherence on oncologic outcomes. To address this knowledge gap, we examined patterns of non-adherence to EBTG for NIBC in a recent, large, national cohort and analyzed the independent effect of non-adherence on long-term survival, controlling for patient, facility, and tumor factors.

Methods: We identified 527,707 women aged 21–69 years old with NIBC (Stage I–III) who were diagnosed between 2010 and 2017 and had ≥12 months of follow-up using the Commission on Cancer (CoC) National Cancer Database Participant User File. Adherence to EBTG during the entire first course of therapy (EFCT), as well as for LRT, CT, and/or ET was defined based on each patient's tumor stage/characteristics and treatment received, and the relevant CoC quality of care measures and National Comprehensive Cancer Network recommendations in-place at the time of diagnosis. Rates of adherence across groups were compared using standardized mean differences (SMD) (≥0.1 denotes statistically significant difference). Hazard ratios (HR) of adherence and 95% confidence intervals (CI) were calculated by logistic regression. Overall survival (OS) was assessed using Kaplan–Meier survival curves and log rank analysis; OS in patients who received adherent and non-adherent care were compared using multivariate Cox models. The effect of minority/historically underserved (M/HU) status, as well as its individual subcomponents (i.e., non-White race, Hispanic/Latina ethnicity, low education, low income, Medicaid coverage, lack of insurance, or rural residence) on adherence and outcomes were analyzed.

Results: Overall, 43.9% of patients received non-adherent care during the EFCT. Non-adherent rates for LRT, CT, and ET were 36.9%, 8.4%, and 3.4%, respectively. M/HU status was present in 42.1% of women. M/HU status was associated with higher rates of non-adherent care for EFCT (47.8% versus 41.1%, SMD>0.1), LRT (40.1% versus 34.6%, SMD>0.1), and ET (4.6% versus 2.5%, SMD>0.1). After controlling for age, M/HU status, comorbidity, year of diagnosis, tumor histology/grade/stage, hormone receptor status, treatment facility location/type, and distance to treatment facility, non-adherent care was independently and uniformly associated with worse OS: EFCT (HR 1.40, 95%CI: 1.36–1.43; Table); LRT (HR 1.42, 95%CI: 1.38–1.46); CT (HR 1.26, 95%CI: 1.21–1.31); and ET (HR 1.63, 95%CI: 1.55–1.72).

Conclusions: Persistent non-adherence to national EBTG for NIBC remains prevalent, particularly for LRT and among M/HU patients. Non-adherence to EBTG for EFCT, LRT, CT, and ET are all independently associated with worse OS in women with NIBC, even after controlling for other relevant factors. Non-adherence to EBTG is the leading, potentially modifiable, adverse predictor of long-term NIBC outcomes. Novel and effective interventions are urgently needed to ensure optimal receipt of evidence-based care in all women with NIBC to reduce cancer health disparities and help attain health equity.

Table. Predictors of overall survival (OS) in women with non-metastatic invasive breast cancer (NIBC)

Variable	aHR (95% CI)	*p* value
Adherence to EBTG (EFCT)		
No	1.40 (1.36 – 1.43)	P<0.001
Age	1.03 (1.03 – 1.03)	P<0.001
M/HU status		
Yes	1.30 (1.26 – 1.33)	P<0.001
Comorbidity		
Charlson-Deyo score ≥1	1.41 (1.36 – 1.46)	P<0.001
Stage		
II	1.94 (1.88 – 2.01)	P<0.001
III	6.18 (5.97 – 6.39)	P<0.001
Grade		
Moderately differentiated	1.29 (1.23 – 1.35)	P<0.001
Poorly differentiated	2.04 (1.95 – 2.15)	P<0.001
Hormone receptor status		
Negative	1.79 (1.73 – 1.85)	P<0.001
Facility Location		
West South Central	Ref	-
New England	1.05 (0.97 – 1.14)	NS
Middle Atlantic	1.07 (1.01 – 1.14)	P = 0.01
South Atlantic	1.24 (1.18 – 1.31)	P<0.001
East North Central	1.27 (1.20 – 1.35)	P<0.001
East South Central	1.25 (1.17 – 1.34)	P<0.001
West North Central	1.15 (1.08 – 1.23)	P<0.001
Mountain	1.08 (1.00 – 1.17)	P=0.04
Pacific	1.00 (0.95 – 1.06)	NS
Facility Type		
Academic/research program	Ref	-
Community cancer program	1.17 (1.11 – 1.22)	P<0.001
Comprehensive community cancer program	1.07 (1.04 – 1.10)	P<0.001
Integrated network cancer program	1.05 (1.01 – 1.10)	P=0.01

Abbreviations: aHR, adjusted hazard ratio; CFCT, complete first course of therapy; EBTG, evidence-based treatment guidelines; EFCT, entire first course of therapy; NS, not statistically significant; OT, overall therapy; Ref, reference.

1148253 - Machine learning-based epigenetic classifiers to identify lymph node metastases in breast cancer patients with ER-positive, HER2-negative invasive ductal carcinoma

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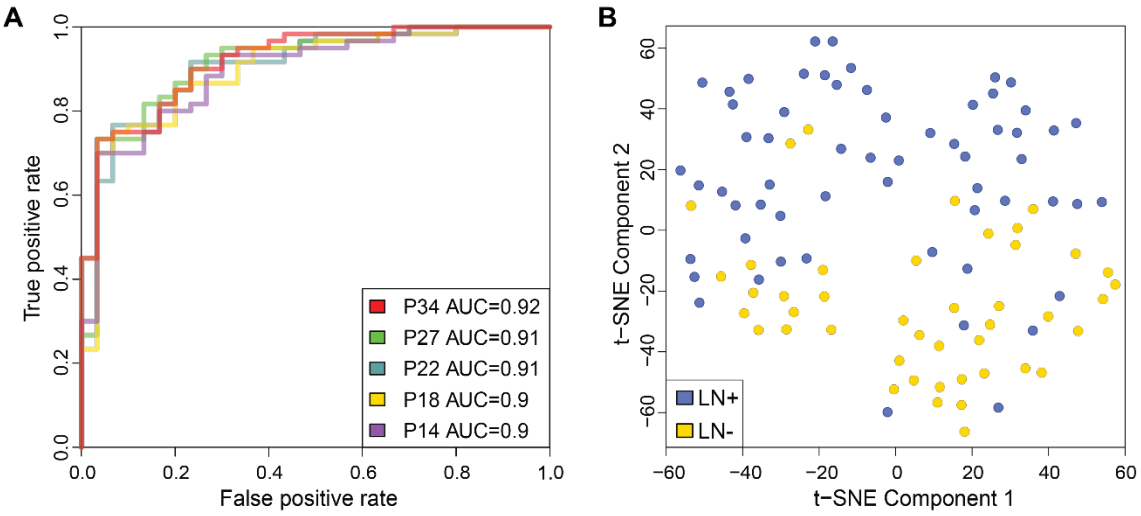
Background/Objective: Surgical staging of the axilla is becoming less relevant in the modern era of effective multimodality therapy for patients with early-stage breast cancer (EBC) who are not treated with neoadjuvant chemotherapy. The National Comprehensive Cancer Network considers surgical staging optional for patients with favorable tumors, older patients, and those whose treatment decisions will not be impacted. Since the ACOSOG Z0011 and RxPONDER trials, the status of the sentinel node less frequently influences surgical or adjuvant chemotherapy decision-making. Nodal status, however, still contributes in part to prognosis and stage. Although the morbidity of sentinel lymph node biopsy is significantly reduced compared to axillary lymph node dissection, no surgical procedure is without risk. Therefore, a non-surgical method for accurately predicting lymph node disease is the obvious next step in the de-escalation of axillary surgery for patients with EBC. In previous studies, we have demonstrated that epigenetic classifiers based on DNA methylation (DNAm) profiles are highly informative and robust methods for disease stratification. In this study, we evaluated this approach to identify epigenetic signatures in the primary tumor that predict lymph node disease.

Methods: We manually curated the cohort of breast cancer patients in The Cancer Genome Atlas (TCGA) to select patients with estrogen receptor-positive and HER2-negative, invasive ductal carcinoma (n=246) with clinically negative axillae. DNAm patterns from primary tumor specimens were compared between patients with pN0 and >pN0. Specimens with tumor purity <75% were removed from the analysis (n=79). Random Forest was employed in a training cohort to obtain the combinations of DNAm features with the highest accuracy for stratifying >pN0 patients. The most efficient combinations were selected according to the Area Under the Curve (AUC). All classifiers were then tested in an independent validation cohort.

Results: There were 76 differentially methylated sites (DMS) identified between pN0 and >pN0 patients. DMS displayed a modest predictive potential for identifying >pN0 disease (AUC=0.73), similar to current clinical-pathological nomograms (AUC=0.67-0.73). Machine learning approaches then generated epigenetic classifiers, which showed superior performance in training and validation cohorts (AUC>0.9; Figure). These epigenetic signatures demonstrated higher discriminative potential than the clinicopathologic variables tested.

Conclusions: Epigenetic classifiers based on primary tumor characteristics can efficiently stratify patients with no axillary lymph node involvement from those with axillary metastasis. These classifiers display better performance than current clinical-based nomograms. Identifying an accurate, non-invasive, and easily adoptable method for staging the axilla can provide the prognostic information needed without the morbidity associated with surgery. The small number of genomic regions employed for this analysis can facilitate the use of PCR-based assays, decreasing the cost compared to high-throughput technology, therefore allowing easier translation into clinical practice.

Figure. Performance of DNAm classifiers for prediction of lymph node involvement in patients with clinically node-negative, ER+/HER2- invasive ductal carcinoma. A- Receiver Operating Curve (ROC) generated with the entire cohort of patients and the top 5 best-performing DNAm classifiers. B- t-SNE representation of the stratification efficiency using a 34-genomic region DNAm classifier (P34) in a subset of patients.



1148580 - Assessing the value of long-term follow-up in surgically excised lesions of uncertain malignant potential in the breast – A 10-year review

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Background/Objective: B3 lesions are a heterogeneous group of breast lesions of uncertain malignant potential that usually require excision. The aim was to assess the efficacy of 5 years of routine radiological or clinical follow-up of patients who had high-risk B3 lesions surgically excised by analysing recurrence and subsequent development of invasive/in-situ cancer.

Methods: A 10-year retrospective review from 2010 - 2019 was performed of B3 lesions diagnosed on core needle biopsy, including patients who proceeded to surgical excision with a high-risk lesion on final histology. The database recorded 6 specific B3 lesion categories: 1. Atypical ductal hyperplasia (ADH), 2. Radial scars/complex sclerosing lesions with atypia 3. Lobular neoplasia (ALH/LCIS), 4. Papillary lesions with atypia, 5. Mixed, 6. Flat epithelial atypia (FEA), including radiological and clinical follow-up data.

Results: A total of 616 patients had a B3 lesion after core biopsy. Of these, 110 patients had high-risk lesions. This included 17 (15.5%) atypical ductal hyperplasia (ADH), 22 (20%) radial scars/CSL with atypia, 47 (42.7%) lobular neoplasia (LCIS/ALH), 7 (6.4%) papillary lesions with atypia, 13 (11.8%) mixed lesions and 4 (3.6%) flat epithelial atypia (FEA) lesions. Four of the 110 (3.6%) patients developed invasive/in-situ disease and 4 (3.6%) developed recurrence during follow-up. Thirty-three of the 616 (5.4%) patients upgraded to invasive/pre-invasive disease after surgical excision.

Conclusions: Five years of routine radiological surveillance may not be necessary in patients who undergo surgical excision of high-risk B3 lesions. Clinical surveillance appears to be of little benefit, especially in patients with radial scars, papillary lesions, and FEA. Subsequent development of invasive/in-situ disease in patients who undergo surgical excision of atypical B3 lesions remains low.

1148209 - Upgrade to malignancy after excision of atypical ductal hyperplasia on needle core biopsy and natural history under active surveillance

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Background/Objective: When atypical ductal hyperplasia (ADH) is diagnosed on needle core biopsy (NCB), excision is typically recommended due to historically reported upgrade rates of 10-20% for ductal carcinoma in situ (DCIS) and <5% for invasive carcinoma (IC). Thus, the natural history of ADH undergoing active surveillance is not well described. We aimed to investigate the rates of upgrade to malignancy (DCIS or IC) of patients who underwent immediate excision of ADH (surgery within 6 months of NCB), and the behavior of ADH undergoing active surveillance (AS) with interval imaging performed every 6 months to monitor for lesion progression.

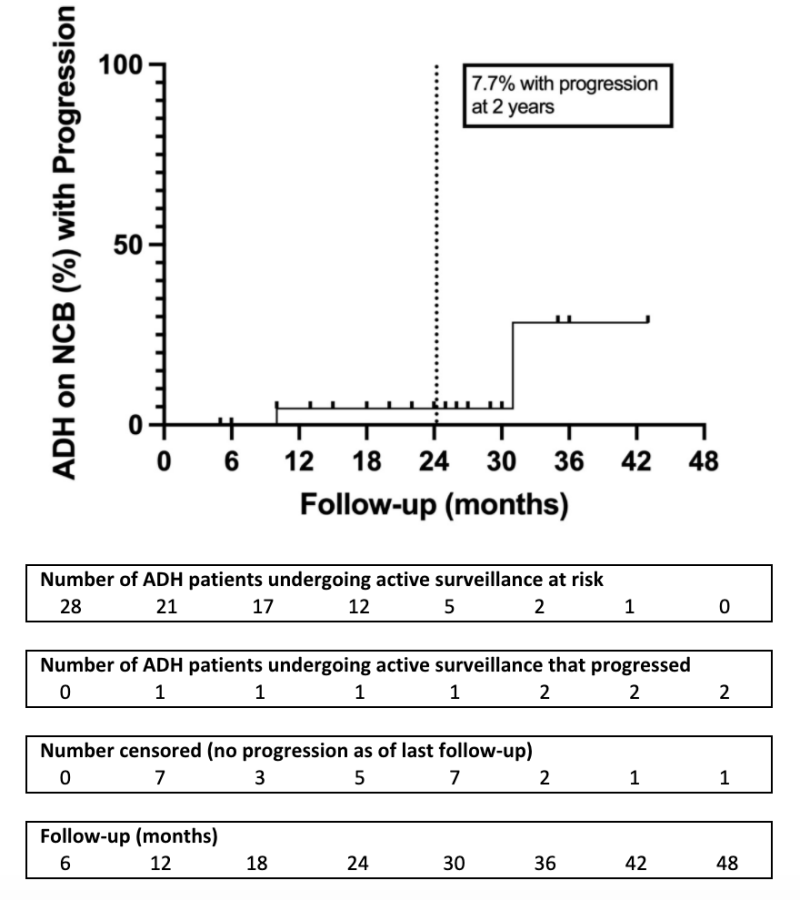
Methods: We retrospectively reviewed the imaging and pathology records of 215 patients with ADH diagnosed on NCB during a 6-year period (2015-2021), to determine the malignancy upgrade rate in patients who had immediate surgical excision, and to determine the rates of radiographic progression and malignancy upgrade in patients undergoing AS. Incidence of radiographic progression (increased calcifications or distortion on mammography; increased diameter on ultrasound) was determined by Kaplan-Meier method.

Results: The mean age of patients was 56 (+ 12) years, and 91% of lesions were mammographically screen detected (n=194). Of 215 patients, 86.5% (n=186) underwent immediate excision, while 13.5% (n=29) underwent AS with interval imaging. Lesions that were immediately excised or observed with AS had similar size (7 vs 6 mm). The upgrade rate among patients who underwent immediate excision was 18.3% (n=34): 15.6% (n=29) DCIS and 2.7% (n=5) invasive ductal carcinoma (IDC; median cancer size 4.5mm; range 1-22mm). Upgraded tumors were more likely to present with a sonographic mass (35% vs.18%, p=.02) and less likely to harbor focal atypia (18% vs 45%, p=.004). Upgrade rates were very low among lesions <4mm (3.7%, n=23) and lesions <1cm with focal ADH (4.5%, n=44). Among the 29 ADH lesions that underwent AS, median follow-up was 20 (range 4-43) months. The majority remained stable (45%, n=13), resolved (38%, n=11), or decreased in size (10%, n=3). Only 2 lesions progressed on imaging (7.7% at 2 years on Kaplan-Meier analysis); 1 declined surgery, and the other had a repeat NCB that was benign.

Conclusions: The most favorable ADH subgroups include patients with lesions <4mm or lesions <1cm with focal ADH, both of which had a <5% risk of malignancy. Of patients undergoing AS, the vast majority (92%) remained stable at 2 years. Our findings suggest that active surveillance, with surgery reserved for the small number of patients whose lesions demonstrate radiographic progression, is a safe approach to managing ADH on NCB for selected low-risk patients. This could spare many patients with

ADH from unnecessary surgery. Given that AS is being investigated for low-risk DCIS in multiple international prospective trials, these results suggest that AS should also be investigated for ADH.

Figure. Natural history of ADH on NCB undergoing active surveillance (percentage of ADH with radiographic progression)



1148142 - Contemporary trends in breast reconstruction use and impact on survival among women with inflammatory breast cancer

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Background/Objective: Breast reconstruction is generally discouraged in women with inflammatory breast cancer (IBC). Nevertheless, breast reconstruction rates are increasing amongst women with IBC. We aim to determine contemporary trends and predictors of breast reconstruction use and its association with mortality among women with IBC.

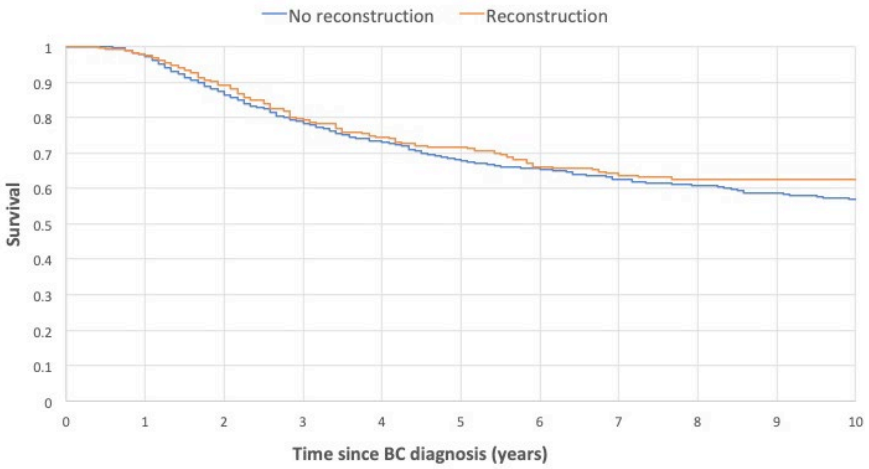
Methods: We conducted a cohort study of women diagnosed with non-metastatic IBC having mastectomy between 2004 and 2015 in the SEER18 database. We collected information on age and year of diagnosis, race, rurality, income, tumour size and grade, lymph node status, clinical stage, receptor

status (ER, PR, and HER-2/neu), surgical treatment (unilateral versus bilateral mastectomy), and vital status. Annual rates of breast reconstruction and contralateral prophylactic mastectomy were calculated. Predictors of breast reconstruction use were identified using a logistic regression model. We generated Kaplan-Meier curves to compare breast cancer-specific survival between women having and not having breast reconstruction in a 15-year follow-up period. We used a Cox proportional hazards model to compare relative hazards of cancer-specific mortality among reconstruction and no reconstruction groups. To account for selection among women that received reconstruction, we performed a propensity score analysis matching 1 reconstruction patient to 3 'no reconstruction' patients. Women were matched on the year and age at diagnosis (both within 2 years), surgical procedure, and propensity score. The propensity of reconstruction was generated using race, income, rurality, tumour grade and size, nodal status, and ER, PR, and HER2 status. A log-rank test was used to compare differences between groups using the Kaplan-Meier method. P-values <.05 were considered statistically significant.

Results: There were 4,076 women with non-metastatic IBC who underwent mastectomy; 388 (9.5%) had breast reconstruction, while 3,688 women (90.5%) did not. The proportion of women undergoing breast reconstruction increased from 6.2% in 2004 to 15.3% in 2015. Contralateral prophylactic mastectomy rates increased from 12.9% in 2004 to 29.6% in 2015. Younger age at diagnosis (<60 years old), higher annual income (>$75,000), living in a metropolitan centre, and having bilateral mastectomy predicted breast reconstruction use, while tumour grade, size, nodal status, and receptor status did not. The 10-year breast cancer-specific survival was 63.1% for women having breast reconstruction and 49.7% for women not having breast reconstruction. The cancer-specific mortality rate was lower among women who had undergone reconstruction (crude HR 0.72, 95% CI 0.60-0.86, P<.001). After accounting for demographic and clinical differences in these women in a propensity matched analysis, 10-year cancer-specific survival was similar among women having breast reconstruction (56.8%) and women not having breast reconstruction (62.4%) (adjusted HR 0.96, 95% CI 0.79-1.16, P=.65).

Conclusions: Rates of breast reconstruction continue to increase in women with IBC, particularly younger women and women with access to breast reconstruction. Breast reconstruction is not associated with inferior breast cancer-specific survival in women with IBC. Breast reconstruction can be an option for select IBC patients who desire the procedure.

Figure. Propensity-matched breast cancer-specific survival among women with inflammatory breast cancer having versus not having breast reconstruction



1143930 - Impact of post-mastectomy radiotherapy on patient reported outcomes for patients with breast cancer undergoing chemotherapy and mastectomy with immediate reconstruction

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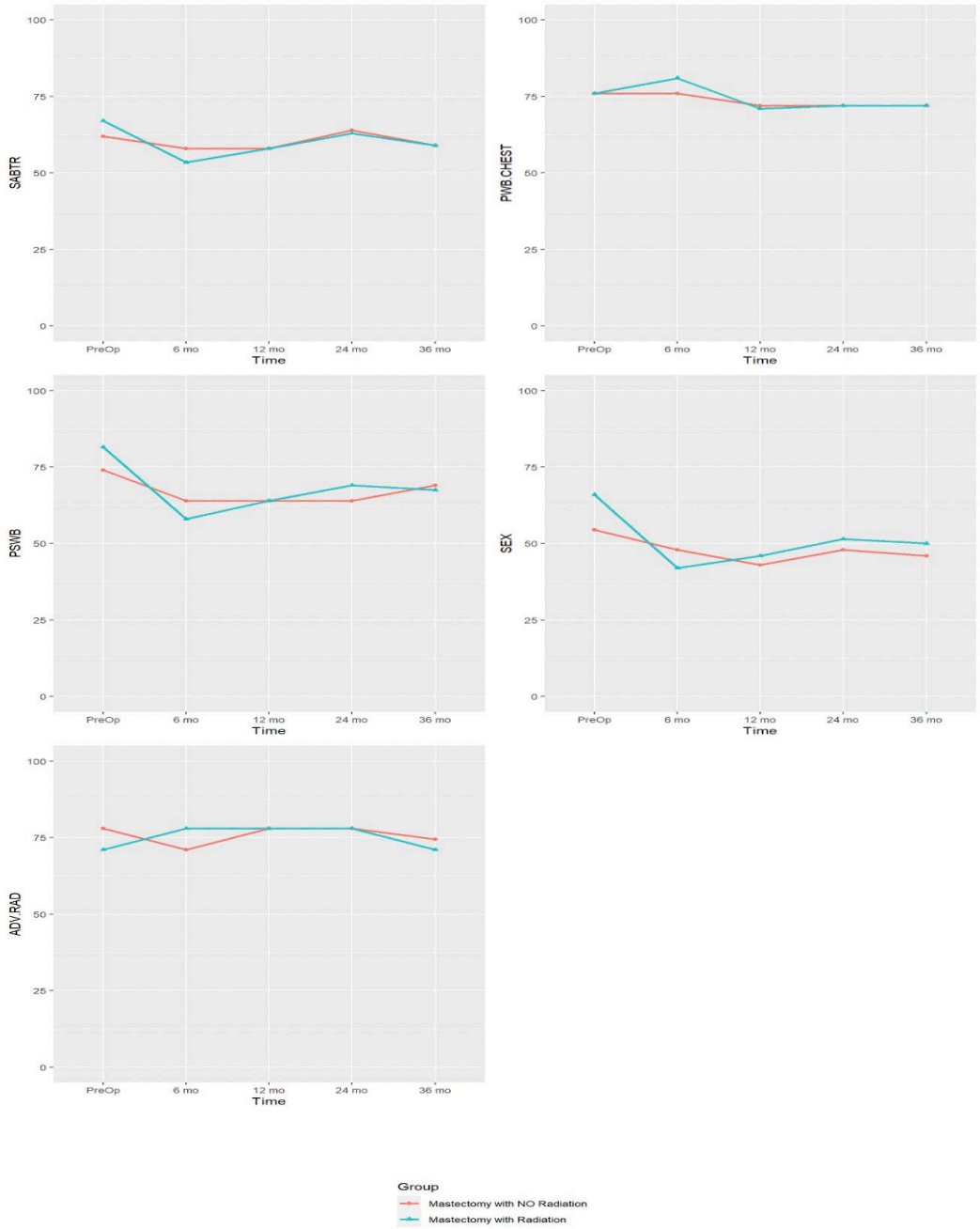
Background/Objective: Patient-reported outcome measures (PROM) are important tools to evaluate postoperative outcomes for patients with breast cancer. The BREAST-Q is a validated PROM for satisfaction and quality of life and is considered the gold standard PROM following breast reconstruction. Both chemotherapy and radiotherapy have independently been associated with decreased breast satisfaction. Our aim was to determine the impact of post-mastectomy radiotherapy (PMRT) on PROMs assessed with the BREAST-Q for patients treated with chemotherapy and mastectomy with immediate breast reconstruction.

Methods: This retrospective cohort study evaluated patients with Stage I-III breast cancer undergoing chemotherapy and mastectomy with immediate reconstruction between 01/2017 – 06/2019. Patients were divided into 2 groups - (1) mastectomy without radiation (M-alone) and (2) mastectomy with PMRT (M-PMRT). Patients completed the BREAST-Q pre-operatively and at the 6-month, 1-year, 2-year, and 3-year timepoints. Each domain of the BREAST-Q including satisfaction with breasts (SABTR), physical well-being of the chest (PWB-CHEST), psychosocial wellbeing (PSWB), sexual wellbeing (SWB), as well as adverse radiation effects (ADV-RAD) was scored on a scale of 0-100 and was compared between groups at baseline and for 3 years postoperatively. Univariate analysis was performed to compare patient and tumor characteristics among the groups.

Results: Of the 599 patients identified, 533 (89%) patients responded to at least 1 BREAST-Q survey. Of these, 236 patients (44%) had M-alone, and 297 patients (56%) had M-PMRT. Age (p=0.09), race (p=0.9), and BMI (p=0.4) did not differ between groups. M-PMRT patients were more likely to have ILC (M-alone 5.1%, M-PMRT 14.0%; p=0.004), HR+/HER2- receptor subtype (M-alone 45%, M-PMRT 64%; p<0.001), neoadjuvant chemotherapy (M-alone 33%, M-PMRT 61%; p<0.001), and axillary lymph node dissection (M-alone 19%, M-PMRT 67%; p<0.001) compared to the M-alone group. Nine percent (27/297) of M-PMRT patients developed complications following PMRT including mastectomy skin flap tissue loss, cellulitis/abscess, hematoma, or tissue expander removal. On univariate analysis with correction for multiple comparisons, there were no differences among M-alone and M-PMRT groups for SABTR, PWB-CHEST, PSWB, SWB, and ADV-RAD scores at any postoperative timepoint (Figure). For both M-alone and M-PMRT groups, compared to pre-operative baseline scores, 3 years scores across all domains (SABTR, PWB-CHEST, PSWB, and SWB) were lower except ADV-RAD, which was unchanged from baseline (Figure). When comparing responses to each of the questions within the ADV-RAD domain, there were no differences among the groups at any time point for marks on the breast (p>0.9), dryness (p=0.4), irritation (p=0.5), soreness (p=0.9), thickening (p>0.9), or noticeable differences in the breast (p>0.9).

Conclusions: For patients with breast cancer undergoing mastectomy with immediate reconstruction and treated with chemotherapy, no differences in SABTR, PWB-CHEST, PSWB, and SWB between M-alone and M-PMRT were noted at any time point. We found no difference in ADV-RAD scores at any time point suggesting that subtle adverse effects secondary to radiation as measured by the BREAST-Q may have been undetected by this tool. Further work is needed to adequately capture radiotherapy side effects experienced by patients undergoing radiation.

Figure. Satisfaction with breasts (SABTR), physical well-being of the chest (PWB-CHEST), psychosocial well-being (PSWB), sexual well-being (SEX), and adverse radiation effects (ADV RAD) 3-year post-operative scores for patients who had mastectomy without radiation (M-ALONE) compared to patients who had mastectomy with post-mastectomy radiotherapy (M-PMRT)



1148208 - Sensation-preserving mastectomy with implant reconstruction: Long-term outcomes and safety

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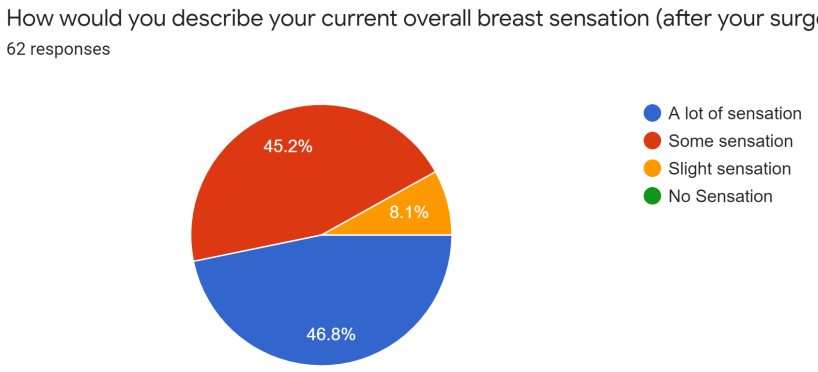
Background/Objective: Nipple-sparing mastectomy (NSM) with immediate reconstruction provides excellent aesthetic results, but poor post-operative sensation remains a major limitation. We describe the evolution of our novel, reconstruction technique combining the latest advances in oncologic, reconstructive, and peripheral nerve surgery to optimize sensory outcomes.

Methods: The study included 131 women (260 breasts) who underwent NSM and pre-pectoral, direct-to-implant reconstruction from May 2019 through July 2021. During this procedure, lateral intercostal nerves were preserved when anatomy was favorable from an oncologic standpoint. When nerves could not be preserved, nipple-areolar complex (NAC) neurotization was performed with a nerve graft coapted from the transected intercostal nerve to a subareolar nerve. One-point pressure thresholds were tested pre-operatively and at multiple time points post-operatively. BREAST-Q questionnaires assessed qualitative sensation and other patient-reported outcomes.

Results: Of patients with a minimum 6 months of follow-up, BREAST-Q and 1-point pressure thresholds outcomes were available in 61. At 6 month testing, >80% of patients had good-to-excellent 1-point pressure thresholds averaged across all areas tested, which increased to 92% at 1 year. Moreover, BREAST-Q responses demonstrated high levels of return of sensation, with 81% reporting their nipples were very or somewhat responsive to touch, and 86% of patients reporting their breasts still played a very or somewhat important role in intimacy. No patients developed chronic, post-mastectomy pain. Major complication rate was 2.3%, and 1 patient (0.8%) developed a new primary breast cancer 2 years after mastectomy.

Conclusions: This study represents the largest series to date of sensibility outcomes following NSM with implant reconstruction and nerve preservation/grafting. High levels of sensation and satisfaction demonstrate that we can achieve an aesthetically pleasing result along with good sensory outcomes. Future studies will focus on differential outcomes between subgroups differing along parameters such as age, implant size, adjuvant treatment, and nerve reconstruction techniques to further analyze and optimize our results.

Figure. Patient-reported breast sensation



1145548 - Postoperative hematomas in the era of outpatient mastectomy: Is ketorolac really to blame?

Sami Abujbarah[1], Kristen Jogerst[2], Heidi Kosiorek[2], Sarwat Ahmad[2], Patricia Cronin[2], Barbara Pockaj[2]
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Background/Objective: Enhanced recovery after surgery (ERAS) protocols for patients undergoing mastectomy with or without implant-based breast reconstruction (IBBR) are associated with decreased length of stay, increased rate of same-day discharge, decreased postoperative pain, and decreased postoperative opioid requirements. These protocols include ketorolac, and there is concern that use of ketorolac at the time of or immediately following mastectomy with or without implant-based reconstruction (IBBR) could be associated with an increased risk of postoperative hematoma. This study evaluates the association between ketorolac administration and rates of hematoma formation.

Methods: A retrospective chart review of all patients undergoing mastectomy with or without IBBR between January 2013 and December 2019 at our institution was completed. Mastectomy ERAS protocols were implemented in February 2017. Patients either didn't receive ketorolac, or they received 15mg or 30mg of ketorolac, depending on team adherence to the ERAS pathway, patient characteristics, and surgical team preference. Ketorolac was administered by the anesthesiology team at time of incision closure. Clinically significant hematoma formation was defined as hematomas that required surgical intervention on day of surgery or postoperative day 1. We first compared patients who received ketorolac, versus those who didn't, on their baseline demographics, surgical characteristics, and prevalence of hematoma formation. We then compared those who received 15mg versus 30mg of ketorolac. Finally, we used univariable and multivariable logistic regression to compare the odds of hematoma formation that required surgical intervention based on demographics, surgical characteristics, and receipt of ketorolac.

Results: A total of 800 patients met inclusion criteria: 477 patients who received ketorolac and 323 who did not. Those who received ketorolac were slightly younger, had a lower average ASA score, were more likely to have bilateral procedures, were more likely to undergo IBBR at time of mastectomy, had longer operative times, were less likely to be on preoperative antiplatelet or anticoagulation medications, had higher PACU pain scores, and were more likely to have hematomas requiring surgical intervention. The overall rate of hematoma formation requiring surgical intervention for the entire cohort was 4.4%. The 15mg and 30mg ketorolac groups had a similar rate of hematoma formation (6.0% vs 5.8%, p=.95). On univariable regression, there was increased odds of hematoma formation in patients who were younger, had bilateral procedures, had longer OR times, and those who received ketorolac. On multivariable regression, none of the previously identified variables retained their significance (Table).

Conclusions: After accounting for associations between ketorolac use and longer OR times, concomitant IBBR, and bilateral procedures, ketorolac administration did not remain an independent risk factor for hematoma formation. Since ketorolac use is not associated with an increased odds of hematoma formation, it continues to be a part of our multimodal analgesia regimen for patients following the mastectomy ERAS pathway.

Table. Odds of hematoma formation requiring OR intervention

Variables	Univariable Analysis			Multivariable Analysis		
	Odds ratio	95% CI	*p* value	Odds ratio	95% CI	*p* value
Age*	0.97	0.95 – 1.00	0.04	0.99	0.96 - 1.02	0.68
Bilateral procedure	2.55	1.14 - 5.68	0.02	1.74	0.69 - 4.39	0.24
Reconstruction	1.86	0.90 - 3.85	0.09	1.17	0.48 - 2.88	0.73
OR time¥	1.00	1.00 - 1.01	0.03	1.00	0.10 - 1.01	0.60
Ketorolac	2.82	1.21 - 6.52	0.02	2.18	0.90 - 5.26	0.08
Preop antiplatelet	1.00	0.41 - 2.46	1.00			
Preop anticoagulant	0.75	0.10 - 5.64	0.78			
Exparel	0.99	0.50 - 1.96	0.97			
ASA score (2 vs 1)	0.91	0.31 - 2.70	0.86			
ASA score (3 vs 1)	0.80	0.23 - 2.81	0.73			

Legend: Univariable and multivariable regression analysis of risk factors for post-operative hematoma requiring operative intervention
* Unit is one year
¥ Unit is minutes
All other variables are compared to a reference of not receiving the listed medication or undergoing the procedure

1146718 - Impact of COVID-19 restrictions on stage of breast cancer at presentation and time to treatment and surgery at an urban safety-net hospital

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Background/Objective: The COVID-19 pandemic disrupted health systems, with the Center for Disease Control recommending postponement of elective surgeries and medical procedures in March 2020. While cancer surgeries continued, screening mammograms declined during this time, and clinics were disrupted. Even pre-pandemic, patients accessing our urban safety-net hospital presented with 3-fold higher rates of late-stage breast cancer than other Commission on Cancer (CoC)-accredited sites across the country. Here we sought to determine the effect, if any, of the COVID pandemic on stage of breast cancer presentation, time to first treatment, and time to surgery at an urban safety-net hospital. We hypothesized that the pandemic would be associated with an increase in late-stage breast cancers at diagnosis among an already vulnerable safety-net population and expected to see delays in care.

Methods: An IRB-approved cohort study was conducted at an urban safety-net hospital. The COVID cohort spanned March 2020, when the local "stay at home" order was issued, through February 2021 when restrictions were lifted. This was compared to a pre-COVID control cohort from March 2018-February 2019. Patients with new breast cancer diagnoses (172, 90 pre-COVID, 82 during COVID) were identified through institutional cancer registry. Stage at presentation, time to first treatment, time to surgery, as well as demographic information including race and payer were collected and compared between the 2 cohorts using multivariate logistic regression and SAS. Late-stage disease was defined as Stage III or IV following American Joint Committee on Cancer 8th edition.

Results: Both cohorts had similar baseline characteristics (Table). Patients were more likely to present with late-stage disease in the COVID cohort than pre-COVID (31.7% vs 18.9% p=0.05). Multiple logistic regression controlling for race and insurance showed that it is 1.2 times more likely for our safety-net

women to present with late-stage disease during COVID restrictions as compared to pre-COVID ($p<0.05$). There was longer time to first treatment and longer time to surgery (when surgery was the first treatment) during COVID than pre-COVID (median 48 days vs 29 days to first treatment; median 65 days vs 36 days to surgery; both $p<0.001$).

Conclusions: Even before the pandemic, women accessing our safety-net were significantly more likely than women at other CoC sites across the country to present with late-stage breast cancer. Here we have shown that the pandemic further exacerbated this problem among our safety-net women, making it significantly more likely that they presented with late-stage breast cancer during COVID restrictions than before. We also showed a longer time to first treatment including time to surgery during COVID. Reasons for this are likely multifactorial. Institutional factors alone do not account for the delay since clinics were only briefly closed and cancer surgeries never stopped (though screening mammograms did). There may have been a perception on the part of patients that care was not accessible during this time, and stressors and competing priorities may have contributed to delays in seeking care. Every effort should be made to minimize disruption to safety-net hospitals during future shut-downs or public health crises, as these patients are already among our most vulnerable.

Table. Demographic variables and stage at breast cancer diagnosis during COVID and pre-COVID

	PreCOVID N=90	COVID N=82	Chi Squared/t statistics	P value
Self-described RACE				
WHITE	37 (41%)	32 (39%)	0.088	0.7803
Non-White	53 (59%) Black 43 Hispanic 6 Other 4	50 (61%) Black 37 Hispanic 11 Other 2		
INSURANCE				
None	20 (22%)	11 (14%)	3.4835	0.3229
Private	17 (19%)	15 (18%)		
Medicaid	31 (35%)	38 (46%)		
Medicare	22 (24%)	18 (22)		
AGE	54.8	55.1	-0.189	0.851
STAGE				
Stage 0-II	73 (81%)	56 (68%)	3.7601	0.0525
Stage III & IV	17 (19%)	16 (32%)		

1148098 - Risks and benefits of routine breast MRI in addition to digital breast tomosynthesis in patients with newly diagnosed breast cancer

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Background/Objective: Digital breast tomosynthesis (DBT) is a technological advancement that has increased the rate of cancer detection and decreased the rate of call-backs from screening over digital mammography alone. The role of routine bilateral breast MRI in the work-up of newly diagnosed breast cancer (BC) is controversial, and the added benefit of routine breast MRI over and above DBT remains undefined. This study was designed to assess the impact of routine breast MRI as an adjunct to DBT in newly diagnosed breast cancers.

Methods: A single institution retrospective analysis was performed of all newly diagnosed female BC patients between October 2015-November 2020 who underwent DBT and routine MRI pre-operatively. Patients who received neoadjuvant chemotherapy or underwent breast MRI for a specific diagnostic purpose were excluded. Clinical characteristics were compared.

Results: A total of 146 patients were included with median age of 56 years. Most patients had clinical T1-2 disease (N=107, 70%), and were clinically node-negative (N=133, 91%). Ninety-two (63%) patients had invasive ductal carcinoma (IDC), 17 (12%) had invasive lobular carcinoma (ILC), and 19 (13%) had ductal carcinoma in situ (DCIS). Most patients' tumors were estrogen receptor-positive (N=128, 88%), progesterone receptor-positive (N=116, 79%), and HER2-negative (N=117, 80%). The median time from biopsy result to surgery was 35 days [5-95 days]. Forty-nine of 146 patients (34%) underwent routine breast MRI demonstrating additional suspicious findings not seen on DBT. Of these, 28 (57%) patients did not undergo biopsy because the result would not have altered the surgical plan (N=14, 29%), or due to inability to visualize the abnormality or safely sample it at time of biopsy (N=12, 25%). In 2 cases, the reason biopsy was not performed was unclear. Of the 21 (43%) patients with suspicious MRI findings who underwent successful biopsy, more than half showed malignancy or a high-risk lesion (n=12, 57%). In total, 37 of the 49 (76%) patients who underwent routine MRI following DBT and had additional findings on MRI either did not undergo biopsy or underwent biopsy with benign results. Two patients (4 %) were diagnosed with additional DCIS, 8 (16 %) with IDC, and 1 (2%) with ILC, which overall represents 7% of the study group.

Conclusions: In this series of patients with newly diagnosed breast cancer who have undergone DBT, the routine use of bilateral breast MRI results in additional findings in about one-third of cases. However, 76% of these findings are non-contributory to the surgical plan, not reproducible or amenable to biopsy, or biopsy-proven benign. These false positive MRI findings may result in increased health care costs, patient anxiety, and time to definitive surgery. Nevertheless, these risks must be weighed against the small but real incidence of synchronous cancers not detected by DBT.

Currently Accruing Clinical Trials

1146129 - The VIVID Study: Volumetric Lumpectomy Specimen Image Visualization for Intraoperatively Directing Cavity Shaves: A Phase II study

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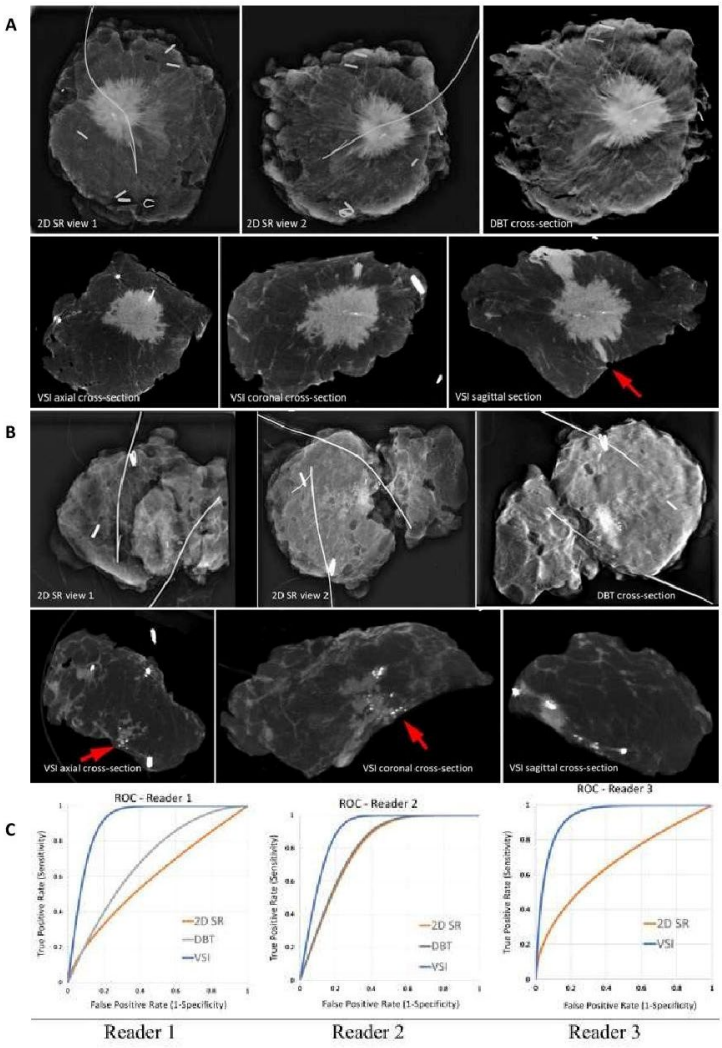
Background/Objective: Significant progress has been made in recent years in reducing re-excision rates after lumpectomy for breast cancer. However, data are still lacking from a prospective clinical study of a widely accessible technology that can reduce the re-excision rate to below 10%, the goal set by the ASBS. In our retrospective study, volumetric specimen imaging (VSI), a true 3D modality, showed superior sensitivity and specificity over 2D radiography and digital tomosynthesis (DBT). Based on these results, we are undertaking a prospective study evaluating the potential of VSI in reducing the positive margin rate to less than 10%.

Methods: This is a multicenter prospective single-arm study with historical control in patients undergoing lumpectomy for invasive breast cancer (IBC) or DCIS. After excision, the lumpectomy specimen is imaged using VSI and the 3D VSI image is interpreted by the surgeon and the radiologist to identify close or positive margins. The surgeon uses that information to excise "VSI directed shaves." Then, the surgeon completes the surgery according to their routine practice. At 2 months post-op, the surgeon completes a survey asking if re-operation would have been required if only the VSI-directed shaves were taken. These data will be compared with matched historical controls using multiple regression to power a follow-on phase 3 randomized trial.

Results: The study includes patients over 18 who are planning to undergo lumpectomy with localization (any localization device is eligible) for the management of IBC or DCIS. The lesion must have been visualized on mammography, DBT, ultrasound, or magnetic resonance imaging. Patients undergoing re-excision or who are expected to have an excised specimen larger than 9x9x7 cm are not eligible.

Conclusions: The primary objective is to determine if intraoperative use of VSI allows surgeons to accurately identify margin status, such that ≤10% of patients have positive margins on final surgical pathology. Additional objectives include sensitivity and specificity of VSI-directed shaves, time spent acquiring VSI images, volume of tissue excised in the main lumpectomy specimen and VSI-directed shaves, comparison of the estimated final positive margin rate for lumpectomy with VSI-directed shaving alone to the historical final positive margin rate, and comparison of the estimated reoperation rate for VSI-directed cavity shaving alone to the historical reoperation rate.

Figure. Example specimen images and ROC curves



1146759 - The PREDICT Registry Australia: A prospective registry study to evaluate the clinical utility of the DCISionRT test on treatment decisions in patients with DCIS following breast-conserving surgery

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Background/Objective: The benefit of adjuvant radiation therapy (RT) for women with ductal carcinoma in situ (DCIS) treated with breast-conserving surgery (BCS) remains controversial. Since there is level-I evidence supporting the role of RT in reducing the risk of local recurrence, current guidelines generally recommend adjuvant RT for all women having BCS. However, the absolute benefit of RT is variable in women with DCIS, and so it is important to develop prognostic and predictive tools to better assess risk and RT benefit. The DCISionRT Test (PreludeDx, Laguna Hills, CA) is a biologic signature that provides a validated score (DS) for assessing 10-year risk of recurrence and RT benefit using individual tumor biology, as assessed by clinical and pathologic biomarkers. The primary objective of the PREDICT registries is to understand the decision impact such a tool would have on treatment decisions.

Methods: This is a multicenter, prospective, non-interventional (observational) cohort study for women diagnosed with DCIS of the breast. After diagnosis of DCIS, sites will send the most representative tissue block or sections mounted on charged slides for DCISionRT testing. Treating physicians will complete a treatment recommendation survey before and after receiving DCISionRT test results. Test results, treatment recommendations, patient preferences, and clinicopathologic features will be stored in a de-identified registry for participating institutions from a variety of geographic regions across Australia. Women will be followed for up to 10 years with completion of a follow-up form. The study has been approved by the North Shore Local Health District Human Research Ethics Committee, St Leonards, NSW, Australia. Universal Trial Number (UTN): U1111-1266-0439; ANZCTR: ACTRN12621000695808; ClinicalTrials.gov: NCT04916808.

Results: The study includes females aged 26 or older who are candidates for BCS and eligible for RT and/or systemic treatment. Subjects must not have been previously treated for DCIS or have previous or current invasive or micro-invasive breast cancer.

Conclusions: The primary endpoints are changes in treatment recommendations for surgical, radiation and hormonal therapy. Secondary endpoints are identification of key drivers for treatment recommendations, including age, size, grade, necrosis, hormone receptor status, and patient preference.

1147401 - A prospective, multi-center, randomized, double-arm trial to determine the impact of the Perimeter B-Series OCT System on positive margin rates in breast conservation surgery

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Background/Objective: Optical coherence tomography (OCT) is a high-resolution tissue-imaging modality that enables real-time, high-resolution imaging of substructures with a penetration of up to 2mm. The Perimeter B-Series OCT System (Perimeter Medical Imaging AI, Toronto, Canada) combines wide field-OCT (WF-OCT) imaging with an artificial intelligence system, ImgAssist, that is designed to assist clinicians in the detection of lesions suspicious for breast cancer within the image. The objective of this investigational device trial is to measure the effectiveness of adjunctive Perimeter B-Series OCT System use compared to the standard of care in identifying and addressing positive margins intraoperatively.

Methods: This is a prospective, multicenter, randomized, double-arm trial in females with biopsy-confirmed cancer undergoing breast conservation surgery (registered with clinicaltrials.gov; released 2 NOV 2021). Following lumpectomy and standard-of-care intraoperative margin assessment, but before skin closure, participants will be randomized to the device or control arm (2:1 schema). Participants in the control arm may undergo intraoperative pathology or frozen section analysis, per the institution's routine standard of care. In the device arm, WF-OCT imaging and analysis will be conducted on all specimen margins, with an opportunity to excise tissue from the lumpectomy cavity post-analysis. The new margin will be imaged with WF-OCT, and the surgeon may take additional tissue up to a maximum of 6 total shaves, including up to 2 shaves in each orientation.

Results: Adult females undergoing breast conservation surgery for the treatment of biopsy-confirmed Stage 0-III invasive ductal and/or ductal carcinoma in situ are eligible. Patients post neoadjuvant therapy will be eligible. Pregnant or lactating participants, those with Stage IV cancer, lobular carcinoma as primary diagnosis, previous ipsilateral breast surgery, multi-centric or bilateral disease, use of cryoassisted localization, or any prior treatment affecting margin integrity will be excluded.

Conclusions: The study hypothesis is that adjunctive use of the Perimeter B-Series OCT System in breast conservation surgery will reduce the proportion of subjects with at least 1 unaddressed positive margin. The primary endpoint is occurrence of at least 1 unaddressed positive margin for a subject. The secondary endpoint is the number of unaddressed positive margins per subject. Safety outcomes are adverse events, number of false-positive shaves per subject (device arm), and patient-reported BREAST-Q Satisfaction with Breasts subscale. Other outcomes are total excised tissue volume, initial procedure; total excised tissue volume, all procedures including repeat surgeries; margin-level effectiveness (sensitivity, specificity, negative predictive value, positive predictive value); and operative time.

1148135 - A pivotal phase III randomized clinical trial to evaluate the safety and efficacy of the fluorescent imaging agent PDG-506-A for the real-time visualization of cancer during standard of care breast-conserving surgery

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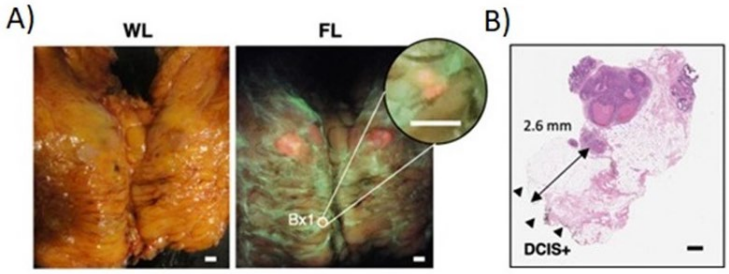
Background/Objective: The goal of breast-conserving surgery (BCS) is to adequately resect the primary breast tumor while conserving as much healthy tissue as possible. Despite best efforts to assess the completeness of surgical resection intraoperatively, positive margins remain frequent after BCS. This often results in the need for repeat surgical procedures to obtain free margins. Potentiated by a recent Phase II study, this ongoing Phase III randomized clinical trial (ClinicalTrials.gov Identifier: NCT04815083) evaluates the safety and efficacy of the imaging agent PDG-506-A for real-time intraoperative fluorescent visualization of cancer during BCS. PDG-506-A, also known as aminolevulinic acid hydrochloride (ALA HCl), is an investigational drug that is converted in the body into the fluorescent molecule protoporphyrin IX (PpIX) that accumulates in cancer cells.

Methods: Three hours prior to anesthesia, patients will receive orally either placebo or PDG-506-A solution which selectively accumulates in tumor tissues to produce PpIX fluorescence in vivo. The Eagle V1.2 Imaging System will then be used to identify areas of fluorescence in the resected BCS specimen or the lumpectomy cavity in patients who are randomized to receive PDG-506-A solution (group allocation is unblinded following completion of standard of care (SoC) BCS). Additional tissue from the surgical cavity will be removed based on the presence of fluorescence in the excised specimen and/or in the lumpectomy cavity. Data collected include patient demographics, tumor characteristics, adverse events, presence of fluorescence in the cavity and/or resected specimen, histopathologic assessment of resected tissues, patient-reported cosmetic outcome, and re-excision rates.

Results: Eligible patients must be female, ≥18 years of age, with histologically confirmed invasive primary breast cancer on core biopsy. Patients must have normal organ and bone marrow function and have agreed to undergo BCS for their primary breast cancer.

Conclusions: The primary aims are to 1) evaluate the safety and efficacy of PD G 506 A and 2) characterize the diagnostic performance of PD G 506 A to identify malignant breast tissue using the Eagle V1.2 Imaging System.

Figure. A) White light and corresponding fluorescence image of breast lumpectomy from a patient receiving 15 mg/kg 5-ALA HCl. B) H&E-stained tissue section detected the presence of ductal cell carcinoma in situ (DCIS) >2 mm below the imaged surface.



1148491 - Sentinel lymph node biopsy with/without axillary dissection in clinically node-positive breast cancer after neoadjuvant chemotherapy

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Background/Objective: Omitting axillary lymph node dissection (ALND) following sentinel lymph node biopsy (SLNB) in patients with initially clinically node-positive disease after neoadjuvant chemotherapy (NAC) is still controversial. NEOSENTITURK MF-18-03 is a prospective multicentric cohort study evaluating whether omitting ALND could be oncologically safe in a subgroup of patients with residual nodal disease in SLNs after NAC. The secondary objective measured in this study include infection, drain duration, total drain output, operative blood loss, and device-related operative, perioperative, and up to 2 months post-operative adverse events.

Methods: All patients with clinically positive axilla will undergo neoadjuvant chemotherapy. Axillary FNA is strongly recommended. However, presence of radiologically (USG, MRI, PET-CT) suspicious lymph nodes will be also considered as clinically axillary positivity. Placing a clip into the suspicious lymph node with positive FNA is also recommended. All patients with clinical node negativity (physical exam, USG, and/or MRI, or PET-CT) after NAC will be considered for SLNB with any technique (blue dye alone, radionuclide alone, or both combined). At least 2 sentinel lymph nodes will be obtained. Targeted axillary dissection by removing the SLNs and the clipped lymph node is also recommended as axillary surgical procedure if the suspicious lymph node is clipped before starting with NAC. All patients having SLNB or TAD with clinically-negative axilla after NAC will be included into the study: 1. SLNB (-)/(+) and level 1-3 RT (N=1500) 2. SLNB(-)/(+) and ALND and level 3 RT (+/-level 1-2) (N=1500) Quality of life will be assessed by SF-12 (V2) forms calculating PCS-12 (Physical Health Composite Scale) and MCS-12 (Mental Health Composite Scale) scores. Lymphedema will be evaluated by circumferential measurements of the arm width at 6 anatomical points and Quick-Dash questionnaire.

Results: Patients between age 18 to 70 and cT0-4, cN1-3, M0 are included into the study, whereas patients with any previous axillary surgery, inflammatory breast cancer, breast cancer diagnosed during pregnancy, without axillary radiotherapy, patients with metastatic disease and patients with a secondary breast cancer or secondary malignancy are excluded.

Conclusions: The primary endpoints are disease-free survival defined as time from diagnosis of cancer to any event as local, regional, or distant recurrence, disease-specific survival defined as time from diagnosis to death from breast cancer, and overall survival defined as time from diagnosis to death from any cause. The secondary endpoints are patient reported morbidity outcomes such as lymphedema, shoulder function, and long-term quality of life.

NEOSENTITURK/MF-18-03,Trial (http://clinicaltrials.gov/ct2/show/nct04250129))

1148854 - The CHEST Trial: ConMed HelixAR ElectroSurgical Generator with Argon Beam Coagulation Technology

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Background/Objective: Hemostasis after completion of mastectomy remains a critical part of any operation. Whether hemostasis or perioperative outcomes may be improved with novel surgical technologies is unknown.

Methods: The CHEST study is a prospective, randomized, controlled trial designed to evaluate the difference in post-mastectomy time to hemostasis between HelixAR Electrosurgical Generator (trial device) and conventional electrosurgical coagulation (control). Subjects are randomized 1:1 with permuted block randomization within 2 strata (unilateral vs. bilateral mastectomy). Eligible patients will be those undergoing unilateral or bilateral mastectomy with reconstruction. All patients will be surveilled for 2 months postoperatively for adverse events.

Results: Eligible patients will be those undergoing unilateral or bilateral mastectomy with reconstruction.

Conclusions: This study is designed to evaluate device efficacy between HelixAR Electrosurgical Generator and conventional electrosurgical coagulation systems for cutting and/or coagulation of tissues during mastectomy, as measured by post-mastectomy time to hemostasis.

Age Extremes

1145953 - The effect of comorbidities in electing neoadjuvant chemotherapy for elderly breast cancer patients

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Background/Objective: Neoadjuvant chemotherapy (NAC) is often employed for operable, locally advanced breast cancer with equivalent survival outcomes compared to adjuvant chemotherapy but may be used differently in elderly breast cancer patients due to medical comorbidities and declining organ function. We hypothesized that patients with multiple comorbidities were more likely to undergo upfront surgery (SX).

Methods: We performed an IRB-approved matched cohort study of female breast cancer patients >70 years old diagnosed between 1998-2016, treated with SX compared to NAC. Patients were matched by performance scale, surgery type, and hormone receptor (HR) status. Comparisons between NAC and SX conducted using Wilcoxon rank sum test for continuous variables, Fisher exact test for categorical variables, and Log-rank test for overall and recurrence-free survival.

Results: A total of 43 SX breast cancer patients were matched to 43 with NAC. Median age at diagnosis was 74 years (range 70-85), and median follow-up time was 57 months (range 4-181); 80% of patients were ECOG 0, 17% were score of 1, 3% were score of 2, and 70% had a Karnofsky score of 100. The prevalence of comorbidities was 37% heart disease, 14% diabetes, and 54% hypertension. The patients treated with NAC were younger, median age 73 v 75 (p=0.004). There was no significant difference in performance score at diagnosis (Karnofsky or ECOG) between NAC versus SX. Patients with heart disease were more likely to receive SX (p=0.003), while patients with a smoking history were more likely to undergo NAC (p=0.028). SX patients were more likely to have >2 comorbidities (p=0.030). T stage and N stage had no statistically significant impact on surgery type. SX patients were more likely to undergo sentinel lymph node biopsy (p<0.001), while axillary dissection patients were more likely to have NAC, this was not statistically significant (p=0.096). Patients who underwent SX were more likely to have HR-positive tumors. Among patients who received adjuvant radiation therapy, 34% had SX, while 66% received NAC (p=0.003). NAC patients were significantly less likely to receive adjuvant hormonal therapy, most likely due to HR negative tumor profile (p<0.001). There was no statistical difference in margin status or re-excision between SX versus NAC. Lumpectomy versus mastectomy also did not have a statically significant impact on recurrence or survival. Of the patients with HR positive tumors, 85% received HR therapy. There was a statistically significant difference in recurrence when matched for HR (p=0.031): patients who received adjuvant hormonal therapy were less likely to have recurrence. Patients with HR positive tumors were more likely to receive adjuvant HR therapy if they did not have a co-morbidity; this was not statistically significant (p=0.157).

Conclusions: Our analysis suggests that elderly patients with at least 2 comorbidities or heart disease alone are more likely to undergo SX. Younger women (median age 73) and patients with a smoking history are more likely to receive NAC. Elderly patients with HR positive tumors benefit from HR therapy

with lower recurrence rates. These findings will help providers counsel elderly patients and avoid undertreatment.

Table. Characteristics of elderly breast cancer patients who received upfront surgery (SX) versus neoadjuvant chemotherapy (NAC)

Characteristic	SX N=43	NAC N=43	p-value
Median Age	75	73	**0.004**
Heart disease	22 (51%)	9 (21%)	**0.003**
History smoking	12 (28%)	23 (53%)	**0.028**
Diabetes	8 (19%)	4 (9%)	0.265
Surgery type			
Lumpectomy	15 (35%)	15 (35%)	1.00
Mastectomy	28 (65%)	28 (65%)	
pT stage			
0	0 (0%)	13 (30%)	**<.001**
1	24 (56%)	20 (47%)	
2	16 (37%)	9 (21%)	
3-4	3 (7%)	1 (2%)	
pN stage			
0	27 (63%)	24 (56%)	**0.049**
1	15 (35%)	11 (25%)	
2-3	1 (2%)	8 (19%)	
SLNB	41 (95%)	16 (37%)	**<.001**
ALND	8 (19%)	30 (70%)	0.096
ER positive	32 (74%)	11 (26%)	**<.001**
PR positive	18 (42%)	6 (14%)	**0.007**
Her2 positive	7 (16%)	0 (0%)	**0.012**
Adjuvant radiation	17 (40%)	33 (77%)	**0.003**
Adjuvant hormonal therapy	27 (63%)	11 (26%)	**<.001**

1146318 - Patterns of specialist consultations among older women with breast cancer: A population-based study

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Background/Objective: Older women constitute approximately one-third of patients with a new diagnosis of breast cancer. Multidisciplinary care is the cornerstone of breast cancer treatment. However, receipt of treatment must be balanced with patient frailty and co-morbidities. We examined patterns of and factors associated with specialized cancer consultations for older women with newly diagnosed breast cancer.

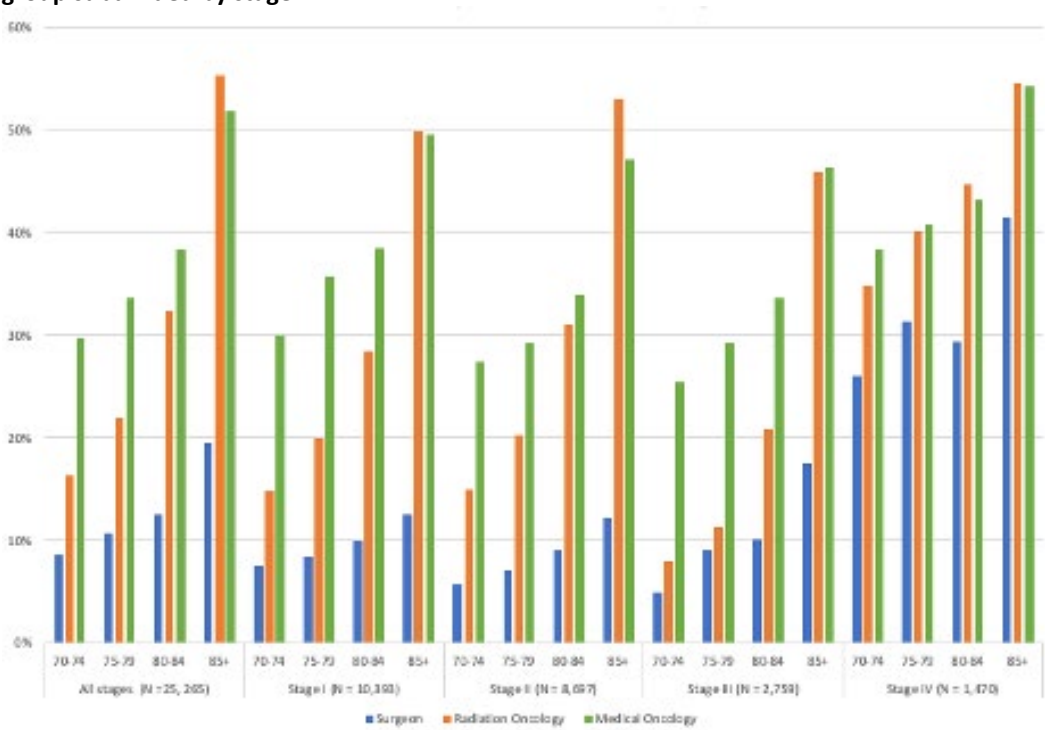
Methods: We conducted a population-based retrospective cohort study of older women (>=70 years old) with incident breast cancer (2010-2018) by linking administrative databases in Ontario, Canada. The outcome of interest was specialized cancer consultation within 12 months of diagnosis, reported as any consultation and broken down by specialty. Factors associated with not receiving specialized consultation were examined using Poisson regression modeling.

Results: Of 25,265 included older women, 4.4% (n=1,111) did not have any specialized cancer consultation within 12 months of diagnosis, with lack of any specialist consultation increasing with age

(1.5% for 70-74, 2.6% for 75-80, 4.6% for 80-84, and 11.9% for >=85; p < 0.001). Consultations with surgery, radiation oncology, and medical oncology lacked in 12.0% (n=3,042), 28.4% (n=7,187), and 36.7% (n = 9,264) of patients, respectively (Figure). We elected to model lack of medical oncology consults as there was a low number of patients who did not receive a surgical consultation. Increasing age group was associated with an increased likelihood of lacking medical oncology consultation, with hazard ratio (HR) 1.10 (95% Confidence Interval – 95% CI: 1.05-1.16) among 75- 79, H: 1.20 (95%CI 1.14-1.26) among 80-84, and HR 1.54 (95% CI 1.47-1.61) among >85. Patients residing in a rural area (HR 0.73, 95% CI 0.62-0.87) and patients diagnosed more recently were less likely to lack medical oncology consultation (HR 0.84, 95%CI 0.79-0.90). Tumor characteristics (stage, triple-negative status, and HER2 status) were not associated with medical oncology consultation.

Conclusions: While the proportion of older women with a new diagnosis of breast cancer who did not receive any specialized cancer consultation was low, more than a third of patients did not have a consultation with medical oncology. Oldest older women were at higher risk of lacking medical oncology consultation, indicating potential age-based disparities in access to and receipt of care. Further research is needed to understand barriers to older women accessing medical oncology consultation and the relationship with outcomes.

Figure. Rates of omission of specialist consultations (surgeon, radiation oncology, medical oncology) by age group subdivided by stage



1147322 - Endocrine therapy alone in older adults with good prognosis estrogen receptor-positive breast cancer

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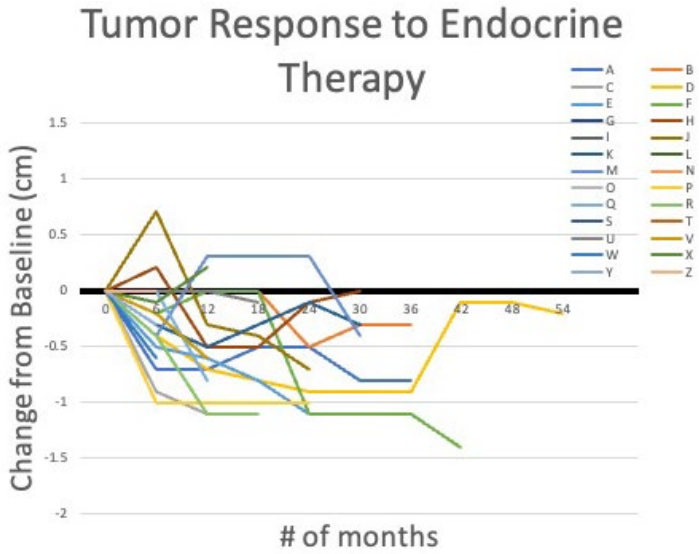
Background/Objective: Thirty percent of all new breast cancers are diagnosed in women over the age of 70. Women in this age group have variable care due to overall health at baseline and functional status. Furthermore, women over the age of 70 are likely to die of other comorbidities. De-escalation in this patient population has been of great interest as evidenced by multiple trials looking at omitting surgery, radiation, and endocrine therapy. Morgan J et al determined that 60% of ER positive patients will have stable disease at 10 years on endocrine therapy. There are not much data looking at optimal monitoring protocol and rate of local regional progression. We aimed to evaluate the rate of local progression in this population.

Methods: Our study aimed determine that women over the age of 70 with clinical T1-2, N0, ER +, HER2-, low-risk invasive breast cancer will achieve control of their disease at 5 years. Low risk was defined as women with Grade 1 or 2 breast cancer and Oncotype Recurrence Scores (RS) less than 25. Thirty-four women were given endocrine therapy only after enrollment, and they were imaged every 6 months with either ultrasound or mammography to determine changes in tumor size. The primary endpoint was determining the change in size in 6-month intervals.

Results: Between 2017-2021, 34 patients consented to participate in this study in which they were given endocrine therapy alone. Eight patients dropped out of the study due to death or desire to pursue surgery. The remaining 26 patients were studied. The average age of women in this study was 79 years old, and the average size of the tumor prior to treatment with endocrine therapy was 15.65mm. The average RS was 12.4. Twenty-one women were given anastrozole, and 5 women were given letrozole. At a median of 12 months, all but 1 patient had a decrease in tumor size, and the average decrease in tumor size was 4.4mm. Half of the women had imaging surveillance with ultrasound, and the other half had mammograms.

Conclusions: In the 4 years of data collected, we saw disease either stay stable or decrease in size. These are important data to move forward in comparing endocrine therapy to surgical therapy. Limitations of our study would be differences in obtaining the images. Size measurements are dependent on technicians doing the imaging. Also, we did not have a uniform modality for measurements. Currently, we have a trial open randomizing patients into surgery vs endocrine therapy in this patient population. The data from that study will be helpful in determining long-term recurrence and disease progression data comparisons. This will help determine statistical significance of endocrine therapy versus surgical treatment.

Figure. Tumor response to endocrine therapy



1148588 - Determining research priorities for young women with breast cancer: A priority-setting partnership

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Background/Objective: Women under the age of 40 years account for approximately 5-7% of breast cancer cases. Young women with breast cancer (YWBC) often have a biologically distinct disease and unique considerations compared to older women, leading to significant opportunities for research to improve patient outcomes and quality of life. Potential disconnects between research being performed and that deemed meaningful and relevant to patients may impede clinical uptake and knowledge translation. The James Lind Alliance (JLA) brings patients, caregivers, and clinicians together in priority setting partnerships (PSPs) to determine key priorities in health research. The objective of this research was to determine the top-10 research priorities for YWBC using an established, multi-stakeholder, priority setting methodology.

Methods: An adapted JLA PSP process was used to determine research priorities for YWBC. A balanced, 15-member steering committee composed of patients, caregivers, and clinician representatives from across Canada was created to coordinate and implement the activities of the PSP including the creation, approval, and dissemination of a nation-wide survey. Survey responses were received in text-based format, sorted, and separated into themes, and eventually organized into scientific questions. A raw list of potential uncertainties underwent a reduction process whereby duplicates were combined and out-of-scope questions were removed. The steering committee voted on a shortlist of 50 questions to be used in the interim prioritization survey. The interim prioritization survey was disseminated back to participants, and a reverse ranking process was used to identify the top 30 priorities brought to the final consensus meeting. The final meeting took place through an interactive, virtual, one-day workshop using a nominal group technique with patients, caregivers, clinicians, and other stakeholders from across Canada and culminated in consensus on the top 10 priorities for YWBC.

Results: There were 1412 responses generated from 359 respondents (75% patient generated). A raw list of 423 unique questions were developed once out-of-scope (n=278) and repeat questions (n=711) were eliminated. Of the remaining questions, 209 were deemed to be gaps in knowledge pertaining specifically to YWBC, while the remainder were questions about breast cancer in general. This list was reduced through iterative voting to the top 50 by the steering committee, top 30 through the interim prioritization survey, and eventual top 10 through a final consensus meeting. The priority areas identified include surgical outcomes, tamoxifen duration, effect of interruption to hormone blockade, biological markers to detect microscopic disease, long-term consequences of treatment-induced menopause, lifestyle and modifiable factors to reduce recurrence, prediction tools for identifying young women at high risk of developing breast cancer, the impact of inflammatory and autoimmune diseases on developing breast cancer in the young, indications for more aggressive treatment, and quality improvement to reduce the interval period between diagnostic treatment and diagnosis.

Conclusions: This work is part of an integrative knowledge translation strategy in partnership with the Reducing the bUrden of Breast Cancer in Young women (RUBY) study, the broader early-onset breast cancer community, as well as funding agencies.

1148611 - What is the surgical choice of young women with breast cancer who receive panel genetic testing?

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Background/Objective: Breast cancers in young adult patients are rare, typically diagnosed in later stage, and tend toward more aggressive clinicopathologic features. Approximately 10-15% of all breast cancers stem from genetic predisposition, and patients diagnosed with breast cancer at a young age (age 45 or younger) are recommended to undergo genetic testing. Genetic panel testing analyzes genes associated with hereditary breast cancer (e.g., BRCA 1/2, PALB2), while also including genes that have no definitive evidence of increased development of breast cancer. Here we seek to review our experience with young breast cancer patients, their multigene genetic panel status, their surgical choice, and rate of genetic testing prior to their breast cancer diagnosis.

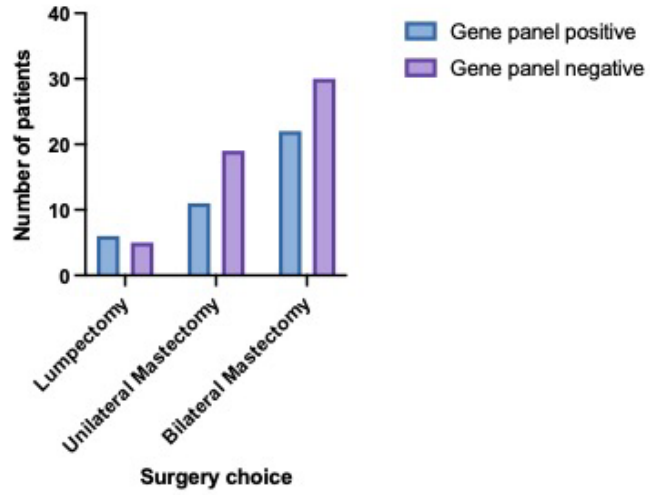
Methods: We analyzed our academic medical center's prospectively maintained database of young breast cancer patients. This database was reviewed for demographics, breast cancer diagnosis, tumor features, genetic panel status, surgery, and recurrence.

Results: A total of 92 patients under 40 years old diagnosed with breast cancer between 2013 and 2018 were identified and included. Average age was 34.5 years (SD 4.2, range 23-39). The most frequent race/ethnicity was Caucasian (66.3%), Black (19.6%), Latinx (12.0%), and Asian (1.1%); 1.1% did not specify. Of these, 46.7% patients met criteria for genetic testing before breast cancer diagnosis; only 7.0% of those were tested before breast cancer diagnosis. Nearly all patients were referred to a genetic counselor after breast cancer diagnosis (95.7%). Most patients were diagnosed with invasive ductal carcinoma (75.0%) and DCIS (10.9%). Most patients' tumors were Nottingham grade 3/3 (43.5%) or grade 2/3 (35.9%). Many patients presented at Stage II or Stage III (38.0% and 20.7%, respectively), and

with positive nodal metastasis (44.6%). Most patients had hormone receptor-positive tumors (57.6%), and 22.8% had triple-negative breast cancer. Approximately half the patients had a negative genetic panel (54.3%). Of the patients who tested negative, 10% underwent lumpectomy, compared to 38.0% unilateral mastectomy, and 60.0% bilateral mastectomy. Amongst those with positive genetic panel (38.0%), 17.1% had a lumpectomy, 31.4% unilateral mastectomy, and 62.9% bilateral mastectomy. There was no significant relationship between genetic panel and surgery choice (p=0.58). Fourteen patients had recurrence (15.2%). Of these, 7.1% were local recurrence, 7.1% regional, 85.7% distant. Of the patients who recurred, 5 (35.7%) tested positive for mutation, 8 (57.1%) negative, and 1 patient has unknown panel status. There were 16 deaths in our review: 15 patients died of complications of breast cancer; 1 cause of death is unknown.

Conclusions: Our young patients had aggressive tumors and presented at a later stage. More than half of patients had a negative genetic panel, and they had a similar rate of mastectomy as the positive panel cohort. Close to half of patients met guidelines for genetic testing prior to breast cancer diagnosis, and only 7% of these patients had genetic testing prior to their breast cancer diagnosis. This discrepancy presents an opportunity to increase genetic testing prior to breast cancer diagnosis, which could potentially lead to earlier stage at diagnosis. Additionally, more research should be done to understand the bearing of lesser-known mutations on a patient's surgical choice.

Figure. Gene panel status and surgery choice



1141669 - Are Hispanic women at higher risk? Evaluating prevalence and treatment patterns of idiopathic granulomatous mastitis

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Background/Objective: Idiopathic granulomatous mastitis (IGM) is a rare, benign, chronic inflammatory breast disease that affects mostly women of childbearing age with a history of breastfeeding. There is no current consensus on the optimal therapeutic strategy for IGM. Existing literature highlights ethnic predispositions to IGM, mainly in Middle Eastern and Asian populations. Anecdotally however, a large proportion of IGM patients in the continental U.S. is of Hispanic origin. The aim of our study is to describe our institutional experience with the treatment of IGM, and to better qualify our patient population to identify and remove barriers to care.

Methods: This study retrospectively analyzed patients with the diagnosis of IGM on core needle biopsy or clinical presentations at the authors' institution from 2012 to 2020. Demographic data were compiled. Continuous and categorical variable were analyzed by independent t-test and chi-square test, respectively.

Results: Between 2012 and 2020, 81 all-female patients were treated in our breast surgery center with a diagnosis of IGM. Summary of the patients' demographic characteristic, medical, and procedural treatments are shown in the Table. These results demonstrate an ethnic majority of Hispanic patients treated for IGM, with a statistically significant proportion of Hispanics originating from Latin America ($p<.00$), non-English speaking ($p<.00$) and uninsured ($p<.00$). A total of 90.1% and 69.1% of patients were treated with antibiotics and steroids, with a median duration of 35 and 55 days, respectively. Bedside procedures occurred in 40 patients, while 20 patients underwent operative debridement. Within our study, 97.4% of patients resolved their first episode, with an average of 253 days to resolution (median 232 days). There were 24.6% of patients who subsequently experienced at least 1 recurrence. Although not statistically significant, the average number of days to start antibiotics was 75 days for Hispanics compared to 56 days for non-Hispanics ($p>.05$).

Conclusions: In this study, we propose the notion that IGM patients are women of vulnerable backgrounds, as shown by our majority of Hispanic patients, and high prevalence of non-English speaking and uninsured patients. Furthermore, our study paints the picture of a lengthy disease process, with prolonged antibiotic and steroid courses, and a clinically high recurrence rate in nearly one-quarter of cases. Spanish-language resources must be developed to better serve the IMG patient population, and larger studies need to further explore if there are treatment or outcome disparities in minority, language, and insurance status.

Table. Baseline patient demographic and treatment characteristics

Patient variables	Total ($N = 81$)
Demographic characteristics	
Age at presentation (years), mean (±*SD*)	35.8 (±7.4)
Ethnicity [a]	
Hispanic/Latino	49 (64.5)
Non-Hispanic/Latino [b]	27 (35.5)
Country of birth [c]	
United States of American	11 (15.9)
Mexico, Central or South America	45 (65.2)
Primary language [d]	
English	42 (52.5)
Spanish	36 (45.0)
Other	2 (2.5)
Insurance status	
Private	30 (37.0)
Public (e.g. Medicaid)	11 (13.6)
None	40 (49.4)
Treatment modalities	
Antibiotics Use	73 (90.1)
Median duration (days, IQR) [e]	35 (41.0)
Steroids Use	56 (69.1)
Median duration (days, IQR) [f]	55 (118)
Bedside procedures (n = 40)	
Aspiration	12 (30.0)
Incision and drainage	19 (47.5)
Both	9 (22.5)
Operative debridement (n = 20)	15 (75.0)

Note. Categorical data is *n* (%). Continuous data as indicated.
[a] *E*thnicity n = 76, missing 5.
[b] Non-Hispanic/Latino patient race : Asian *n* = 11, Black/African n = 4, Middle Eastern n = 1, Other/Unavailable n = 3, White n = 8.
[c] Country of birth *n* = 69, missing 12.
[d] Primary language *n* = 80, missing 1.
[e] Antibiotics *n* =71, missing 2.
[f] Steroids, median duration for oral steroids *n* = 51, none missing.

1144466 - De-escalation of axillary staging in patients ≥70 with early-stage hormone positive and clinically node-negative breast cancer

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Background/Objective: Sentinel lymph node biopsy is no longer routine practice in patients ≥70 years undergoing treatment for early ER+ HER2- breast cancers since nodal staging in this age group with favorable cancers has not shown to benefit overall survival and is the premise of current Choosing Wisely guidelines. More recently, a study by McKevitt et al. has demonstrated increased use of all adjuvant therapies in patients ≥70 years with sentinel lymph node positivity; however, among patients who received any combination of adjuvant therapy, there was no significant breast cancer-specific survival despite nodal status. In an effort to better tailor therapy for this age group, we sought to understand trends of current recommendations at our institution regarding all forms of adjuvant therapies.

Methods: Women ≥70 years treated for early stage ER+ HER2- breast cancer between 2018 and 2019 were identified in our institutional cancer database. Patients included in the study were female with T1 or T2, ER+ HER2- tumors, clinically node-negative, and who had undergone sentinel lymph node biopsy (SNB). Fisher's exact test was performed to assess the association between recommendations for adjuvant chemotherapy, hormone therapy, and radiation therapy based on age, tumor grade, sentinel nodal status, and genomic assay data.

Results: A total of 219 patients met study criteria during this timeframe. Median age was 75 years with a range between 70 and 93 years. There were no statistically significant differences observed among patients receiving adjuvant chemotherapy or radiation therapy (p=0.572) with respect to age. There was a statistically significant finding between implementation of adjuvant chemotherapy and tumor histological grade (p=0.007) but not on implementation of radiation therapy (p=0.083). Histologic grade did not influence the recommendation for hormonal therapy (p=0.363). There was no statistically significant finding between pathologic nodal status and recommendations for chemotherapy (p=.142) or radiation therapy (p=0.245). Genomic assay data was available for 47 patients. There was a statistically significant finding between genomic risk factor level and the decision for chemotherapy treatment (p=0.001). The association between genomic risk factor level and the decision for radiation treatment was not statistically significant (p=.978).

Conclusions: In ER+ cN0 patients who are ≥70 old and receiving hormonal therapy, only chemotherapy treatment was statistically significantly influenced by tumor histologic grade and genomic scoring. Nodal status had no statistically significant influence on chemotherapy or radiation use. Thus, the need for SNB or axillary staging is unnecessary in this patient population.

Benign

1146081 - The influence of BMI on the histopathology and outcomes of patients diagnosed with atypical breast lesions

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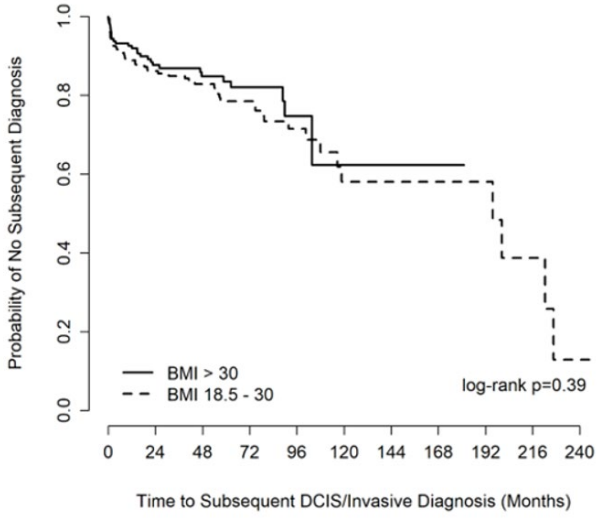
Background/Objective: Multiple studies have demonstrated a link between obesity and breast cancer. The potential association between obesity and high-risk atypical breast lesions, however, has not been well characterized. We sought to evaluate the characteristics and clinical outcomes of patients with breast atypia based on a woman's body mass index (BMI).

Methods: We retrospectively identified all adult women diagnosed with atypical ductal hyperplasia (ADH), atypical lobular hyperplasia (ALH), or lobular carcinoma in situ (LCIS) at a single institution from 2008-2017. BMI groups were defined as a BMI 18.5 to <30 or BMI ≥30. Differences between groups were assessed using the Chi-square test or Fisher's exact test for categorical variables, and analysis of variance (ANOVA) or Kruskal-Wallis test for continuous variables. Unadjusted time to subsequent diagnosis was estimated with the Kaplan-Meier method. Adjusted logistic regression was used to estimate the association of BMI with upstaging to malignancy or subsequent breast cancer diagnosis.

Results: Breast atypia was identified in 503 patients, 88.7% of whom were first diagnosed on needle biopsy. The median age at diagnosis was 54 with a median BMI of 28.1. Forty-one percent of patients were classified as obese (BMI ≥30). ADH was identified in 74% patients, ALH in 11.5%, and LCIS in 12.9%. The types of atypia were similar between the 2 BMI groups (overall p=0.07). At the time of surgical excision following needle biopsy, 14.8% (N=66/446) were upstaged to DCIS (41/66, 62.1%) or invasive cancer (25/66, 37.9%). For those upstaged to breast cancer, tumor subtype, grade, and stage were not associated with BMI (all p>0.05). After adjustment, BMI was not associated with upstaging to breast cancer at the time of the initial surgical excision following needle biopsy (p=0.16). At a median follow-up of 89.9 months, 82 patients were subsequently diagnosed with breast cancer during follow-up. For those subsequently diagnosed with breast cancer, tumor subtype, grade, and stage were not associated with BMI (all p>0.05). After adjustment, BMI was not associated with the risk of a subsequent malignancy (p=0.08). The unadjusted time to a subsequent malignant diagnosis was similar between BMI groups (Figure; log-rank p=0.39).

Conclusions: In a large cohort of patients diagnosed with high-risk breast histology (ADH, ALH, and LCIS), the risk of upgrade and/or subsequent progression to a breast malignancy were not associated with BMI. Although high-risk histologies are known to confer an increased risk of breast cancer development, factors other than obesity may have a more significant influence on progression after an atypia diagnosis and should be examined in future studies.

Figure. The unadjusted time to a subsequent malignant diagnosis by BMI



1147738 - Can lactational training and nipple evaluation during pregnancy lead to reduction in lactational mastitis?

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ICH /Disha for Cancer, KOLKATA, West Bengal, India

Background/Objective: The incidence of lactational mastitis ranges between 2% to 33% with an average incidence of 10%. It is highest in the first few weeks and decreases gradually. Breast abscess occurs in 3% to 11% of cases of mastitis. The cause can be mainly attributed to maternal factors (nipple abnormalities, faulty feeding technique). The study hypothesis was that the evaluation of nipple abnormality and counselling of pregnant women during pregnancy is likely to increase establishment of breastfeeding rate and reduction of lactational mastitis and abscess.

Methods: This prospective observational study had an intervention arm (group A, n=100) of pregnant women who were counselled about correct technique for lactation. The nipple was examined to check if it might cause any hindrance to breastfeeding (inverted, flat, very large, very small). In the control arm (group B, n=92), there were pregnant women (equally matched) with group A. The result was analysed using chi square test using SPSS software version 24.

Results: In Gr A, 90 out of 100 mothers could establish breastfeeding. Out of 10, 2 developed mastitis. In Gr B, 60 out of 92 established breastfeeding. Of the 32 remaining mothers, 18 developed mastitis. There was significant improvement in establishment of breastfeeding among mothers who were counselled/examined during pregnancy. (The chi-square statistic is 17.2204. The p-value is .000033). The incidence of lactational mastitis was significantly lower in Gr A (The chi-square statistic is 4.0139. The p-value is .045128).

Conclusions: Predelivery counselling and evaluation of nipple abnormalities (and appropriate measures) improves establishment of lactation and reduction of lactational mastitis/breast abscess. Including

nipple evaluation and lactation training is a simple and effective method. The study recommends that it should be included as part of routine antenatal check-up.

1148484 - Upgrade rate of lobular neoplasia in the setting of synchronous breast cancer

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Background/Objective: Atypical lobular hyperplasia and classical lobular carcinoma in situ encompass a spectrum of proliferative lesions known as lobular neoplasia (LN). When imaging-concordant and found on core needle biopsy (CNB), LN infrequently upgrades to invasive carcinoma or ductal carcinoma in situ (DCIS) on surgical excision; therefore, routine excision is not indicated. Current recommendations are to excise LN in the setting of synchronous carcinoma, but upgrade rates in this setting are not well-studied. Our primary objective was to determine the frequency of upgrade to cancer after excision of LN on CNB in the setting of either a synchronous ipsilateral or contralateral carcinoma.

Methods: Patients with LN diagnosed on CNB who underwent excision, and who also had a concurrent diagnosis of either ipsilateral (n=38) or contralateral (n=18) breast malignancy from 2010-2021 were retrospectively identified from a single institution. For ipsilateral patients, at least 2 separate biopsies, 1 of which demonstrated only LN, were necessary for inclusion. Patients were excluded if imaging/pathology were discordant, if there were additional high-risk lesions in the LN CNB requiring excision, or if LN was co-located with carcinoma on CNB specimens. Frequency of upgrade, to either invasive or in situ carcinoma, was quantified, and factors associated with upgrade were assessed using Fisher's exact test.

Results: The median age was 55 (range 33-74). Among patients with ipsilateral carcinoma, the upgrade rate of LN to invasive carcinoma was 2.6% (1/38). For contralateral carcinoma, 16.6% (3/18) of LN upgraded to malignancy (2 invasive carcinoma, 1 DCIS). All upgraded LN lesions were detected as non-mass enhancement on MRI with the exception of 1 detected as architectural distortion on mammogram (Table). In 29% (11/38) of ipsilateral and 16.7% (3/18) of contralateral patients, there was no additional LN or carcinoma demonstrated at the LN CNB site. There were no LN upgrades when the synchronous carcinoma CNB was invasive ductal carcinoma (n=26) or invasive mammary carcinoma (n=2). However, when the synchronous carcinoma CNB was invasive lobular, 15.4% (2/13) of LN upgraded to invasive lobular carcinoma. Among those with contralateral carcinoma, the median age of those who upgraded was significantly higher than those who did not upgrade (65 versus 54, p=0.03). There were no differences in upgrade risk according to family history, subtype of LN, extent of LN on CNB, grade, or hormone receptor status of synchronous carcinoma (p>0.05).

Conclusions: Our results demonstrate a low LN upgrade rate (2.6%) with ipsilateral synchronous invasive or in situ carcinoma, particularly if the synchronous carcinoma is invasive ductal carcinoma (0% upgrade). Further, almost 30% of ipsilateral patients had no pathology at excision. These data do not support current recommendations for excision of all LN found with concurrent ipsilateral carcinoma, and routine excision may not be warranted in the setting of imaging/pathology concordance. In contrast, LN upgraded in 16.6% of patients with contralateral malignancy, supporting excisional biopsy in this population. Larger multi-institution retrospective or prospective evaluation is necessary to validate

these findings. Evaluation of the genomic changes in LN and synchronous cancers could help identify true precursor lesions and better inform the need for excision.

Table. Imaging and pathologic characteristics of upgraded lobular neoplasia

	Imaging modality that detected LN[a]	Imaging finding for LN	Extent of LN on Imaging	Distance between LN and carcinoma on imaging	Extent of LN lesion on core needle biopsy	LN upgrade/ synchronous carcinoma	Size of upgraded lesion on final pathology
Ipsilateral							
ALH[b]	MRI after breast cancer diagnosis	Non-mass enhancement	10 mm	7.4 cm	2 TDLU[d]	IMC[e] / Mucinous carcinoma	0.6 cm
Contralateral							
ALH	MRI after breast cancer diagnosis	Non-mass enhancement	63 mm	Not applicable	<4 TDLUs	ILC[f] / ILC	Multiple foci (1.1 cm, 0.5cm and 0.2cm)
ALH + cLCIS[c]	Diagnostic mammogram	Architectural distortion	24 mm	Not applicable	1-2 TDLU ALH, 1 TDLU LCIS	ILC / ILC	3 cm
ALH	MRI after breast cancer diagnosis	Non-mass enhancement	Unable to obtain	Not applicable	Focal	DCIS[g] / DCIS	0.9 cm

[a] LN, lobular neoplasia
[b] ALH, atypical lobular hyperplasia
[c] cLCIS, classical lobular carcinoma in situ
[d] TDLU, terminal duct lobular unit
[e] IMC, invasive mammary carcinoma
[f] ILC, invasive lobular carcinoma
[g] DCIS, ductal carcinoma in situ

1148632 - Upgrade rates of pleomorphic and florid lobular carcinoma discovered on needle core biopsy

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Background/Objective: Pleomorphic and florid lobular carcinoma in situ (PLCIS and FLCIS) are rare variants of LCIS. Data are limited regarding the upgrade rates of these entities upon excisional biopsy, and the options for management of these patients is unclear.

Methods: We retrospectively reviewed the final surgical pathology of all patients with a needle core biopsy (NCB) result of FLCIS, PLCIS, or a combination FLCIS+PLCIS, from 2010-2020. Patients with concurrent breast cancer were excluded. Imaging reports, clinical data, and NCB and surgical pathology reports were reviewed, and upgrade rates to ductal carcinoma in situ (DCIS) and invasive carcinoma were calculated. Clinical data, risk factors, and imaging data were compared between benign and malignant surgical pathology after excision.

Results: Study cohort included 64 patients: 27 with FLCIS, 25 with PLCIS, and 12 with combined PLCIS+FLCIS noted on NCB. The mean age of patients was 61 (±11 years). Majority of lesions (73.4%, n=47) were detected by screening mammography (n=47), and most patients were asymptomatic (96.9%, n = 62). The median size of lesions on initial imaging was 8mm (range 3-48mm). Patients with malignant lesions (vs benign) were more likely to present with asymmetry/distortion on mammogram (20% vs 2%, p=0.16), although this difference was not statistically significant (Table). For the entire cohort (n=64), 76.6% (n=49) were benign (residual LCIS noted with no DCIS or invasive cancer). Nine patients (18.4%)

with a NCB of LCIS, but benign surgical pathology, received 5 years of chemoprevention with hormonal therapy. For the entire cohort, 4.7% (n=3) upgraded to DCIS, and 18.9% (n=12) to ILC, (median cancer size 4mm; range 1-16, no positive lymph nodes or distant metastases). Of patients with pure FLCIS (n=27), 3.7% upgraded to DCIS, and 22.2% to ILC. Of patients with pure PLCIS (n=25), 8% upgraded to DCIS, and 24% to IC. Of patients with combined FLCIS+PLCIS (n=12), 0% upgraded to malignancy (Table). There was no evidence of recurrence at a mean follow-up of 27 months (range 1-126) for the patients who upgraded to malignancy.

Conclusions: In this series of FLCIS, PLCIS, and FLCIS+PLCIS noted on NCB, 4.7% upgraded to DCIS, and 18.9% to ILC, for an overall upgrade rate of 23.6%. Due to the high upgrade rate to malignancy of 23.6%, and uncertainty if FLCIS and PLCIS is an obligate precursor to invasive cancer, excisional biopsy is recommended.

Table. Clinical, imaging, and pathologic characteristics of patients with FLCIS, PLCIS, or FLCIS+PLCIS on needle core biopsy

	All (n=64)	Benign (n=49)	Malignant (n=15)
Age, mean (±SD)	61 ± 11	61 ± 11	62 ± 10
Physical exam findings			
Palpable mass on examination	1 (1.6%)	0	1 (6.7%)
Nipple discharge	1 (1.6%)	1 (2.0%)	0
Initial imaging findings			
Calcifications on MMG	46 (71.8%)	36 (73%)	10 (66.7%)
Asymmetry/distortion on MMG	4 (6.3%)	1 (2.0%)	3 (20.0%)
Mass on MMG or US	5 (7.8%)	4 (8.2%)	1 (6.7%)
Initial imaging size on MMG, US, MRI (mm), median (range) (n=33)	8 (3-48)	7.5 (4-48)	9 (3-22)
NCB pathologic features			
Necrosis	25 (39.1%)	21 (42.9%)	4 (26.7%)
Focal	20 (31.3%)	15 (30.6%)	5 (33.3%)
NCB results*			
PLCIS	25 (39.0%)	17 (34.6%)	8 (53.3%)
FLCIS	27 (42.2%)	20 (40.8%)	7(46.7%)
PLCIS + FLCIS	12 (18.8%)	12 (24.6%)	0

NCB: needle core biopsy, FLCIS: florid lobular carcinoma in situ, PLCIS: pleomorphic lobular carcinoma in situ, MMG: mammogram, US: ultrasound, MRI: magnetic resonance imaging
*+/- Classic LCIS present with LCIS variant

1148639 - Factors associated with radial scar to support excision versus close observation

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Background/Objective: The current management of radial scar (RS) is excision due to the risk of associated atypia or malignancy, with upgrade rates reported up to 29% in the literature. It is hypothesized that specific patient and lesion factors (i.e., family history, smoking status, size of lesion) portend a higher risk of upstaging on final pathology. We aim to evaluate demographics and lesion features in patients undergoing excision for RS who are at high risk of upgrade in hopes of creating a more targeted approach to excision that will reduce health care burden and unnecessary surgical intervention.

Methods: We performed a single-institution, retrospective analysis that identified patients diagnosed with RS by core biopsy who underwent excision between August 2011 and April 2020. Patients were divided into 1 of 3 categories based on final pathology: 1) RS with IDC/DCIS, 2) RS with atypia, and 3) RS only. Patient and lesion factors were then analyzed to identify differences between the 3 groups using chi square and ANOVA testing. Different imaging modalities were identified and compared among groups; all imaging modalities used to identify the lesion were listed.

Results: Seventy-seven patients were identified and underwent surgical excision for RS. Analysis showed no significant difference between the 3 groups in terms of demographics or lesions factors that were predicative of upgrade (Table). Only 6.5% of RS were upgraded to IDC/DCIS (5/77), 6.5% showed atypia (5/77), and 87% had no upgrade on final pathology (67/77). Our patient population ranged from 26-93 years old, BMI 17.8-45, and lesion size from 0.6-46mm. The majority of RS were identifiable on mammography (92%), and all upgraded lesions were visible by this modality. Of note, all palpable lesions were without atypia. A high portion of women who had used OCPs or had family history of breast or ovarian cancer also developed radial scars.

Conclusions: Our study shows no statistically significant differences between patient or lesions factors that can identify high-risk radial scars. Our study did note the upgrade rate for RS to IDC or DCIS was 6.5% compared with the previously documented 29%. Despite being a pathology that is a radiologic diagnosis, 4.5% of radial scars without atypia were palpable. We also found that most women (>50%) diagnosed with RS, had a family history of breast or ovarian cancer or had a history of OCP use. Further research endeavors are needed to identify predicative factors for high-risk RS, leading to a de-escalation of care in a subset of patients resulting in lower health care costs and burden to patients.

Table. Factors comparing radial scar with malignancy or atyipa to radial scar without atypia

	RS + IDC/DCIS	RS + Atypia	RS + No Atypia	P Value
Smoking history	1/5 (20%)	2/5 (40%)	22/61 (36.1%)	p = 0.57
OCP History	1/1 (100%)	3/5 (60%)	14/18 (77.8%)	p = 0.83
HRT history	2/2 (50%)	3/5 (60%)	19/49 (38.8%)	p = 0.44
Family Ovarian/breast cx history	3/5 (60%)	5/5 (100%)	38/67 (56.7%)	p = 0.38
Breast Biopsy History	2/5 (40%)	0/5 (0%)	12/66 (18.2%)	p = 0.50
BIRADs Density 3 or 4	3/5 (60%)	1/5 (20%)	26/65 (40%)	P = 0.67
ID Modality:				
Mammo	5/5 (100%)	5/5 (100%)	61/67 (91%)	P=0.36
Tomo	4/5 (80%)	3/5 (60%)	32/67 (47.8%)	P = 0.15
US	0/5 (0%)	1/5 (20%)	6/67 (9%)	P = 0.79
MRI	0/5 (0%)	0/5 (0%)	1/67 (1.5%)	P = 0.72
Palpable	0/5 (0%)	0/5 (0%)	3/67 (4.5%)	P = 0.52
Bx method:				
US guided	5/10 (50%)	0/10 (0%)	43/64 (67%)	P=0.42
Stereotactic	0/10 (0%)	5/10 (50%)	21/64 (33%)	P=0.42
Factor	**Group**	**Mean**	**Std Deviation**	**P Value**
Lesion Size (mm)	RS + IDC/DCIS (N=5)	12.8	4.6043	P = 0.77
	RS + Atypia (N=5)	9.6	7.9246	
	RS + No atypia (N=58)	12.074	7.9224	
BMI	RS + IDC/DCIS (N=5)	30.4400	6.49869	P = 0.32
	RS + Atypia (N=5)	33.4600	4.32065	
	RS +No atypia (N=66)	29.1473	6.38858	

1143360 - Is breast density associated with upstage to malignancy during excisional biopsy for atypical ductal hyperplasia, flat epithelial atypia, intraductal papilloma, and radial scar?

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Background/Objective: The decision to perform excisional biopsy (EB) after needle biopsy (NB) demonstrates atypical ductal hyperplasia (ADH), flat epithelial atypia (FEA), intraductal papilloma (IDP), or radial scar (RS) can be difficult as underlying malignancy is infrequently present. This controversy prompted a search for factors associated with upstage to guide recommendations for surgery. It is hypothesized that ADH, FEA, RS, and IDP will have a higher rate of upstage to malignancy in women with dense breasts.

Methods: An IRB-approved retrospective analysis was performed of women who underwent NB then EB for ADH, FEA, IDP, or RS between January 1, 2017 and January 1, 2021. An IRB-approved breast patient repository was used to identify these patients, and the EMR was used for supplemental information. The rate of upstage to malignancy was compared between BI-RADS classified mammographic densities with A (fatty) and B (scattered fibroglandular) combined as a "less dense" (LD) group, and C (heterogeneously dense) and D (extremely dense) combined as a "more dense" (MD) group. We evaluated the overall distribution of factors for each group and stratified by age 50 years. Chi-square was used to compare frequency of outcomes. Statistical significance was set at an alpha of 0.05.

Results: A total of 473 patients underwent EB for ADH, FEA, IDP, and RS. Fifteen patients were excluded for having a combination of diagnosis (such as an IDP with atypia, as we previously discovered that this was associated with a higher risk of upstage), and 5 patients were excluded who did not have mammographic density reported in the screening or diagnostic imaging. This left 453 patients. Of these, 283 (52.5%) had LD breast tissue, and 215 (47.5%) had MD breast tissue. LD patients were older, with a mean age of 58.5 years compared with 51.2 for MD ($p<0.001$). There were 178 patients (39.3%) who had ADH, 129 (28.5%) had IDP, 96 (21.2%) had RS, and 50 (11%) had FEA. The overall rate of upstage was 10.6% (n=48) including 37 ADH (20.8% upstage rate), 3 FEA (6%), 7 IDP (5.4%), and 1 RS (1%). Comparing LD and MD, there was no difference in the rate of upstage overall (28 LD, 11.8% vs. 20 MD 9.3%, $p=0.40$). Evaluating upstage rate by specific lesion type compared with breast density, there were no significant differences within groups. The upstages included 21 LD ADH patients (22.3% upstage rate) vs. 16 MD (19%, $p=0.59$), 6 LD IDP patients (8%) vs. 1 MD (1.9%, $p=0.13$), 1 LD RS patient (2%) vs. 0 MD ($p=0.35$), and 0 LD FEA patients vs. 3 MD (9.4%, $p=0.18$). Because age is a risk factor for breast cancer, and older women tend to have less dense breasts, we stratified for age 50 but continued to find no significant difference ($p=0.73$).

Conclusions: Despite breast density being an independent risk factor for breast cancer development, we did not find an associated increase in the rate of upstage to malignancy during EB in patients with ADH, FEA, IDP, and RS.

1130777 - Clinical outcomes in surgical management of inflammatory granulomatous mastitis

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Background/Objective: Inflammatory granulomatous mastitis (IGM) is a rare inflammatory condition of the breast that typically presents in young women. While the condition is benign and self-limiting, it is frequently a debilitating and anxiety-provoking condition for the patient. The treatment for IGM is not clearly established, and surgery is often the last resort in the clinician's treatment algorithm. The clinical outcomes of surgical treatment for IGM are not well-documented in literature. This study opted to describe the clinical outcomes of patients requiring surgery for IGM in the United States over a 10-year period.

Methods: The National Surgical Quality Improvement Project (NSQIP) database was used to identify patients treated with surgery for IGM between 2010-2020. ICD-10 code N61.2 was used to identify patients with IGM. Patients older than 18 years of age were included. Cases with any missing information were eliminated. Descriptive statistics were used to analyze demographic information, and

binary logistic regression was used to adjust for confounding factors utilizing Statistical Package for the Social Sciences Version 26.

Results: A total of 141 patients were analyzed. The median age was 41 (range 18-81). Women comprised 97.2% of the cohort. Majority of the patients were white (46.2%), 25.5% were black, and 24.8% were of Hispanic origin. A total of 14.6% of patients had open wounds prior to surgery, 19.8% had type 2 diabetes (DM2), and 32.6% of the women were smokers. Majority of the wounds (58.9%) were classified as dirty/infected. Majority of the surgeries were incision and drainage procedures (53.2%), followed by partial mastectomy (16.3%), debridement (11.3%), and simple mastectomy (2.1%). After adjusting for confounders, smoking and DM2 were not found to be predictors of needing a mastectomy or a partial mastectomy. Return to the operating room was required in 3.5% of the patients; readmission to hospital occurred in 3.5% of patients. Mortality rate was 0%, and only 1 patient developed *C. difficile* colitis.

Conclusions: Surgery remains an uncommon treatment option for patients with IGM. Majority of surgery performed for IGM consists of incision and drainage procedures. Surgery done for IGM is associated with low complication rates. Even when surgery is required for IGM, mastectomy remains a last-resort option.

1144931 - Mastitis and mammary abscess management audit (MAMMA)

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Background/Objective: Mastitis is a common benign breast disease. With increasing sub-specialization, decoupling of breast surgical practice from on-call general surgery, and absence of recent national or international guidance on management, we hypothesize marked variation in practice, unnecessarily high admission rates, lack of uniformity in antimicrobial prescriptions, and high rates of incision and drainage

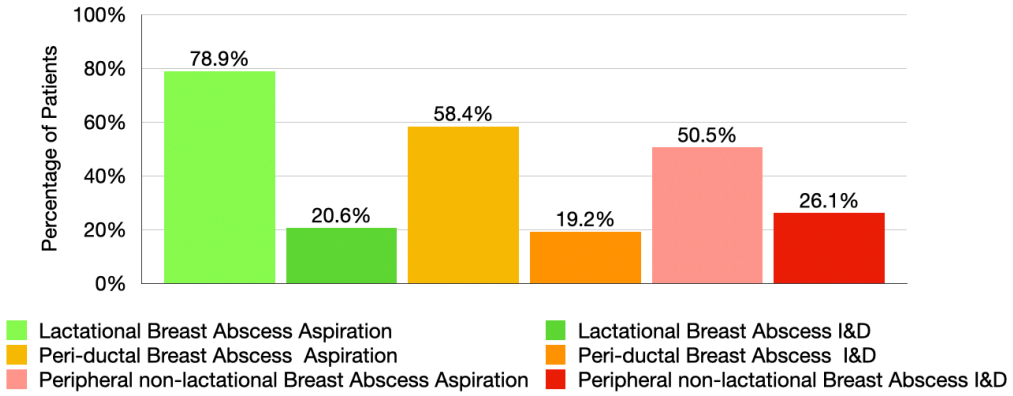
rather than radiological aspiration. In this regard, MAMMA aims to describe current practices in the management of mastitis and breast abscesses in the UK and Ireland and to provide recommendations for best practice.

Methods: The study was regarded as audit by MRC HRA Decision Tool; each participating site was required to register locally with their clinical governance department. MAMMA was carried out in 2 phases. Phase I reviewed existing local hospital treatment pathways. Phase II was a prospective audit. All female patients with symptoms of mastitis and breast abscess over the age of 16 years old were included. Exclusion criteria included male patients, patients with breast cancer, breast surgery within 90 days of presentation, and breast implant in situ on the affected side. All units in the UK and Ireland were invited to participate. The audit was supported by the Mammary Fold national breast trainee association and endorsed by the Association of Breast Surgery. All study data were collected and managed using REDCap electronic data capture tool. Statistical analysis was performed using open-source statistical software JASP Team (2020).

Results: A total of 1,370 records were collected from 70 hospitals across the UK and Ireland, of which 37 records were excluded (7 incomplete records, 10 patients <16 years of age, 12 patients with sebaceous cysts, 8 patients without a diagnosis). A significant difference was observed in the age of women suffering from lactational mastitis and breast abscesses and women with non-lactational disease (mean+/-SD in years, 32+/-5.2 for lactational disease, 42.1+/-14 for non-lactational disease, $p<0.001$). A total of 82.6% of patients were prescribed short-course antibiotics (<10 days), and there was no UK-wide consensus on the first-line antibiotic. Co-amoxiclav was the most frequent antibiotic of choice (44.6%), followed by flucloxacillin (37.4%). Overall, 22.3% of patients were admitted for inpatient treatment, with a median length of stay of 2 days (IQR 2-4 days). Justification for admission was intravenous antibiotics and sepsis. Diagnostic ultrasound scan was performed in 81.3%, with significant variation in rate depending on diagnosis ($p<0.001$). Needle aspiration was performed in 60.2% of patients, of which 13.5% went on to have surgical incision and drainage. Overall, surgical incision and drainage was performed in 22.5% of patients with abscesses. Justification for incision and drainage were skin changes and necrosis, duration of symptoms over 5 days, and pointing of abscess.

Conclusions: The results demonstrate good practice in areas, such as the use of diagnostic ultrasound and breast surgery follow-up. However, MAMMA highlights opportunities to improve care, such as reducing hospital admission rates, increasing the rate of needle aspiration, and curtailing the surgical incision and drainage rate. Variation in the management would be best addressed through an updated set of international guidelines.

Figure. Percentage of patients undergoing needle aspiration and incision of drainage



Complications

1145386 - Impact of axillary lymph node dissection and sentinel lymph node biopsy on upper-limb morbidity in breast cancer patients: Systematic review and meta-analysis

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Background/Objective: Axillary de-escalation is motivated both by a desire to reduce harm as well as an improved understanding of the oncological safety of axillary conservation. Understanding the impact of axillary surgery and disparities in operative procedures on post-operative arm/shoulder morbidity would better direct resources to the point of need as well as cement the need for de-escalation strategies. While previous systematic reviews of the literature on upper-limb (UL) morbidity have been conducted, quantitative assessment by meta-analysis was not possible due to reporting outcome heterogeneity. Prior meta-analysis conducted was concentrated on specific outcomes (e.g., lymphedema). By applying composite trans-study data integration, we synthesized data from validated outcome measures. Our aim was to review and meta-analyze the impact of axillary lymph node dissection (ALND) and sentinel lymph node biopsy (SLNB) on upper-limb morbidity across time.

Methods: A systematic literature search was conducted using Embase, Medline, CINAHL, and PsychINFO databases from 1990 to March 2020 according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyses) guidelines. Included studies were randomized, controlled, and observational studies focusing on UL morbidities in patients receiving breast surgery. The most frequently reported validated outcomes were extracted; lymphedema (arm volume/ circumference/ bioimpedance/ perometry), pain (visual analogue scale/ numerical rating scale/ McGill questionnaire), strength (dynamometer), range of motion (ROM) (goniometry), upper-limb function (Disabilities of the Arm, Shoulder and Hand questionnaire) and quality of life (FACT-B, SF-36, EORTC QLQ30/BR23 questionnaires). Random effects meta-analysis models were used to compute pooled estimates of outcome incidence comparing SLNB and ALND at different times (<12 months, 12-24 months, >24 months).

Results: Literature searches revealed 7415 articles, of which 66 fulfilled the selection criteria. Pooled estimates of lymphedema incidence after ALND at <12 months, 12-24 months, and >24 months were observed to be 16.7% (95%CI 9.9-23.5), 24.5% (95%CI 4-45), and 24.1% (95%CI 16.1-32.1) respectively. All studies comparing SLNB to ALND reported a higher rate of lymphedema in the latter, with a difference in incidence of 13.7% (95%CI 10.5-16.8, p<0.005). Pooled estimates for pain after ALND at 12 months, 12-24 months, and >24 months were 40% (95%CI 23.8-56.2), 38.5% (95%CI 15.7-61.4), and 32.9% (95%CI 18.8-47), respectively. A greater proportion of patients were in pain following ALND compared to SLNB, with a difference in incidence of 24.2% (95%CI 12.1-36.3, p<0.005). Pooled estimates for incidence of reduced strength and ROM after SLNB and ALND were 15.2% vs 30.9% and 17.1% vs 33.8% respectively. Type of axillary surgery, higher BMI, and advanced age were recognized as predictors for UL morbidities.

Conclusions: The meta-analyses demonstrate that the pooled estimates for the short-term and long-term incidence of lymphedema after ALND are higher than estimates in prior systematic reviews. ALND patients reported higher rates of lymphedema, pain, reduced strength, and ROM compared to SLNB.

Other outcomes could not be meta-analyzed due to the heterogeneity of the reported results. This highlights the importance of standardized, validated outcome measures where international consensus should be encouraged. The findings support the continued drive to de-escalate surgical management of the axilla, such as increasing the use of axillary radiotherapy and exploring targeted axillary dissection as an option where possible.

Figure. Pooled estimates of incidence of lymphedema at >24 months after ALND, b: Pooled estimates of difference in incidence of lymphedema between SLNB and ALND, c: Pooled estimates of difference in incidence of pain between SLNB and ALND

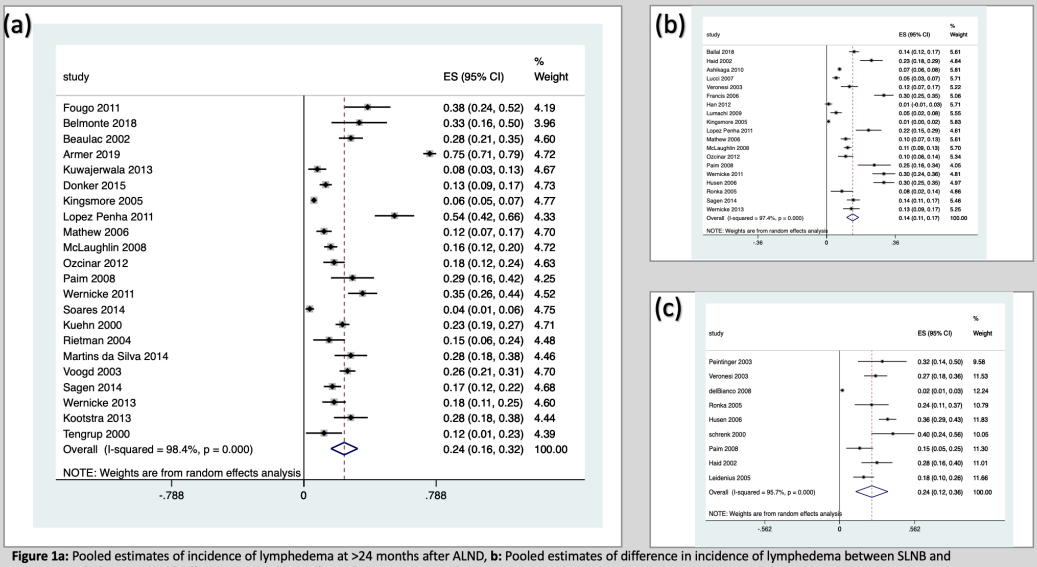

Figure 1a: Pooled estimates of incidence of lymphedema at >24 months after ALND, **b:** Pooled estimates of difference in incidence of lymphedema between SLNB and ALND, **c:** Pooled estimates of difference in incidence of pain between SLNB and ALND.

1148316 - Are younger women more at risk of phantom breast syndrome? A systematic review of prevalence and neural pathophysiology of PBS

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Background/Objective: The prevalence of phantom breast syndrome (PBS) post-mastectomy is a poorly reported and understudied postoperative condition that can lead to debilitating chronic pain and lower quality of life. The pathophysiology of PBS may reveal nuanced information of related chronic pain conditions such as phantom breast pain (PBP) and intercostobrachial neuralgia. The purpose of this analysis was to examine the prevalence, risk factors, and pathophysiology of phantom breast syndrome in breast post-mastectomy.

Methods: A comprehensive literature search was conducted in October 2021 using publications extracted from the PubMed, Scopus, and Cochrane Library databases. Eligible studies reported postoperative complications related to PBS and its pathophysiology. Two independent reviewers screened articles, and conflicts were resolved by a third reviewer. The criteria used were those described in the PRISMA Declaration for performing systematic reviews.

Results: Initial screening yielded 233 studies, and after 3 rounds of screening, 14 studies were included for final extraction. The predominant risk factors reported for PBS were younger age, preoperative sensory disturbances, depressive symptomatology, and tranquilizer use. A positive association between frequency of PBS and the appearance of a pain condition was also found.

Conclusions: Phantom breast syndrome (PBS) is a significant post-mastectomy condition that may reveal a susceptibility to maladaptive neuroplastic cortical changes. Further neuroimaging studies of PBS are needed to attain a better understanding of underlying peripheral and central neural mechanisms. Further analysis of the risk factors of PBS are needed to formulate specific disease criteria for post-mastectomy patients.

1148338 - Risk factors for complications in prepectoral and subpectoral implant-based breast reconstruction

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Background/Objective: Prepectoral implant-based breast reconstruction is being offered to breast cancer patients more frequently because it results in less postoperative pain, faster recovery, and a lower risk of animation deformity compared to subpectoral reconstruction. However, concerns regarding the safety of this procedure persist, including the perceived increased risk of capsular contracture, implant exposure, implant visibility, and delayed detection of breast cancer recurrence associated with the procedure. The purpose of this study was to assess complication rates and to determine risk factors for complications after prepectoral implant reconstruction and to compare those to risk factors for complications after subpectoral implant reconstruction.

Methods: A retrospective chart review was performed on all patients who underwent prepectoral or subpectoral implant-based breast reconstruction performed by a single surgeon from 2010 to 2021. Demographic, clinical, and operative data, as well as complication rates, were recorded. Complications included major or minor mastectomy skin flap necrosis (MSFN), major or minor infection, capsular contracture, implant loss, seroma, hematoma, dehiscence, and local recurrence. Demographic, clinical, and operative data were compared between patients who experienced at least 1 major or minor complication to patients without a complication.

Results: A total of 758 prepectoral reconstructions were performed in 468 patients with a mean age of 52.5 +/- 9.9 (+/- SD) years and mean body mass index (BMI) of 28.8 +/- 6.1 kg/m2. There were 163 subpectoral implant reconstructions performed in 100 patients with a mean age of 46.9 +/- 8.8 years and a mean BMI of 25.2 +/- 5.0 kg/m2. Complications rates in prepectoral implant reconstruction patients were low and comparable to subpectoral reconstruction, with regard to major infection (3.4% vs. 1.2%), major necrosis (1.7% vs 1.2%), capsular contracture (6.5% vs. 9.8%), implant loss (4.1% vs. 4.3%), seroma (0.3% vs. 1.2%), hematoma (0.3% vs. 0%), dehiscence (0.7% vs. 1.2%), local recurrence

(1.3% vs. 1.2%), and total complications (22.7% vs. 22.1%; p>0.1462), respectively. Postmastectomy radiation, adjuvant chemotherapy, and therapeutic reconstruction were risk factors for a complication in prepectoral implant reconstruction (p<0.0206), while lower BMI and postmastectomy radiation were risk factors for a complication in subpectoral implant reconstruction (p<0.0303).

Conclusions: Prepectoral implant reconstruction is an effective alternative to subpectoral implant reconstruction and offers breast cancer patients the potential for less postoperative pain, faster recovery, and a lower risk of animation deformity. Complications rates and total complications were low with pre-pectoral implant reconstruction and comparable to that of subpectoral implant reconstruction. Risk factors for a complication in prepectoral implant reconstruction included postmastectomy radiation, adjuvant chemotherapy, and therapeutic reconstruction, while lower BMI and postmastectomy radiation therapy were risk factors for a complication in subpectoral implant reconstruction. Different patient and clinical factors need to be considered when assessing the potential for complications after prepectoral implant reconstruction compared to that after subpectoral implant reconstruction.

Table. Demographic, clinical, and operative characteristics associated with at least 1 major or minor complication in prepectoral and subpectoral implant-based breast reconstruction

No. of patients/breasts	Total Prepectoral	≥1 Complication	No Complication	*p* value
No. of patients	468	104	424	
No. of breasts	758	118	640	
Follow up (Months)‡	23.6±24.0	35.5±29.0	22.3±22.8	0.0001*
Demographic				
Age (yrs)(Mean±SD)‡	52.5±9.9	51.6±9.3	52.4±9.9	0.4553
BMI (kg/m²) (Mean±SD)‡	28.8±6.1	29.5±6.9	28.7±5.8	0.2260
Smokers (%)	5.8 (27)	8.6 (9)	5.4 (23)	0.2494
Diabetes (%)	5.1 (24)	8.6 (9)	3.8 (16)	0.0659
Neoadj. Chemotherapy (%)	15.6 (73)	13.5 (14)	13.9 (59)	1.0000
Adjuvant Chemotherapy (%)	23.9 (112)	32.7 (34)	18.4 (78)	0.0020*
Postmastectomy Radiation (%)	14.1 (107)	28.0 (33)	11.6 (74)	0.0001*
Operative and Clinical				
Unilateral (%)	38.0 (178)	30.8 (32)	34.4 (146)	0.5629
Bilateral (%)	62.0 (290)	69.2 (72)	65.6 (278)	0.5629
Prophylactic (%)	45.5 (345)	35.6 (42)	47.3 (303)	0.0206*
Therapeutic (%)	54.5 (413)	64.4 (76)	52.6 (337)	0.0206*
Single-Stage (%)	98.3 (745)	97.4 (115)	98.4 (630)	0.4381
Two-Stage (%)	1.7 (13)	2.5 (3)	1.6 (10)	0.4381
Implant Volume (cc)	356.0±123.8	370.7±129.1	353.3±122.7	0.1608
Autologous Fat Grafting (%)	41.3 (313)	43.2 (51)	40.9 (262)	0.6843

No. of patients/breasts	Total Subpectoral	≥1 Complication	No Complication	*p* value
No. of patients	100	21	87	
No. of breasts	163	27	136	
Follow up (Months)‡	31.9±22.4	32.9±23.4	32.2±22.6	0.8995
Demographic				
Age (yrs)(Mean±SD)‡	46.9±8.8	46.5±8.9	46.9±8.6	0.8496
BMI (kg/m²) (Mean±SD)‡	25.2±5.0	23.1±4.4	25.8±5.2	0.0303*
Smokers (%)	5.0 (5)	9.5 (2)	3.4 (3)	0.2492
Diabetes (%)	3.0 (3)	4.8 (1)	2.3 (2)	0.4808
Neoadj. Chemotherapy (%)	12.0 (12)	9.5 (2)	11.5 (10)	1.0000
Adjuvant Chemotherapy (%)	35.0 (35)	57.1 (12)	56.3 (49)	1.0000
Postmastectomy Radiation (%)	14.1 (23)	48.1 (13)	7.4 (10)	0.0001*
Operative and Clinical				
Unilateral (%)	37.0 (37)	38.1 (8)	33.3 (29)	0.7985
Bilateral (%)	63.0 (63)	61.9 (13)	66.7 (58)	0.7985
Prophylactic (%)	37.4 (61)	29.6 (8)	39.0 (53)	0.3934
Therapeutic (%)	62.6 (102)	70.4 (19)	61.0 (83)	0.3934
Single-Stage (%)	72.4 (118)	55.6 (15)	75.7 (103)	0.0569*
Two-Stage (%)	27.6 (45)	44.4 (12)	24.3 (33)	0.0569*
Implant Volume (cc)	366.1±136.8	318.3±122.1	375.6±137.9	0.0839
Autologous Fat Grafting (%)	77.9 (127)	77.8 (21)	77.9 (106)	1.0000

1148560 - Investigating factors associated with post-mastectomy emergency department visits: A population-based analysis

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Background/Objective: In 2016, a multi-pronged pathway was implemented across 13 hospitals to improve the mastectomy perioperative care experience and focused on 2 objectives: 1) to increase same-day surgery mastectomy rates and 2) decrease the number of unnecessary postoperative ED visits. The pathway successfully increased same-day mastectomy rates from 2.7% to 59.2%; however, the rate of postoperative ED visits remained high at 20.9% in spite of focused interventions at the patient and provider level to enhance perioperative support. Our study investigates potential factors associated with high postoperative ED visits following mastectomies

Methods: Data were collected using the Discharge Abstract Database and the National Ambulatory Care Reporting System database. Eligible patients included all women over 18 years old who underwent a mastectomy province-wide between 2004 and 2020. Patient demographics variables including age, SES, Charlson comorbidities, date of surgery, surgery type, and health regions were collected. Primary outcome of interest was ED visit within 30 days of mastectomy. Univariate and multivariate analyses were performed to identify independent predictors for post-operative ED visits.

Results: A total of 19,974 patients had mastectomy during the study period, of which 4590 (23%) had an ED visit within 30 days of surgery. The most common causes of ED visits were incision issues, infection, hematoma/seroma, and pain. Independent factors associated with ED visits were increasing age, overnight stay mastectomy, reconstruction, comorbidities, depression, and living rurally. There was a slight decrease in ED visits post-implementation of the perioperative pathway (20.9% vs. 23.7%), but it was not statistically significant.

Conclusions: Post-operative ED visits remain high despite initiating a province- wide surgical pathway in 2016, which emphasizes patient education and improved perioperative care and supports. Currently, the majority of ED visits are manageable in non-emergent settings. Further investigations are necessary to discern whether additional perioperative interventions can curb the high ED visit rate.

1144744 - The modified 5-Item Frailty Index: Predicting perioperative risk in breast augmentation

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Background/Objective: Augmentation mammaplasty remains one of the most commonly performed surgical breast procedures. While the literature supports a relatively low complication rate, these procedures are typically paid for out-of-pocket; as such, complications can present patients with steep additional costs. The ability to predict these complications can significantly inform patient management.

The 5-item modified Frailty Index (mFI-5) is a simple, validated index that allows surgeons to preoperatively calculate a patient's complication risk. The authors hypothesize that the mFI-5 can predict complications within 30 days after augmentation mammaplasty.

Methods: The authors retrospectively reviewed all patients from the 2013-2019 American College of Surgeons, National Surgical Quality Improvement Program (ACS NSQIP) databases who underwent breast augmentation. Patients were assigned frailty scores based on conditions previously defined by the mFI-5. Other risk indices such as age, BMI, ASA class, total number of major comorbidities, and modified Charlson Comorbidity Index were collected. The primary outcome measure was aggregate 30-day complications. Regression analysis was performed to assess risk ($p<0.05$) using R statistical software.

Results: A total of 3,558 augmentation mammaplasty patients (mean age 35.3 ± 11.2) were included. Seventy patients developed 1 or more complications (1.97%), consistent with previous literature. The most common complications were surgical site infections and unplanned returns to the operating room. A total of 3,350 patients had a mFI-5 score of 0, 196 had a mFI-5 score of 1, and 12 had a mFI-5 score of 2. Logistic regression analysis found that compared with patients with an mFI-5 score of 0, patients with a positive mFI-5 score of 1 were 4.1 times more likely to develop a postoperative complication ($p<0.001$). mFI-5 was found to be a predictive risk factor for complications, along with age >65, presence of at least 1 major comorbidity, and the modified Charlson Comorbidity Index score >1 (all $p<0.05$). Interestingly, mFI-5 was a superior predictor of complications compared to BMI, number of comorbidities, and ASA classification.

Conclusions: Plastic surgeons frequently use age as a proxy to predict how well a patient will do postoperatively, but this ignores how frail the patient actually is. By using the mFI-5 rather than just age or a specific comorbidity, surgeons can identify unsafe young patients, which is crucial in augmentation mammaplasty as the majority of patients are younger than 50 years. To date, the impact of frailty on breast implant procedure outcomes has not been studied using the mFI-5. The present analysis shows that patients with higher mFI-5 scores are likely to have higher risk of postoperative complications after breast augmentation. By preoperatively identifying frail patients, the surgical team can better account for discharge planning and postoperative support to minimize risk of complications.

Table. Logistic regression for complications by strata

Risk Index, by strata	N	OR	95% CI	P value
Age				
<20 years (Reference)	101			
20-49 years	3018	1.86	0.40-32.99	0.54
50-65 years	378	1.61	0.27-30.65	0.66
>65 years	61	15.09	2.67-283.81	0.01
BMI				
<18.5 (Reference)	264			
18.5-24.9	2475	0.74	0.34-1.96	0.50
25.0-29.9	617	1.14	0.46-3.22	0.78
>30	202	1.32	0.41-4.27	0.64
Frailty				
Frailty Score = 0 (Reference)	3350			
Frailty Score = 1	196	4.10	2.12-7.40	<0.001
Frailty Score = 2	12	NA	NA-Inf	0.99
Number of major comorbidities				
0	3325			
1	211	3.76	1.94-6.78	<0.001
2	20	NA	NA-Inf	0.98
3	1	NA	NA-Inf	1.00
5	1	NA	NA-Inf	1.00
Charlson Comorbidity Index (CCI)				
CCI = 0 (Reference)	3800			
CCI = 1	324	1.10	0.42-2.38	0.83
CCI = 2	132	5.82	2.90-10.08	<0.01
CCI = 3	19	NA	NA-Inf	0.98
CCI = 4	1	NA	NA-Inf	1.00
CCI = 7	1	NA	NA-Inf	1.00
CCI = 8	1	NA	NA-Inf	1.00
ASA Class				
Class I: No disturbance (Reference)	1970			
Class II: Mild disturbance	1435	0.97	0.59-1.60	0.92
Class III: Severe disturbance	140	1.88	0.64-4.45	0.19
Class IV: Life threatening	5	NA	NA-Inf	0.99
None Assigned	8			

1134268 - Postoperative outcomes after staged vs. coordinated mastectomy and bilateral salpingo-oophorectomy

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Background/Objective: Individuals with high-risk gene mutations for breast and ovarian cancer may be given the option to undergo risk-reducing bilateral salpingo-oophorectomy (BSO) in addition to mastectomy to decrease their lifetime risk of these cancers. While mastectomy can be performed at the same time as BSO in a coordinated approach, it can also be performed sequentially in a staged approach. Although a coordinated approach may have the benefit of fewer surgery and anesthesia events to recover from, it is unclear if it may be associated with higher rates of postoperative complications compared to a staged approach. The objective of this study was to assess whether postoperative complication rates were different between patients who underwent coordinated mastectomy and BSO versus staged operations.

Methods: Billing data from the Marketscan database was used to identify patients who underwent mastectomy and BSO from 2010 to 2015. Patients who underwent both procedures were placed in the coordinated group if procedure codes for mastectomy and BSO were within 14 days of each other to account for date discrepancies in coding endemic to this database. All patients within this group were validated to have had a single surgery event including both procedures codes. Those who had more than 14 days between procedure code entries were placed in the staged group. The primary endpoint was the incidence of any postoperative complication within 90 days. Secondary endpoints were incidence of infection, hematoma, seroma, fat necrosis, wound dehiscence, implant removal, cardiopulmonary adverse events, and venous thromboembolic events. Statistical analyses were performed using Chi-Squared Analysis and Fischer's Exact Test. A multivariate analysis was also performed.

Results: A total of 49,278 patients were identified who had mastectomy and/or BSO, of whom, 2,736 underwent both operations. Four hundred (14.6%) patients were included in the coordinated group, and 2336 (85.4%) were included in the staged group. There were no significant differences between the groups in terms of age or institution region. Patients in the coordinated group were more likely to have an Elixhauser Co-morbidity Index Score greater than 3 ($p<0.01$). Patients in the coordinated group had a lower incidence of total postoperative complications (n=89 [22.3%]) compared to the staged group (n=636 [27.2%]; p=0.04). There were no differences between the 2 groups for any of the individual postoperative complications (Table) aside from rate of breast seroma, which occurred less frequently in the coordinated group (n=18 [4.5%]) compared to the staged group (n=180 [7.7%]; p=0.02). In the multivariate analysis, the staged group had higher odds of postoperative complications compared to the coordinated group (OR 1.35 [95% CI 1.04-1.76; p=0.02]) when controlling for age, region, year of surgery, and comorbidity score.

Conclusions: Among patients undergoing both mastectomy and BSO, coordinated operations are associated with lower rates of postoperative complications compared to staged operations. While

further studies are needed to corroborate these findings, coordinated breast and gynecologic operations appear to be safe.

Table. Comparison of postoperative outcomes in staged versus coordinated procedures

	Mastectomy and BSO		
Postoperative complication	Coordinated (n=400) N (%)	Staged (n=2,336) N (%)	Significance (P value)
Infection	36 (9.0)	238 (10.2)	0.46
Hematoma	9 (2.3)	81 (3.5)	0.20
Breast seroma	18 (4.5)	180 (7.7)	0.02
Fat necrosis	13 (3.3)	109 (4.7)	0.20
Wound dehiscence	23 (5.8)	174 (7.5)	0.22
Implant removal	14 (3.5)	57 (2.4)	0.22
Cardiac	1 (0.3)	6 (0.3)	1.0
Respiratory	2 (0.5)	4 (0.2)	0.21
DVT/PE	8 (2.0)	48 (2.1)	0.94
Overall complications	89 (22.3)	636 (27.2)	0.04

Abbreviations: BSO, Bilateral Salpingo-Oophorectomy, DVT, deep vein thrombosis; PE, pulmonary embolism.

1139848 - Postoperative complications following lumpectomy and mastectomy in women with pregnancy-associated breast cancer

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Background/Objective: The rate of complications following lumpectomy and mastectomy in women with pregnancy-associated breast cancer (PABC) is poorly studied. This study aimed to further delineate postoperative complications.

Methods: This is a single-institution retrospective study of 74 patients with PABC treated with lumpectomy (n=28) or mastectomy (n=46). Patient demographics, presentation, tumor characteristics, staging, genetic testing, and postoperative complications were recorded.

Results: PABC was diagnosed in 74 patients; 28 (37.8%) were diagnosed with PABC during pregnancy (PABC-P), and 46 patients (62.2%) were diagnosed with postpartum PABC within the first 12 months after delivery (PABC-PP). The overall clinical stage distribution at diagnosis was: Stage 0, 6.9%; I, 18.1%; II, 47.2%; III, 22.2%; and IV, 5.6%, with no significant difference between PABC-P and PABC-PP (p=0.18). There was no significant difference in the rate of lumpectomy (25.0% vs 23.9%, p=0.92), mastectomy (75.0% vs 76.1%, p=0.92), sentinel lymph node biopsy (39.3% vs 52.2%, p=0.28), axillary dissection (14.3% vs 4.3%, p=0.19), or rate of immediate reconstruction (42.9% vs 65.7%, p = 0.094) performed in patients with PABC-P and PABC-PP, respectively. Contralateral prophylactic surgery was performed in 43.2% of patients (39.3% PABC-P vs 47.5% PABC-PP, p=0.59). Re-excision was required in 12.2% of patients (10.7% PABC-P vs 13.0% PABC-PP, p = 0.99). The majority (79.9%) of patients did not experience any postoperative complications, regardless of whether they underwent lumpectomy or mastectomy (83.3% vs 78.6%, p=0.99) or if they had PABC-P or PABC-PP (89.3% vs 73.9%, p=0.11). There was a statistically significant difference in the rate of complications between PABC-P patients undergoing mastectomy with immediate reconstruction (n=0 out of 9, 0%) compared to PABC-PP patients (n=9,

39%; p=0.035). Seroma was the most commonly observed complication after both lumpectomy and mastectomy (n=3 vs n=5, p=0.39).

Conclusions: Overall, there was no increased risk of postoperative complications in women with PABC treated with lumpectomy as compared to mastectomy; however, there is an increased risk of postoperative complications in patients with PABC-PP treated with mastectomy and immediate reconstruction.

CPM

1147702 - Trends in utilization of contralateral prophylactic mastectomy among different age, racial, and ethnic groups

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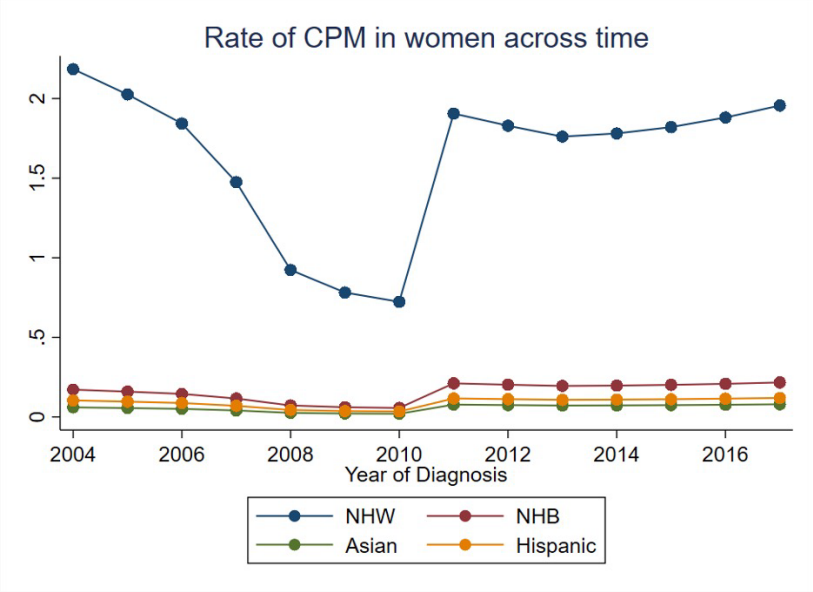
Background/Objective: An increase in the use of contralateral prophylactic mastectomy (CPM) has been observed in the last 2 decades in women diagnosed with breast cancer with varying rates of reconstruction. Historically, younger women of European ancestry have shown higher usage. The objective of this study is to compare the use of CPM and reconstruction among typically underrepresented racial and ethnic groups as well as women over the age of 65 years.

Methods: Women ages 18 years and older, diagnosed with Stages I to III primary breast cancer who underwent mastectomy from 2004–2017 were identified in the National Cancer Database (NCDB). The sample was grouped into CPM vs non-CPM. Bivariable and multivariable analyses were used to examine the associations between the use of both CPM and reconstruction and sociodemographic and clinical factors.

Results: A total of 571,649 patients met the study criteria. Compared to the non-CPM patients, those in the CPM group were younger (<50 years 46% vs 23.3%, p<0.001), White (88.4% vs 82.5%), had less advanced clinical stage (Stage I 48.8% vs 45.0%, p<0.001), were insured (73.5% vs 48.9%, p<0.001), and were without comorbidities (86.0% vs 79.8%, p<0.001). On multivariable analysis, women diagnosed between 2004 and 2011 (odds ratio (OR) 1.51, 95% confidence interval (CI) 1.48-1.55, p<0.001) and those without private insurance (uninsured 0.50, 0.47-0.53, p<0.00; Medicaid 0.65, 0.63-0.67, p<0.001; Medicare 0.72, 0.71-0.74, p<0.001) were less likely to undergo CPM. Furthermore, older (>65 years, 0.17, 0.17-0.18, p<0.001) and non-White (Black 0.65, 0.54-0.58, p<0.001; Asian/Pacific Islander 0.46, 0.44-0.47, p<0.001, Hispanic 0.62, 0.60-0.64, p<0.001) women were less likely to undergo CPM. Among those who underwent CPM, women who were older (>65 years 0.11, 0.11-0.12, p<0.001), non-White (Black 0.73, 0.72-0.75, p<0.001; Asian/Pacific Islander 0.58, 0.56-0.61, p<0.001, Hispanic 0.86, 0.83-0.89, p<0.001), with advanced stage (Stage III 0.36, 0.35-0.37, p<0.001), triple-negative (0.76, 0.75-0.78, p<0.001) and without private insurance (uninsured 0.27, 0.25-0.28, p<0.001; Medicaid 0.41, 0.40-0.42, p<0.001; Medicare 0.45, 0.44-0.46, p<0.001) were less likely to undergo reconstruction.

Conclusions: CPM rates declined from 2004-2010, but increased from 2010-2017, including among those ages >65 years. These temporal trends are seen within our subgroup analyses of non-White women and ages over 65 years. While White women are the predominant recipients of CPM, our analysis shows that since 2010, non-White women have had an increase in CPM usage but are still less likely to have reconstruction. Further research is needed to understand relevant factors impacting surgical decision-making.

Figure. Graph of CPM rates in women (NHW, NHB, Asian, Hispanic)



DCIS

1144308 - Is it time to de-escalate axillary surgery in ductal carcinoma in situ?

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Background/Objective: Recently, axillary surgery has been de-escalated in invasive breast cancer, and sentinel lymph node biopsy (SLNB) may be omitted in certain group of patients according to the Choosing Wisely initiatve. However, SLNB is a standard procedure to rule out lymph nodes metastasis when mastectomy is indicated in DCIS cases. Our purpose was to study the outcome of SLNB in these patients, identify risk factors for a positive SLNB, and determine the impact of this result on further treatment and outcome.

Methods: A retrospective analysis was performed on 48 patients who underwent mastectomy with SLNB for DCIS at a tertiary hospital in Dammam, Saudi Arabia between 2010 and 2018. We evaluated their clinical, pre-operative, and postoperative histopathological characteristics. Follow-up data in terms of regional recurrence and upper limp lymphedema were also reported.

Results: An invasive component was found in the mastectomy specimen of 10 out of the 48 patients (20.8%). The average number of SLN retrieved was 3.5. Out of the total 48 patients, only 3 patients (6.3%) had a positive SLNB, all of which were macro-metastasis, and they underwent axillary lymph node dissection (ALND). No additional positive lymph nodes were identified in the ALND specimens. Two of the 3 patients presented with a breast lump of T2 size, and 2 had a suspicious lymph node on preoperative ultrasound. All had Grade 3 DCIS and all were positive for Her2 neu receptor. Only 1 had microinvasion on the preoperative biopsy. All 3 patients received adjuvant chemotherapy, 2 received adjuvant hormonal therapy, and 2 received adjuvant radiation therapy. Lymphedema was reported in 4 out of 48 patients (8.3%). Regional recurrence was not reported in any patient.

Conclusions: Our results confirm the low rate of positive SLNB in DCIS (6%) even with the presence of microinvasion on the diagnostic biopsy. Factors that might increase the likelihood of a positive SLNB were a T2 size breast lump, a suspicious axillary lymph node on preoperative ultrasound, high-grade DCIS, and HER2nue positivity. Since ALND can be safely omitted in those patients according to AMAROS study, and the risk of lymphedema is considerable, we believe that SLNB during mastectomy for DCIS should not be routinely performed. It is to be offered to a certain group of patients with the former risk factors to guide adjuvant radiation and systemic treatment. We are calling for larger studies to confirm our findings. It is time to consider de-escalating axillary surgery in DCIS.

1146522 - A DCIS biosignature integrated with a novel biologic subtype was predictive for RT benefit and for elevated recurrence risk despite BCS and RT

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Background/Objective: Randomized studies in breast ductal carcinoma in situ (DCIS) patients treated with breast-conserving surgery (BCS) have failed to identify those at low risk who do not benefit from radiation therapy (RT) or those at elevated risk despite BCS with RT. The DCIS biosignature, DCISionRT® (PreludeDxTM, Laguna Hills, CA), has been validated in multiple studies to be prognostic for 10-year risk of ipsilateral breast recurrence (IBR) after BCS and predictive for RT benefit. The goal of this study was to validate DCISionRT with a novel, integrated Residual Risk subtype (RRt) biosignature (DCISionRT+RRt) to identify patients at higher risk following BCS with RT.

Methods: The DCISionRT+RRt integrated biosignature was evaluated for 926 women with pure DCIS treated with definitive BCS with or without RT from a multinational cohort: Uppsala University Hospital, Sweden (1986-2004), University of Massachusetts, Worcester, MA (1999-2008), Kaiser Permanente Northwest, Portland, OR (1990-2007), and Royal Melbourne Hospital, Australia (2006-2011). Central pathology review and biosignature testing was performed on formalin-fixed paraffin embedded tissue at a CLIA-certified lab (Laguna Hills, CA), providing a unique decision score (DS+) for each specimen. Individual patient outcome and biosignature results were analyzed independently (McCloud Consulting). Clinical utility of the integrated biosignature was assessed in 3 patient groups: a) Low Risk (DS+≤2.8), b) Elevated Risk (DS+>2.8 without RRt), and c) Residual Risk (DS+>2.8 with RRt).

Results: The integrated biosignature classified women into three groups: Low Risk (n=338, 37%), Elevated Risk (n=399, 43%), and Residual Risk (n=189, 20%) (Table 1). In patients with Low DS+, the average 10-year IBR risk was 5.1% and no difference was observed between those treated with and without RT (HR=0.8, p=0.7, Δ=0.8%). Patients in the Elevated Risk group had elevated risk (20.6%) without RT and a significant RT risk reduction to 4.9% 10-year IBR risk after RT (p<0.001). However, the Residual Risk group had high 10-year IBR risk without RT (42.1%) and elevated residual risk after BCS with RT (14.7%, p=0.005) compared to those without RRt. Patients derived similar relative risk reduction from RT in both the Elevated Risk and Residual Risk groups. Overall, women treated with BCS without RT with DS+>2.8 had a 10-year IBR risk of 25.7% and benefited significantly from RT (HR=0.26 and Δ=17.7%), and they had a higher RT benefit than those in the Low Risk group (multiplicative interaction p=0.05, additive interaction p<0.001).

Conclusions: The integrated biosignature was prognostic for 10-year IBR risk and predictive for RT benefit. This biosignature now identifies 3 distinct groups of women: (1) Low Risk with a low 10-year IBR risk after BCS without RT and no benefit from adjuvant RT; (2) Elevated Risk with increased 10-year IBR risk without RT but low 10-year IBR risk with RT; and (3) Residual Risk with high 10-year IBR risk after

BCS without RT and elevated 10-year IBR risk after BCS with RT. The biosignature can identify patients with elevated recurrence risk after RT where additional therapies may be warranted.

Table. 10-year total IBR risks (95% confidence intervals)

	Low Risk Group DS+ ≤ 2.8 n=342, events=14	**Elevated Risk Group** DS+ > 2.8 without RRt n=395, events=34	**Residual Risk Group** DS+ > 2.8 with RRt n=189, events=29
BCS without RT	4.8% (2.0% - 11.4%)	21.0% (14.2% - 30.4%)	52.1% (33.2% - 73.9%)
BCS with RT	4.7% (2.5% - 9.0%)	5.0% (2.9% - 8.7%)	13.7% (8.3% - 22.2%)
RT absolute difference	0.1% (-5.0% - 5.2%)	16.0% (7.6% - 24.4%)	38.4% (17.1% - 59.7%)
RT hazard ratio	0.9 (0.3 - 2.4)	0.23 (0.1 - 0.4)	0.22 (0.1 - 0.5)

1146701 - A novel DCIS biosignature identifies two subsets of women with HER2(+) DCIS with significantly different risks of local recurrence after BCS and RT

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Background/Objective: NASBP-B43 was designed to determine if 2 doses of trastuzumab would improve local control after breast-conserving surgery (BCS) plus radiation therapy (RT) in women with HER2(+) breast ductal carcinoma in situ (DCIS). The trial demonstrated a non-statistically significant advantage to the drug in reducing ipsilateral breast tumor recurrence (IBTR). The DCIS biosignature (PreludeDxTM, Laguna Hills, CA) has been shown to be prognostic of 10-year IBR risk and predictive of RT benefit. Nevertheless, our data revealed that there remains a subpopulation of patients with an elevated risk of recurrence despite BCS and RT. We therefore developed a novel Residual Risk subtype (RRt) biosignature that identifies a subset of patients within HER2(+) DCIS with a much higher recurrence risk after BCS plus RT. In this study, we analyzed a cohort of women with HER2(+) DCIS treated with BCS plus RT to determine if the biosignature could identify subsets of women with a) higher recurrence risk after BCS plus RT who may benefit from further therapy, such as trastuzumab and b) low risk after BCS plus RT who would not likely benefit from further therapy to reduce local recurrence.

Methods: DCISionRT with the integrated residual risk biosignature (DCISionRT+RRt) was evaluated on a subset of 178 women with HER2(+) DCIS who were treated with BCS and RT in a multinational cohort of 926 patients from the United States, Sweden, and Australia who were used in the validation studies for DCISionRT. Central pathology review and biosignature testing were performed at a CLIA-certified lab (Laguna Hills, CA). HER2(+) DCIS was defined as patients with a HER2 3+ immunohistochemistry ≥10% (ASCO/CAP). The biosignature identified patients with and without Residual Risk (RR). Individual patient outcome and biosignature results were analyzed independently (McCloud Consulting).

Results: The biosignature classified 113 of 178 HER2(+) women (63%) into the Residual Risk group (DS>2.8 with RRt). Patients were similarly classified as RR independent of age or tumor size (Table). Grade 3 was more common in the RR group than the no RR (87% vs. 63%) group. In the RT-treated patients, those with RR had a significantly higher 10-year total IBR rate of 16.2% (95%CI 9.74%-265.5%) than the patients without RR 1.6% (95%CI 0.2%-10.94%) (p=0.012). Similar results were observed for invasive recurrence.

Conclusions: The new, integrated biosignature was predictive for 10-year IBR risk after BCS plus RT in women with HER2(+) DCIS. The biosignature identified 1) a subtype of women with a HER2(+) DCIS with suboptimal benefit to adjuvant RT (63%) who had significantly elevated 10-year IBR risk remaining after BCS and RT compared to those without RR who had low 10-year IBR risk after BCS and RT. Collectively, this suggests that there is a subpopulation of HER2(+) DCIS that may benefit from further therapy, such as HER2-directed therapies.

Table. Clinicopathology of HER2(+) patients treated with RT, by residual risk subtype

	HER2(+) not RR Group n (%)	HER2(+) RR Group n (%)	All HER2(+) Patients n (%)	p-value
All	65 (37)	113 (63)	178 (100)	
Age <50	12 (18)	33 (29)	45 (25)	0.15
Age ≥50	53 (82)	80 (71)	133 (75)	
Nuclear Grade 1 or 2*	24 (37)	15 (13)	39 (22)	<0.001
Nuclear Grade 3	41 (63)	98 (87)	139 (78)	
Size ≤ 1 cm	38 (58)	59 (52)	97 (54)	0.44
Size > 1 cm	27 (42)	54 (48)	81 (46)	

1147230 - Risk factors for recurrence after DCIS based on repository tissue analysis

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Background/Objective: As screening mammography rates have increased over time, the number of cases of ductal carcinoma in situ (DCIS) have as well. According to the American Cancer Society, 1 in 5 women with breast cancer will be diagnosed with DCIS. Based on Surveillance, Epidemiology and End Result (SEER) database of 100,000 women, the ipsilateral invasive recurrence rate after DCIS is around 5.9%. We sought to utilize a DCIS tissue repository to evaluate demographic and risk factors associated with elevated risk for ipsilateral and contralateral recurrence in patients undergoing treatment for DCIS.

Methods: The Repository of Archival Human Breast Tissue (RAHBT) is a retrospective review of tissue from 2000-2019 from the St. Louis Breast Tissue Registry (STBTR). Data were obtained in accordance with the guidelines established by IRB, and all patient information was de-identified prior to sharing with investigators. A qualifying case is defined as DCIS with subsequent DCIS or invasive breast cancer in the ipsilateral or contralateral side at least 6 months following the initial DCIS diagnosis. For each case with a subsequent recurrence, we identified 1 or 2 DCIS controls who did not develop ipsilateral or contralateral tumors during the study period and were matched on race, age at diagnosis, year at initial

DCIS diagnosis, and surgery type. Cox proportional hazards regression was used to estimate the hazard ratios (HR) of subsequent ipsilateral and contralateral events based on age, BMI, mammographic density, family history of breast cancer, grade, hormone receptor status, type of surgery, radiotherapy, hormone therapy, and surgical margins.

Results: A total of 169 qualifying cases were reviewed from 2000-2019 out of 1252 in situ cases in the STBTR. Of these, 52.1% were from 2000-2009, and 47.9% were from 2010-2019. There were 92.3% of cases who were older than 40 years at the time of their initial diagnosis. Regarding race, 67.1% of cases were Caucasian, 30.5% were African American, 1.7% were Asian, and 0.1% were Pacific Islander. Majority of these cases were ER-positive (71.6%) and PR-positive (60.4%). Women with family history of breast cancer were more likely to have recurrence compared to women with no family history of breast cancer (HR=1.72, 95% CI 1.03-2.87). The use of adjuvant endocrine therapy post-operatively was associated with a significantly reduced risk of ipsilateral recurrence (HR=0.55, 95% CI 1.03-2.87). There were no significant associations between the other factors and the risk of ipsilateral recurrence. None of these factors were significantly associated with the risk of contralateral events.

Conclusions: Family history of breast cancer was significantly associated with ipsilateral recurrence, while the use of endocrine therapy reduced the risk of an ipsilateral recurrence. Contralateral breast cancer does not have strong associations with the studied risk factors. These data provide more evidence to tailor discussions with patients about expectations after DCIS treatment. Of course, the majority of women will likely have no recurrence, but these data allow us to identify high-risk characteristics in patients that warrant further discussion.

1147017 - Patient and provider views on active surveillance for ductal carcinoma in situ of the breast

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Background/Objective: Multiple international trials are currently investigating the safety of active surveillance (AS) for low-risk ductal carcinoma in situ (DCIS), which involves clinical and radiographic exam every 6 months, and surgical excision being offered only in the case of a progressive lesion with a biopsy showing invasive cancer. The objective of this study was to explore the patient and provider views on acceptability of AS for low-risk DCIS to contribute knowledge toward an effective implementation strategy if AS is proven to be a safe and efficacious management option for low-risk DCIS.

Methods: Qualitative descriptive analysis was performed to explore patient and provider views on AS for DCIS. Women with a history of DCIS were recruited using purposive sampling and interviewed in 5 focus groups. They were asked whether they would consider AS if it was an available option for them, and what information they consider to be important in making their decision. Concurrently, actively practicing breast cancer clinicians were interviewed via semi-structured telephone interviews, and asked whether they discuss AS with their DCIS patients and the circumstances in which they would consider AS. All interviews were conducted using interview guides that were created and pilot tested as part of a larger study on patient-centered care on DCIS. The responses were recorded and transcribed verbatim. Data was analyzed iteratively, and constant comparative analysis was used to extract dominant themes.

Results: A total of 35 women were interviewed in 5 focus groups held in 5 provinces in Canada, and a total of 35 clinicians from general surgery, surgical oncology, medical oncology, and radiation oncology were interviewed. Common themes among women who may consider AS included: evidence that AS is safe and reliable, availability and accessibility of an established AS program, and accurate assessment of individual risk of progression. On the other hand, the majority of women expressed that they would not consider AS – some due to personal anxiety and others due to a strong family history of breast cancer. They also raised the risk of missing invasive disease and the need for multiple investigations in the future as reasons against AS. The majority of clinicians currently offer AS only if the patient is unfit for surgery or if the patient is not interested in pursuing surgery. They pointed out that currently, there is no robust evidence base and guidelines on how to safely provide AS, nor a unified view of its value among clinicians. Similar to the women interviewed, clinicians felt that the risk of missed invasive disease would deter them from offering AS, and they believed that patients would not favor AS.

Conclusions: The women and clinicians were aligned in their hesitancy for AS in its current state. Fear of missed invasive disease and lack of evidence and guidelines were the main reasons against considering AS, and they highlighted a need for individualized risk assessment for progression. If AS were to be proven to be safe, these important considerations should be included for an effective implementation of AS for DCIS.

1147279 - Use of a novel biosignature score results in de-escalation of adjuvant radiation therapy in patients undergoing breast-conserving surgery for ductal carcinoma in situ (DCIS)

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Background/Objective: De-escalation of breast cancer therapy has progressed over the past 10 years as greater understanding of tumor biology has allowed for more tailored therapy. Breast conservation for patients with ductal carcinoma in situ (DCIS) includes surgical resection with consideration of post-operative radiation. Although adjuvant radiation does not impact overall survival, prior studies show a persistent benefit in reduction of ipsilateral in-breast tumor recurrence. The goal of the current study was to evaluate the impact of a novel residual risk biosignature (DCISion RT®) on adjuvant radiation recommendations for patients undergoing breast-conserving surgery for DCIS.

Methods: The DCISionRT biosignature was evaluated in women diagnosed with DCIS (no microinvasive disease) from a single surgeon of consecutive patients undergoing breast-conserving surgery between 2019-2021. A central pathology review and biosignature testing was performed on Formalin Fixed Paraffin Embedded tissue sections at a CLIA-certified lab (Laguna Hills, CA yielding a decision score (DS). Radiation recommendation before and after biosignature assessment was identified through retrospective chart review. The impact of the biosignature on radiation therapy recommendations was assessed using McNemar's test to determine whether the proportion of patients who were initially recommended radiation was altered after biosignature assessment. The average scores (DS), DCIS tumor size, tumor grade, margin status, and age of the patients who underwent radiation versus those who omitted radiation were compared using an unpaired t test.

Results: Seventy-three patients underwent breast-conserving surgery for DCIS during the study period. Of those, 20 (27%) met RTOG9804 criteria (low- or intermediate-grade DCIS, measuring less than 2.5 cm with margins ≥ 3 mm), including 12 of 22 (55%) in the group of patients who ultimately omitted radiation and 8 of 51 (16%) in the group of patients who received adjuvant radiation. Prior to the biosignature result, all 73 patients were recommended to consider adjuvant radiation. However, following the biosignature result, 22 patients (30%) omitted radiation due to a low-risk biosignature score ($p<0.001$). Patients who ultimately omitted radiation had a significantly lower biosignature score (DS mean 1.9) versus those who proceeded with adjuvant radiation (DS mean 3.0) ($p=0.03$). There was no significant difference between the 2 groups with respect to patient age, margin status, tumor grade, or method of detection. The only factor that varied between the 2 groups, in addition to the biosignature score, was tumor size whereby patients in the radiation group had larger tumor size (mean 16.6mm) versus those patients in the no radiation group (9.8mm) ($p=0.02$).

Conclusions: The DCISionRT biosignature score along with clinical and pathological features resulted in a 30% reduction in adjuvant radiation therapy in this single-institution cohort. The only other factor predictive of receipt of radiation was tumor size. Long-term follow-up of outcomes and continued multidisciplinary incorporation of the biosignature is likely to identify increasing numbers of patients with DCIS who can safely forego radiation following breast-conserving surgery.

1147399 - Value of post-excision mammography in ductal carcinoma in situ patients presenting with malignant-appearing calcifications

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Background/Objective: There are conflicting data on the value of post-excision mammogram (PEM) to ensure clear margins following breast-conserving surgery (BCS). Here we evaluate utilization and yield of PEM among patients with DCIS presenting as mammographic (MMG) calcifications (Ca++).

Methods: Patients with a final diagnosis of DCIS presenting as MMG Ca++ and undergoing BCS were identified from a prospectively maintained database from 1/2016 – 6/2020. Patient demographics, extent of MMG Ca++, margin status, rates of re-excision, and PEM use were examined. All PEMs were reviewed by a single radiologist.

Results: A total of 399 patients met eligibility criteria; 78 (19.5%) underwent PEM, with 15 (19.2%) demonstrating suspicious residual Ca++. Factors associated with PEM use included larger extent of MMG Ca++ (median 2.2cm w/PEM vs 1.2cm w/out, $p<0.001$) and ≥2 groups of MMG Ca++ ($p=0.008$) on initial imaging; localization of MMG Ca++ with bracketing ($p<0.001$); and close or positive margins ($p=0.005$). Overall, 117/399 (29.3%) patients underwent at least 1 re-excision with additional DCIS identified in 53/117 (45.3%). Patients with PEM were more likely to undergo re-excision ($p=0.011$); 11/15 (73.3%) patients with PEM demonstrating residual Ca++ underwent re-excision, with DCIS present in 7/11 (63.6 %); including 1/3 (33.3%) patients with negative margins, 4/6 (66.7%) with close margins, and 2/2 (100%) with positive margins (Table). There were 21/63 (33.3%) patients with negative PEM who underwent re-excision, with DCIS present in 9/21 (42.8%) cases, including 7/14 (50%) patients with close

margins, and 2/7 (28.6%) with positive margins. Among 321 patients without PEM and close (n=75) or positive (n=28) margins, 85 (26.5 %) underwent re-excision, with DCIS present on re-excision in 37/85 (43.5%) of patients. When analyzed by extent of MMG Ca++ (<2cm, 2-3cm and >3cm), patients with MMG Ca++ >3cm were more likely to have positive PEM (p=0.026) and undergo re-excision, yielding residual DCIS in 62.5% of cases (Table).

Conclusions: In this cohort of DCIS patients presenting with MMG Ca++, 117/399 (29.3%) underwent re-excision. PEM use was associated with more extensive imaging findings and when obtained, PEM directed re-excision in patients with negative, close, and positive margins with an overall yield of additional DCIS in 63.6% patients as compared to 42.9% of patients with negative PEM and 43.5% of patients without PEM. Further analyses to define subsets of patients most likely to benefit from PEM are warranted.

Table. Use of PEM, re-excision by PEM and yield of additional disease in patients undergoing breast conservation surgery (BCS) for ductal carcinoma in situ (DCIS) by margin status at initial lumpectomy and by extent of MMG Ca++.

		Margin Status		
	Overall Cohort (n = 399)	Negative Margins (n = 256)	≥1 Close Margins (≤2 mm, n = 106)	≥1 Positive Margins (n = 37)
# with PEM (%)	78 (19.5%)	38 (14.8%)	31 (29.2%)	9 (24.3%)
# with positive (pos) PEM	15/78 (19.2%)	5/38 (13.2%)	8/31 (25.8%)	2/9 (22.2%)
# with pos PEM and re-excision	11/15 (73.3%)	3 (60.0%)	6 (75.0%)	2 (100.0%)
# with pos PEM and residual DCIS on re-excision	7/11 (63.6%)	1 (33.3%)	4 (66.7%)	2 (100%)
		Extent of MMG Ca++		
	Overall Cohort (n=399)	Ca++ < 2 cm (n = 270)	Ca++ 2-3cm (n = 56)	Ca++ > 3 cm (n = 70)
# with PEM (%)	78 (19.5%)	37 (13.7%)	8 (14.3%)	33 (47.1%)
# with pos PEM	15/78 (19.2%)	4/37 (10.8%)	1/8 (12.5%)	10/33 (30.3%)
# with pos PEM and re-excision	11/15 (73.3%)	3/4 (75%)	0/1 (0%)	8/10 (80%)
# with pos PEM and residual DCIS on re-excision	7/11 (63.6%)	2/3 (66.7%)	0/1 (0%)	5/8 (62.5%)

1148407 - A comparison of risk perceptions in patients with DCIS or atypical breast lesions

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Background/Objective: The standard therapy for many women with ductal carcinoma in situ (DCIS) includes a combination of surgery, radiation, and endocrine therapy. However, there is growing evidence that not all DCIS lesions will progress to invasive cancer, prompting investigation into the safety of de-escalation (i.e., active monitoring; AM) in select patients with low-risk DCIS. A key component to the feasibility of AM will be patient acceptance, yet there are minimal data on how patient perceptions of cancer risk may impact acceptance of AM. The aim of this study was to assess patient-reported outcomes (PROs) of patients with breast atypia (non-obligate precursor to breast cancer) or DCIS. We also wished to determine the potential association of PROs with patient estimates of cancer risk, in order to gain insight into potential facilitators and barriers to de-escalation.

Methods: Patients diagnosed with DCIS, atypical ductal hyperplasia, atypical lobular hyperplasia, or lobular carcinoma in situ between 2012 and 2017 at 1 of 4 participating NCI Comprehensive Cancer Centers were asked to complete a one-time cross-sectional survey. PROs explored decisional uncertainty, psychological outcomes, decision control preferences, and perceived cancer risk. Clinical, pathological, and treatment information was abstracted from the medical record. The association of patient and clinical characteristics and PROs with cancer-risk overestimation were explored. Risk overestimation was defined as a response of “moderate,” “likely,” or “very likely” to questions related to 5-year or lifetime risk of invasive cancer.

Results: A total of 912 patients completed the survey (59% response rate), including 365 patients with atypia (40%) and 547 patients with DCIS (60%). DCIS patients were slightly older. There were 77.5% of atypia patients who underwent surgery compared to 98.3% of DCIS patients. There were 52.5% of DCIS patients who overestimated their risk of DCIS recurrence. Patients with atypia were more likely than patients with DCIS to overestimate their risk of invasive cancer (68.5% and 48.8% respectively, $p<.0001$). DCIS patients were more likely than those with atypia to report that treatment decisions were mainly theirs ($p<0.001$) as opposed to shared decision-making with their physician or relying on their physician to make the decision. DCIS patients undergoing AM were the least likely to overestimate their risk of invasive cancer, while AM atypia patients were most likely to overestimate their risk (Table). DCIS patients reporting that treatment decisions were mainly theirs were less likely to overestimate DCIS recurrence risk (OR 0.58, 95% CI 0.37 - 0.90). Overall, atypia and DCIS patients who reported decisional conflict (OR 1.84, 95% CI 1.26 – 2.67) were more likely to overestimate their future risk of invasive cancer.

Conclusions: Patients with atypia and DCIS who report decisional uncertainty are more likely to overestimate their future risk of cancer. Meanwhile, patients who report a more active role in their treatment decisions are less likely to overestimate their risk. This study identifies patient factors that are associated with overestimation of invasive cancer risk and therefore may make patients more or less

likely to consider AM. Additional study is needed into facilitators and barriers of patient participation in AM for DCIS.

Table. Summary of overestimation of cancer risk and SURE scale findings in patients with breast atypia or DCIS

		Atypia		DCIS		
	All Patients	AM N=82	Surgery N=283	AM N=9	Surgery N=538	P-value
Overestimate cancer risk						
No	395 (43.3%)	25 (30.5%)	90 (31.8%)	6 (66.7%)	274 (50.9%)	<.0001
Yes	517 (56.7%)	57 (69.5%)	193 (68.2%)	3 (33.3%)	264 (49.1%)	<.0001
SURE scale*						
<4	390 (42.8%)	76 (92.7%)	270 (95.4%)	0 (0%)	44 (8.2%)	<.0001
4	522 (57.2%)	6 (7.3%)	13 (4.6%)	9 (100%)	494 (91.8%)	<.0001

**SURE scale score less than 4 indicates clinically significant decisional uncertainty*

1148556 - Impact of surgical delays during the initial surge of the COVID-19 pandemic on patients with high-risk and malignant breast disease

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Background/Objective: On March 13th, 2020, the American College of Surgeons issued a guideline that requested that all hospitals delay elective surgeries to conserve resources to care for patients infected with SARS CoV-2 virus. The purpose of this study was to examine the short-term impact of these surgical delays on pathologic outcomes for patients with benign and malignant breast disease whose surgeries were delayed because of this guideline.

Methods: This was a retrospective chart review of patients scheduled for breast surgery from March 16th, 2020 to April 30th, 2020 but subsequently delayed. We included patients with invasive disease, ductal carcinoma in situ (DCIS), and high-risk lesions (HRLs). HRL was defined as lesions with atypia, lobular carcinoma in situ, papillomas, or radial scars. Patient demographics, tumor characteristics, and number of days from biopsy to surgery were collected. We compared clinical versus pathologic tumor size, node status, and grade for invasive and DCIS lesions. Additionally, we examined the proportion of DCIS and HRLs that were upgraded to DCIS or invasive disease.

Results: There were 108 patients who experienced surgical delays, of which 57 (52.7%) had invasive cancer, 26 (24%) had DCIS, and 25 (23.1%) had HRLs. The median delay for all patients was 94 + 49 days. Of 54 patients with hormone receptor-positive and Her2neu-negative disease, 46 (80.7%) received neoadjuvant hormonal therapy prior to surgery. There were no significant differences in clinical and pathologic tumor size for invasive and tumor grade for DCIS lesions. More than 80% of patients with invasive disease had a pathologic tumor size within 1cm of the clinical tumor size at presentation, and only 4 (7.3%) had a tumor size difference >1cm at resection (Table). Only 14 (60.9%) of DCIS lesions were within 1cm of clinical size and 4 (17.4%) were >1cm of the clinical size. Tumor upgrade rates were examined for DCIS and HRLs. Nine (34.6%) of DCIS lesions were upstaged to invasive cancer at surgical

resection; all were AJCC T1N0 cancers. Three (12%) of the HRLs were upgraded to DCIS, and 3 (12%) to invasive disease for an overall upgrade rate of 6 (24%).

Conclusions: Surgical delays had a more negative impact for patients with DCIS or HRL disease than invasive cancer. These findings could provide some insight into how surgical delays could impact lesions that have not become invasive.

Table. Pathologic outcomes at surgical resection

	Invasive disease (n=57)	DCIS (n=26)	High Risk Lesions (n=25)
Tumor size			
Mean change*	1.9 ±1.9	1.4±1.2	0.9±0.5
Final size within 1cm of clinical size	45 (81.8%)	14 (60.9%)	12 (75%)
Final size >1cm of clinical size	4 (7.3%)	4 (17.4%)	0 (0%)
Final size <1cm of clinical size	6 (10.9%)	5 (21.7%)	4 (25%)
Tumor grade			
Final grade same as clinical grade	40 (75.5%)	17 (73.9%)	NA
Final grade higher than clinical grade	2 (3.8%)	2 (8.7%)	NA
Final grade smaller than clinical grade	11 (20.8%)	4 (17.4%)	NA
Nodal status			
Final node status same as clinical node status	30 (73%)	6 (100%)	NA
Clinical node status N1, pathologic N0	0 (0%)	0 (0%)	NA
Clinical node status N0, pathologic N1	11 (26.8%)	0 (0%)	NA
Tumor upgrade			
DCIS	NA	NA	3 (12%)
Invasive disease	NA	9 (34.6%) (all T1N0)	3 (12%) (all T1N0)

*Clinical tumor size on imaging compared to pathologic tumor size
DCIS, ductal carcinoma in situ

Disparities

1145533 - Black women are less likely to be classified as high-risk for breast cancer using Tyrer-Cuzick 8 Model

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Background/Objective: Supplemental breast cancer screening with breast MRI for women at high risk of developing breast cancer can improve outcomes and lower mortality rates. The Tyrer-Cuzick 8 (TC8) model is one of the most widely used models for calculating a woman's breast cancer risk and thus helps determine if a woman qualifies for supplemental breast cancer screening. However, there is concern that the TC8 model classifies Black women as high-risk less often than other racial groups, leading to disparities in supplemental breast cancer screening. This study sought to assess racial differences in TC8 scores and examine contributing factors to this disparity.

Methods: In 2020, our institution - an academic medical center with urban and suburban locations in the US - implemented a prospective clinical workflow to offer breast cancer risk assessment including calculation of TC8 scores to patients between the ages of 25-75 undergoing routine breast imaging. In this single-institution study, we assess racial differences in TC8 scores among patients who participated in the risk assessment program. Data on race, breast density, BMI, and TC8 scores were retrospectively extracted from the electronic medical record. TC8 scores were then classified as normal risk (<20%) or high risk (≥20%). BMIs were categorized based on World Health Organization classifications, with a BMI ≥30 being classified as obese. Logistic regressions were run to evaluate racial differences in TC8 scores, and rank biserial correlations were employed to determine the impact of breast density and BMI on TC8 scores.

Results: Between July 20, 2020 and June 29, 2021, 15356 patients fit the inclusion criteria, of which 5796 identified as White, and 5813 identified as Black. Of the 5796 White patients, 1015 (17.5%) had a high-risk TC8 score, while 4781 (82.5%) had a normal-risk TC8 score. Of the 5813 Black patients, 620 (10.7%) had high-risk TC8 scores, and 5193 (89.3%) had normal-risk TC8 scores. Logistic regression demonstrated that White patients were more likely to have high-risk TC8 scores than Black patients (OR=1.757). Rank biserial correlations showed an inverse relationship between TC8 score and BMI (rrb=-0.04) and a direct relationship between TC8 score and breast density (rrb=0.37). Since the magnitude of the rank biserial correlation value for TC8 score and breast density was greater than that of TC8 score and BMI, it can be concluded that breast density has a greater impact on TC8 scores than BMI.

Conclusions: Our results suggest that Black women are less likely to be classified as high risk based on their TC8 scores and are thus less likely to qualify for supplemental screening, possibly due to lower rates of breast density and higher BMIs. This study is the first to elucidate contributing factors to this disparity. Further study is needed to determine the clinical impact of this disparity.

1147858 - Comparison of breast cancer treatment quality metrics and breast conservation rates between Arabic Middle Eastern and Caucasian women using the Mastery of Breast Surgery Registry

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Background/Objective: Disparities in breast cancer management among different ethnic groups and races have been well described, and their effect on outcomes have been studied in several ethnicities and races such as Caucasian, Asian, and African American. However, studies looking at specific breast cancer treatments and outcomes in American women of Middle Eastern or Arabic descent are very scarce in literature. The Mastery of Breast Surgery (MOBS) is an online registry platform from the American Society of Breast Surgeons (ASBS) that is utilized by more than 1600 surgeons, most of whom are in the United States, and contains cancer-specific and treatment data for more than 177,000 cancers. This registry also captures the race of the patient among other demographic data. The purpose of this study is to compare breast cancer characteristics, treatments, and quality metrics among Arabic and Middle Eastern women to those of Caucasian women in the MOBS registry.

Methods: A review of de-identified data of all cancers entered in the MOBS in 2 ethnic groups, Arabic Middle Eastern (ArME) and Caucasian, was conducted. We looked at 5 quality metrics and breast conservation surgery rates in these 2 groups. The metrics are whether the cancer was diagnosed via a needle biopsy, a sentinel lymph node biopsy was performed for invasive Stage I or II disease, radiation treatment was initiated if recommended for breast-preserving surgery, hormonal therapy was initiated if recommended for hormone receptor-positive invasive breast cancer, and chemotherapy was administered if recommended for Stage T1c, II or III disease. We also investigated the reasons for which a sentinel lymph node biopsy was not performed.

Results: Breast conservation rates were not statistically different between the 2 groups (62.11% for the ArME, and 64.5% for the Caucasian, p=0.2487). There was no statistical difference between the groups for the quality metrics either. However, in women who did not undergo a sentinel lymph node biopsy, women of ArME ethnicity were more likely not to have this procedure done due to more locally advanced disease (clinically positive nodes, biopsy-proven positive nodes, Stage III or IV disease, and inflammatory breast cancer) (64.65% for ArME, and 44.83% for Caucasian, p=0.00012).

Conclusions: To the best of our knowledge, this is the first study that utilizes the MOBS registry database to analyze whether a disparity exists in breast cancer care among women of Arabic Middle Eastern ethnicity. Our study indicates that this group of women may present with more locally advanced disease precluding the use of a sentinel lymph node biopsy. However, further studies are recommended to understand the reasons behind such disparity, if one truly exists, and to shed light on whether there is a difference in treatment outcomes.

1147217 - The changing demographics of breast cancer: A population-based projection

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Background/Objective: Breast cancer is the second leading cause of death in females in the United States (US). As the demographics of the population changes, it is important to understand the changing pattern of breast cancer. As the incidence of breast cancer changes with the population, these changes should be used to guide early interventions and practice patterns in a way that incorporates vulnerable populations.

Methods: Using the 2016 US Census projections, estimates for population were obtained by age, race, and ethnicity. Using SEER 18 delay-adjusted data, the breast cancer population-based incidence rates were obtained by age, race, and ethnicity. Modeling was obtained using an Average Annual Percent Change (AAPC) model with data from 2014-2018, assuming both a constant incidence rate as well as changes in age-adjusted, site-specific cancer incidence rates. These data were applied to our projection model to project incidence rates through 2040.

Results: The incidence of breast cancer is predicted to outpace the increase in population growth by 2040. Using a non-constant incidence rate (AAPC model), the breast cancer incidence is projected to increase by 31% compared to a population increase of only 18.6%. The increase in breast cancer incidence is estimated to be made up of mostly non-white females, seeing an increase from 25.8% of the incidence rate in 2020 to 35.1% of the incidence rate in 2040. Conversely, white female incidence rates are projected to decrease from 74.1% in 2020 to 64.9% in 2040.

Conclusions: As the US minority population continues to increase over time, it is important to be aware of the increasing incidence rates in non-white Americans. While it has been shown that Black/African American women have a higher breast cancer mortality than White women, it is important to note that this group makes up only a portion of minorities in the US. By 2040, both Hispanic women and Asian/Pacific Islander women are projected to see the greatest increase in breast cancer incidence. Preventive programs, practice patterns, and public policies should be aimed at accommodating the changing population demographics of breast cancer.

Table. Projected incidence of breast cancer from 2020 to 2040

	AAPC 2014-2018					
	Nonminority			Minority		
	No.	%Δ	% of Total	No.	%Δ	% of Total
2020	276826	6.9	74.1	78840	15.7	25.9
2030	326043	22.3	70.1	110577	40.3	29.9
2040	358715	29.9	64.9	148532	117.9	35.1

1148195 - Timeliness of multimodal care for at-risk breast cancer patients at a safety-net institution

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Background/Objective: Delays in breast cancer treatment disproportionately affect certain populations. Breast cancer treatment has developed into complex, multimodal sequences, and outcomes correlated with processes of care have evolved beyond the traditional binary assessment of receipt/non-receipt of treatment. There is a paucity of data regarding timeliness between multiple treatment modalities in vulnerable safety-net populations. We sought to identify differences in timeliness to primary, secondary, and tertiary interventions for Spanish-speaking, Black, and publicly-insured breast cancer patients.

Methods: Patient demographics, time intervals between treatments, and types of interventions (surgical, systemic, radiation) were analyzed retrospectively for consecutive breast cancer patients at a safety-net hospital from 2016 to 2020. Time intervals were defined as primary time (PT) from diagnosis to initiation of primary intervention, secondary time (ST) from completion of primary to initiation of secondary intervention, and tertiary time (TT) from completion of secondary to initiation of tertiary intervention. Pre-defined time interval benchmarks for comparison were ≤90 days for PT and ≤60 days for ST and TT. Comparison groups were Spanish-speaking vs other spoken languages, Medicaid insurance vs other insurances, and Black race vs other races. Chi square and Mood's median tests were used for analyses.

Results: Of 242 patients, 105 (43.4%) primarily spoke Spanish, 143 (59.1%) were of Hispanic ethnicity, 33 (13.6%) were of Black race, and 198 (81.8%) had Medicaid insurance. Median age at diagnosis was 56 years, and stages at diagnosis were 92 (38.1%) Stage I, 56 (23.2%) Stage II, 45 (18.5%) Stage III, and 19 (7.9%) Stage IV. Primary intervention was surgical in 127/235 cases (54.0%), secondary intervention was systemic in 41/178 (23.0%), and tertiary intervention was radiation in 67/86 (77.9%). Seventy-one patients began tertiary intervention, with completion of therapy in 61 (85.9%) cases. Overall, median days (IQR) for PT were 67 (46), ST were 62.5 (51), and TT were 69 (48). More White compared with Black (59 (86.4%) vs 9 (44.4%), p=0.01) and Spanish- compared with English-speaking (33 (93.9%) vs 38 (68.4%), p=0.04) patients completed a tertiary treatment combination. No significant differences for completion of primary and secondary intervention were noted among comparison groups. Overall median PT, ST, and TT among comparison groups with reference to benchmarks are shown in the Figure. In contrast with PT, benchmarks for ST and TT were rarely achieved. Black race (vs other races) was associated with lower odds of PT ≤90 days (OR 0.42, 0.18 - 0.96, p=0.04) and longer median PT (97 (70) vs. 65 (41) days, (p=0.007)). No other significant associations with language, race, or insurance type were found with meeting benchmarks for PT, ST, or TT.

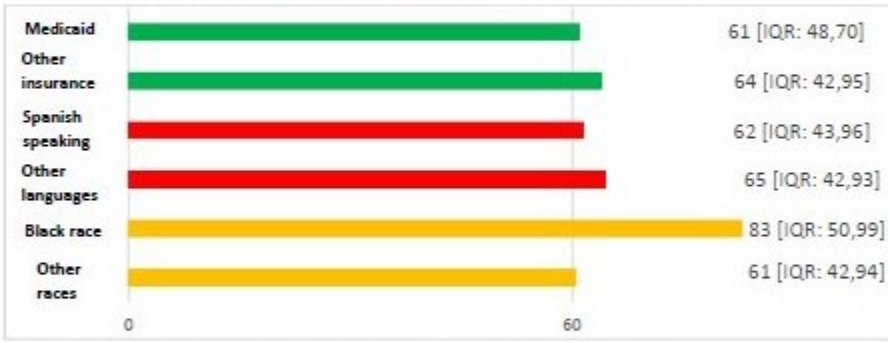
Conclusions: Contrary to prior reports, Spanish-speaking status was protective in some aspects of completion of multimodal care at a safety-net hospital, and further investigation may reveal insights for other populations. However, Black patients remain at risk for worse outcomes due to prolonged time to intervention. Among vulnerable breast cancer patients at a safety-net hospital, identifying barriers to achieving benchmarks for timely completion of all phases of multimodal care warrants immediate attention.

Figure. Median days (IQR) between interventions

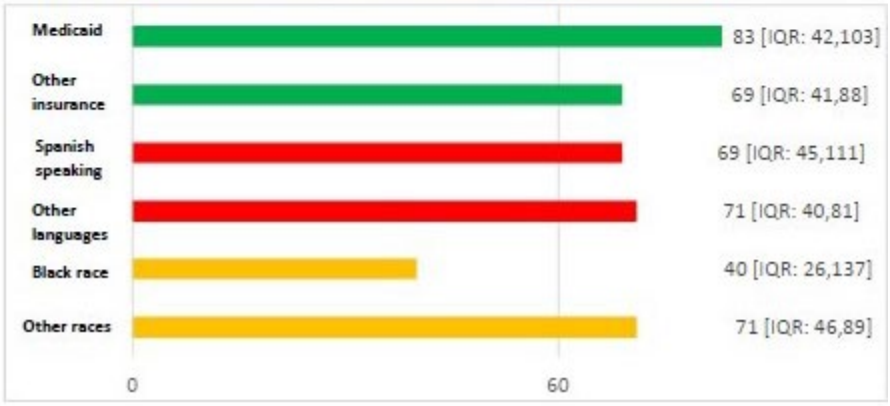
A. Diagnosis to initiation of primary intervention (PT) (benchmark ≤ 90 days)

Mdn=median. IQR, interquartile range: [Q1,Q3]. *p=0.007

B. Completion of primary to initiation of secondary intervention (ST) (benchmark ≤ 60 days)



C. Completion of secondary to initiation of tertiary intervention (TT) (benchmark ≤ 60 days)



1148400 - Maintaining breast cancer services during the COVID-19 pandemic in Ireland

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Background/Objective: At the onset of the COVID-19 pandemic, the UK Association of Breast Surgery issued guidance that included prioritisiation of cases by index of suspicion, utilization of telemedicine, and temporizing the management of elderly (over 70) via empirical endocrine therapy where possible. This advice also extended to the delay of reconstruction, the omission of radiotherapy, and the avoidance of neoadjuvant chemotherapy. In Ireland, although some of the British recommendations were applied, increased resources allowed relative continuation of normal operative services. We sought to retrospectively assess the impact of the pandemic on breast cancer surgical practice at a public university hospital.

Methods: In an effort to compare pre- with intra-pandemic practice, all cancer cases (including in-situ disease) at an academic medical institution were compared, including all breast cancer cases diagnosed between April and August in 2019 and 2020. Patient demographics, clinical data, and treatment details were collated from digital and physical medical records, referral letters, and departmental notes. Data were collected in Microsoft Excel 365, and statistical analysis was carried out in IBM SPSS Version 27.

Results: A total of 260 cases diagnosed with breast neoplasia (including in-situ disease) were retrospectively identified, with 128 diagnosed in the pre-pandemic period (PPP) and 132 in the intra-pandemic period (IPP). This IPP cohort was older (64.45±15.60 vs 56.09±14.46 years $p<0.001$), and with a greater predisposition to multicentricity with a mean number of lesions being greater than the previous year (1.52±0.83 vs 1.27±0.58 lesions $p=0.008$). Tumor size remained similar. The proportions of recurrences in the pandemic year (13.6%) were comparable to the PPP (10.2%). The percentage of patients who underwent surgery (80.3% IPP vs 86.7% PPP) remained stable, as did the proportion of cases receiving neoadjuvant treatment (15.2% IPP vs 12.5% PPP). Among those who underwent surgery, the rate of breast-conserving surgery was 60.6% pre-pandemic versus 55.9% intra-pandemic. Among those who had mastectomy, the immediate breast reconstruction rate was 55.8% pre-pandemic versus 25% intra-pandemic. Looking into axillary management, the PPP rate of complete clearances was 19.2% versus the IPP rate of 17.8%.

Conclusions: Amidst the first wave of COVID in Ireland, symptomatic services appear to have been adequately maintained. The volume of breast cancer diagnosed in the 2 time periods was similar. The later age at diagnosis during the pandemic may be due to the prioritization of referrals of older women who are more likely to be diagnosed with cancer when presenting with a lump. Although the rate of mastectomies remained stable, the number of women who underwent reconstruction was less, in line with the guidance offered at the time. Further research is warranted to examine the impact of changes in care on long-term breast cancer outcomes.

1148513 - Age disparities in inflammatory breast cancer treatment: An NCDB analysis

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Background/Objective: Inflammatory breast cancer (IBC) is an aggressive form of breast cancer with poor prognosis. Guideline-consistent IBC treatment includes surgery, chemotherapy, and radiation. Previous studies have identified disparities in IBC outcomes attributable to race, socioeconomic status, and molecular features. We sought to determine whether age contributes to IBC disparity, hypothesizing that younger patients receive more comprehensive treatment, and older patients undergo less aggressive therapies.

Methods: The National Cancer Database (NCDB) was used to identify female patients with unilateral IBC treated from 2005-2018. Patients were stratified by age (<50, 50-65, >65); demographics, clinical characteristics, and treatment factors were compared. Logistic regression determined factors associated with receipt of surgery, chemotherapy, and radiation.

Results: Of the 8,404 patients with IBC, 30.2% (2,539) were age <50 years, 42.7% (3,587) were age 50-65, and 27.1% (2,278) were age >65 years. The youngest age group represented more minority patients (38.6% vs. 30.5% age 50-65 vs. 23.8% age >65, p<0.001). Patients in the oldest age group had significantly more co-morbidity (25.8% Charlson-Deyo scores >1 vs. 16.6% age 50-65 vs. 9.7% age <50, p<0.001). Older patients presented more frequently with American Joint Committee on Cancer clinical Stage IV disease (31.8% age >65 vs. 26.7% age <50, p=0.002). However, patients in the youngest age group more often presented with node-positive disease (69.3% vs. 61.6%, p<0.001) and grade 3 histology (53.5% vs. 47.6% p=0.002). Nearly all patients age <50 received chemotherapy compared with only three-quarters of those >65 (95.6% vs. 74.7%, p<0.001). The surgical approach for the majority of patients was modified radical mastectomy (MRM), with the oldest patients occasionally receiving less aggressive simple mastectomy and partial mastectomy. Less than half of patients age >65 received radiation (44.4% vs. 63.6% age <50). On multivariable regression, youngest age was significantly and positively associated with chemotherapy (OR 1.5, p=0.003), any surgery (OR 1.3, p=0.001), and radiation (OR 1.2, p=0.001). Patients with node-positive disease were more likely to receive chemotherapy (OR 1.3, p=0.016) and radiation (OR 1.3, p=0.001), but less likely to undergo surgery (OR 0.8, p=0.008). Other factors associated with no surgery were black race (OR 0.58, p<0.001), lack of insurance (OR 0.4, p<0.001), and greater co-morbidity (OR 0.76, p=0.03). Greater co-morbidity also predicted omission of radiation (OR 0.65, p<0.001) but not chemotherapy (OR 0.87, p=0.46).

Conclusions: The youngest patients with IBC receive the most comprehensive treatment aligned with current NCCN and professional society guidelines. Older patients undergo less aggressive treatment regimens, which are likely tailored to functional status and co-morbidity. Further prospective studies are needed to determine whether other factors such as progression of disease or patient preference predict decisions for surgery and adjuvant therapy.

1148433 - Outcomes after implementation of breast recovery after surgery pain protocol by race

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Background/Objective: The use of breast recovery after surgery (BRAS) pain protocols have been adopted at many institutions to facilitate improved patient experiences in the peri-operative setting. Racial disparities in the Black population related to cancer treatment symptoms are well published. However, currently, no BRAS implementation strategies have evaluated the effectiveness of BRAS on post-operative pain scales and the use of morphine milliequivalents (MME) for the Black population. The primary goal of this study is to evaluate these differences during and after lumpectomy with sentinel lymph node biopsy with the implementation of the BRAS protocol for Blacks and Caucasians. We hypothesize that the implementation of the BRAS protocol will improve these outcomes.

Methods: We completed a retrospective chart analysis of patients from January 1, 2014, to June 30, 2019, to determine the efficacy of BRAS protocol in reducing the highest self-reported PACU pain scale, total morphine equivalents (MME), intra-operative MME, and post-operative MME. BRAS protocol was first implemented at our institution in February 2017. The protocol included preoperative administration of celecoxib (200mg), gabapentin (600mg), and Tylenol (1000mg). PECS I and II blocks were performed following induction of anesthesia. Intra-operatively, patients received minimal use of narcotics as needed. For patients undergoing lumpectomy with sentinel node biopsy, a total of 168 patients were reviewed prior to initiation of BRAS protocol, and 232 patients were reviewed after initiation of BRAS. These patients either identified as Black or Caucasian. Other races were excluded in our analysis, as well as patients with chronic pain. Of the total patients studied, 15 (8.9%) pre-BRAS and 30 (12.9%) BRAS protocol patients identified as Black. Statistical analysis was completed using the Mann-Whitney U Test.

Results: Black patients were found to have a higher post-op pain scale pre-BRAS than Caucasians and experienced a statistically significant reduced post-op pain scale from 8 to 2 with BRAS ($p= 0.0037$). Black patients required a higher use of MME than Caucasians in total and intra-operative and post-operative settings pre-BRAS but experienced a statistically significant reduction in total oral MME with BRAS implementation ($p < 0.0001$). The MME medians were the same for Black and Caucasian races post BRAS for total usage and intra-operative and post-operative usage.

Conclusions: Our results demonstrate that Blacks are more likely to exhibit higher post-operative pain scales and MME usage than Caucasians after lumpectomy with node biopsy and that implementation of BRAS protocols can significantly reduce post-operative pain and narcotic consumption. These findings are essential for the optimization of patient care. However, further research is necessary to ensure equitable outcomes for all races.

Table. Patient outcome variables

Variable	Race	Pre-BRAS Median [IQR]	BRAS Median [IQR]	p-value
Highest PACU Pain Scale	Overall	5.0 [0.5-7.0]	2.0 [0.0-5.0]	p < 0.0001
	Black	8.0 [3.5-9.0]	2.0 [0.0-4.5]	0.0037
	Caucasian	5.0 [0.0-7.0]	2.0 [0.0-5.0]	0.0001
TOTAL Oral MME	Overall	60.0 [37.5-82.5]	30.0 [15.0-37.5]	p < 0.0001
	Black	75.0 [57.5-102.5]	30.0 [15.0-60.0]	0.0035
	Caucasian	60.0 [37.5-82.0]	30.0 [22.5-45.0]	p < 0.0001
Intra-Operative Oral MME	Overall	37.5 [28.1-67.5]	30.0 [15.0-37.5]	p < 0.0001[a]
	Black	45.0 [22.5-75.0]	30.0 [15.0-45.0]	0.2062[a]
	Caucasian	37.5 [30.0-63.8]	30.0 [15.0-37.5]	p < 0.0001[a]
PACU Oral MME	Overall	7.5 [0.0-30.0]	0.0 [0.0-15.0]	p < 0.0001[a]
	Black	37.5 [0.0-45.0]	0.0 [0.0-19.1]	0.1380[a]
	Caucasian	7.5 [0.0-22.5]	0.0 [0.0-15.0]	p < 0.0001[a]

Note: IQR – Interquartile Range as Q1-Q3; PACU – Post-anesthesia care unit; MME – Morphine Milliequivalents; Missing data excluded from analyses on a test-by-test basis; a denotes p-value is adjusted

1202428 - BeneFIT: Breast cancer intervention with exercise, implementing an exercise regimen in a diverse patient population

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Background/Objective: The effect of exercise in breast cancer patients has been studied in homogenous patient populations and has demonstrated benefits of improved cancer related quality of life, decreased recurrence, and improved survival. The American Society of Clinical Oncology Breast Cancer Survivorship guidelines recommend 150 minutes of moderate exercise weekly as a Level 1A recommendation. Black women with breast cancer have increased stage at diagnosis and decreased overall survival. The BeneFIT trial seeks to diversify the results of prior exercise research to demonstrate appreciable benefits in newly diagnosed cancer patients of diverse ethnic, racial, and socioeconomic backgrounds.

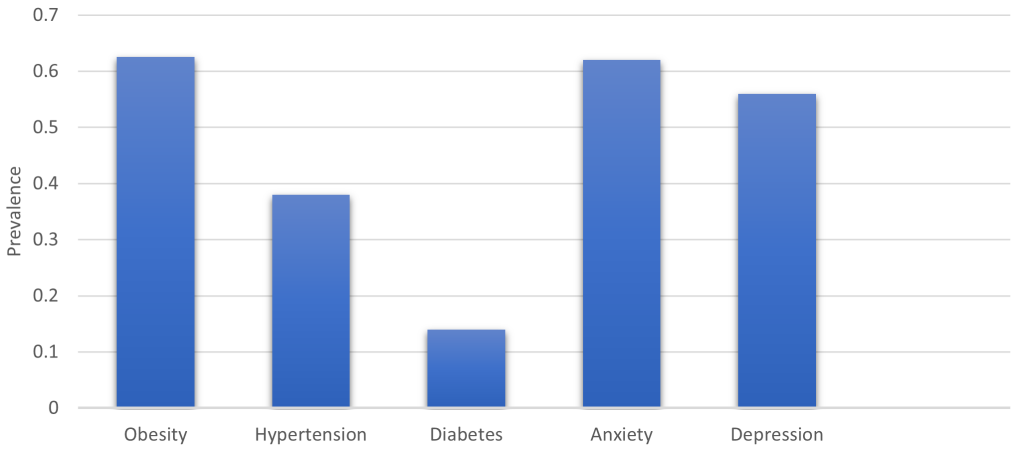
Methods: Patients newly diagnosed with breast cancer were identified and consented to participate in exercise regimen using FitBIT (digital exercise tracking device). Patients were identified who were diagnosed with breast cancer within the past year. Patients completed baseline biometrics and psychosocial assessments regarding mental health and cancer-related quality of life. Subsequently, baseline exercise patterns were monitored, and patients underwent counseling to reach a goal of 150 minutes of moderate exercise weekly. The effects of implementing consistent exercise were measured using a digital activity tracking device (FitBIT).

Results: Analysis of participants demonstrate a high level of comorbidities and mental illness affecting patients in a resource-poo,r socioeconomically diverse metropolitan community. Sixteen patients were enrolled in the study ranging from age 33 to 74. Eighty-three (83%) patients identified as persons of color (non-white). The average BMI of patients was 32, 62.5% of patients were obese or morbidly obese. In these patients, 38% had hypertension, 14% had diabetes. The primary endpoint of the study with moderate activity was not met by the patients. More than half of patients (56%) demonstrated

symptoms of depression on PHQ-9. Many demonstrated anxiety, with 62.5% of patients scoring mild or moderate anxiety. Exercise data demonstrated that patients were able to maintain mild activity, with a mean of 149 minutes of light activity weekly.

Conclusions: In this study, we identified several comorbidities in breast cancer patients that may limit the ability to achieve a recommended metric of breast cancer care - regularly scheduled exercise comprising 150 minutes of moderate activity weekly. To improve survival, wellbeing, and quality of life in patients who are experiencing physical and mental health challenges, an intervention identifying barriers to achieving health and exercise-related goals may be needed in addition to implementing the use of digital tracking devices. There remain significant changes to be implemented in providing equitable care to minorities and socioeconomically diverse breast cancer patients. The implications of implementing consistent moderate activity in these patients may have long-term ramifications that remain an area of future research.

Figure. Comorbidities of breast cancer patients enrolled in BeneFIT



1148829 - Invasive lobular carcinoma: An underserved population's outcomes

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Background/Objective: Invasive lobular carcinoma (ILC) typically presents as a large ill-defined tumor. It can be multicentric or bilateral with early diagnosis more difficult due to decreased sensitivity of screening mammogram. In the literature, ILC is shown to be more responsive to endocrine therapy (ET). Due to the limited literature in non-white and Hispanic patients with ILC, we aim to evaluate our unique patient population to determine characteristics, overall tumor, and nodal response rate to treatment and disease-free survival.

Methods: A retrospective chart review was conducted for patients treated with ILC from 1/2015-6/2021 at a single institution. Variables included patients age, race, education, income, language preference, BMI, date of diagnosis, date of surgery, type of surgery, pathology, treatment including

chemotherapy and radiation, and recurrence. The data were analyzed and recorded looking at the mean, median, and ranges.

Results: The Table summarizes the results. The study included 154 patients. Median age was 62, range 38-91. A total of 70.7% were non-white and Hispanic. Median BMI was 28.5 kg/m2, range 16.6-59. There were an equal number of palpable versus nonpalpable tumors. There were 3 (1.9%) bilateral cancers, which is lower compared to literature, which reports 5-6%. Two of the bilateral cases were black patients, 5% of this race. Preoperative MRI was more accurate in tumor size compared to mammogram. The median percent difference between pathologic size and preoperative MRI size was 0. Size was underestimated by 31.6% for mammogram. Twenty-two (14.3%) patients had positive margins; 7 had re-excision, 4 had mastectomy, and 9 had no further surgery, 2 were lost to follow-up. Estrogen receptor-positive tumors were seen in 150 (97.4%) patients. Twenty-four (15.6%) received neoadjuvant therapy, 4 (16.7%) received chemotherapy, 16 (66.7%) received ET, and 4 (16.7%) received a combination ET and chemotherapy. ET had a larger percent change in size. The median duration of endocrine therapy was 36 months, range 1-60 months. Eighty-two (53.2%) patients received radiation. There were 12 (7.8%) recurrences, 2 local, 10 distant. Three (1.9%) known patients died of disease. Median follow-up was median 23.8 months, range 0.67 - 81.2 months.

Conclusions: ILC is a distinct disease from IDC; however, locoregional and systemic treatment approaches remain similar. ILC tends to be ER-positive, more accurately seen on MRI, and more responsive to neoadjuvant ET. In our largely non-white and Hispanic cohort, the clinical and pathological characteristics and outcomes appear similar to reported series. Nevertheless, larger clinical trials can be conducted to better tailor treatment regimens specific to ILC.

Table. ILC demographics and outcomes

Total Patients	154
Age (median, range)	62, 38-91
Race/ethnicity	
White	36
Black	39
Hispanic	40
Other	8
BMI (median, range)	28.5kg/m2, 16.6 - 59
Lumpectomy	89 (57.8%
Mastectomy	
Unilateral	43 (27.9%)
Bilateral	14 (9.1%)
Breast reconstruction	16 (28%)
Stage	
1	77 (43.5)
2	58 (37.3%)
3	10 (6.5%)
Size (mm) (median, range)	20, 0-160
Positive nodes	45 (29.2%)
1-4	33 (21.4%)
5-9	7 (4.4%)
10+	6 (3.9%
Estrogen receptor positive	150 (97.4%)
Neoadjuvant therapy	24 (15.6%
Endocrine therapy	16 (66.7%)
Chemotherapy	4 (16.7%)
Combination	4 (16.7%)
Decrease in size based on MRI	
Neoadjuvant endocrine therapy	40.9%
Neoadjuvant chemotherapy	4.5%
Combination	27.1%
Decrease in size based on mammogram	
Neoadjuvant endocrine therapy	61.4%
Neoadjuvant chemotherapy	48.8%
Combination	82%
Follow up (months) (median, range)	23.8, 0.67-81.2

1148317 - Modifiable predictors for non-receipt of guideline-concordant care (GCC) after breast cancer diagnosis

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Background/Objective: Disparities in care delivery among patients with breast cancer persist along multiple demographic dimensions including race, ethnicity, and rurality. Less clear are what modifiable factors predict and contribute to disparities in the timeliness, appropriateness, and quality with which care is delivered. We sought to identify modifiable factors associated with non-receipt of GCC among women with breast cancer.

Methods: Our institutional database was queried to identify women ≥18 years old who were diagnosed 2010-2018 with Stage 0-III breast cancer, underwent breast surgery, and had complete stage, biomarker, and treatment data. GCC criteria and eligibility (Table) were defined by treatment modality for chemotherapy, post-lumpectomy radiation [RT], post-mastectomy RT, and endocrine therapy [ET]. Multivariable logistic regression was used to identify factors predicting GCC receipt.

Results: A total of 629 patients were included. Of these, 55.1% (n=108) of chemo-indicated, 63.4% (n=194) of post-lumpectomy RT-indicated, 29.4% (n=75) of post-mastectomy RT-indicated, and 62.7% (n=316) of ET-indicated patients received modality-specific GCC; 69.8% (n=439) initiated treatment ≤60 days of diagnosis. Having practical stressors (e.g., challenges with childcare, transportation, or treatment decisions) was associated with decreased likelihood of receiving both guideline-concordant chemotherapy and ET ($p<0.05$, Table). Notably, longer time-to-evaluation was associated with decreased likelihood of receiving guideline-concordant post-lumpectomy RT and ET ($p<0.05$, Table).

Conclusions: Patients with longer time to evaluation were less likely to receive guideline-concordant post-lumpectomy radiation and endocrine therapy, suggesting that delayed presentation for care after diagnosis of breast cancer can predict who is less likely to receive standard-of-care treatment. Having practical stressors was also associated with non-receipt of guideline-concordant chemotherapy and endocrine therapy. Identifying modifiable factors associated with disparate care can help illuminate opportunities for risk assessment, psychosocial intervention, and disparity mitigation in the provision of care for women with breast cancer.

Table. Guideline-concordant for breast cancer

Treatment* domain/metric	Guideline-concordant Care (GCC) Criteria	Modifiable Factors associated with GCC receipt (odds ratio [OR], 95% CI)	
		Time to Evaluation (TTE), days	*Practical Stressors, any vs. none*
Chemotherapy[a]	(1) cN2-3 and/or pN2-3 (2) Triple-negative (ER-/PR-/HER2-) and >10 mm (3) HER2+ and >5 mm (4) Oncotype DX RS ≥31	**NS**	0.33, 0.15-0.74
Radiation			
Post-lumpectomy[b]	Age <70 years	0.98, 0.96-0.999	**NS**
Post-mastectomy	pT3-4 and/or pN2-3	**NS**	**NS**
Endocrine Therapy[c]	(1) ER+ (2) PR+	0.97, 0.95-0.98	0.65, 0.42-0.99

CI, confidence interval. Cont, continuous. NS, not significant. Ref, Reference. *The logistic regression models for each treatment modality included all variables >0.10 significance in univariate analyses and were as follows (significant findings are underlined):

a. chemo (TTE, race/ethnicity, marital status, cN status, estrogen receptor (ER) status, HER2 status, family stressors, physical stressors, practical stressors)
b. post-lumpectomy RT (age, TTE, race/ethnicity, insurance, BMI, cT, cN, grade, HER2 status, practical stressors)
c. endocrine therapy (age, TTE, BMI, race/ethnicity, marital status, insurance, HER2 status, practical stressors)

1118966 - How collaborative partnership with regional ASBrS surgeon increases access to oncoplastic surgery rurally

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Background/Objective: In our experience, rural cancer patients historically have less access to plastic surgery. A retrospective review revealed few patients had reconstruction, and it was mostly delayed until after primary therapy. This represented a barrier to care geographically, and a disparity that we decided to change.

Methods: Since 2018, we have established collaboration between small rural hospitals and ASBrS surgeons (at accredited breast programs) who integrate plastic surgery into all prospective discussions with shared patients. This has resulted in better-informed decisions about the role for plastic surgery prospectively at a rural cancer program, better plastics coordination with other cancer treatments (e.g., postoperative RT), and earlier use of reconstructive procedures.

Results: A total of 112 patients with primary breast cancer treated at rural critical access hospital were analyzed over a 3-year period for access to plastic surgery prospectively at the time of their initial index surgery. Twelve patients were excluded for lack of follow-up or not appropriate for analysis (6 neo-adjuvant chemotherapy patients under treatment, 2 male breast cancers, and 4 Stage IV patients). One hundred patients have completed therapy to be analyzed for the integration of plastic surgery prospectively. Eighty-seven (87%) patients had initial conversations regarding the various roles for plastic surgery before primary therapy, most often by a dedicated breast surgeon (84/87) affiliated with breast program, with 36 patients also seeing (36%) a plastic surgeon before curative primary breast surgery. Thirteen patients (13%) did not have documented prospective plastics discussions and were usually seen by outside surgeons (N=12/13) who were often not certified breast surgeons. Thirty-four patients (34%) had primary plastic surgery as a simultaneous component of their primary breast cancer operation, consisting of a partial mastectomy and oncoplastic closure with contralateral reduction/lift

(N= 16/34), or some form of mastectomy (nipple sparing or complete, unilateral, or bilateral) with implants (N=18/34). Patients receiving immediate postoperative radiotherapy (excluding adjuvant chemotherapy first) had to wait slightly longer in the oncoplastic-reconstructed breasts (7 weeks average delay before RT) compared to standard lumpectomy breasts (4 weeks average post-operatively). Similarly, patients receiving post-mastectomy RT following reconstruction with expanders/implants had to wait longer than non-reconstructed patients. Cosmesis was scored as good to excellent in all reconstructed patients by providers. Complications included 2 patients (6% patients reconstructed) with aggressive advanced bilateral breast cancers treated with bilateral complete mastectomies who had infected implants that had to be removed, and this delayed post-operative RT by several months. Both were done by a local plastic surgeon at a non-breast-certified site. Margins trended wider in cases treated with partial mastectomy associated with primary oncoplasty (median of 5mm), also resulting in less need for RT boosts versus standard lumpectomy (median of 2mm).

Conclusions: Collaboration with dedicated ASBrS surgeons regionally has increased access to plastic surgery for a rural population. This has resulted in better cosmetic outcomes incorporated at the time of primary surgery and better coordination with radiation oncology care postoperatively as well. We believe more patients could benefit from this prospective collaborative approach. If this can be done at a rural critical access hospital, it can be done anywhere.

1130779 - Breast cancer presentation with respect to ethnicity in a screened population at a community hospital

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Background/Objective: African American (AA) women are known to present with higher-stage breast cancer. It is unclear whether this is due to lack of access for preventive care, biological aggressiveness of their tumors, or multifactorial issues. The purpose of this study was to examine differences in stage and presentation with respect to race in patients who underwent mammography within 12 months of their cancer diagnosis comparing AA to non-AA women.

Methods: Patients presenting to our community cancer center for surgical treatment from 8/2019-10/2020 were retrospectively reviewed for ethnicity, presentation, last screening mammogram (MMG) before diagnosis of breast cancer, stage of presentation, size of primary tumor, type of cancer, grade, and receptors. Cancers were staged according to the American Joint Committee on Cancer criteria. Data were reported as frequencies and proportions for categorical variables and as median and interquartile range (IQR) for continuous variables. Differences between groups were compared using the Chi-square or Fisher's exact test for categorical variables and Kruskal Wallis test for the continuous variables.

Results: During the 14-month observation period, 176 patients presented for breast cancer treatment. The patients having their MMG <1 year prior to cancer presentation (n=33) were similar in age to the overall cohort (Table), and there was no difference in age between AA and non-AA. The median tumor size for the AA population was higher than the non-AA population, and the odds for having a tumor ≥20mm at presentation was 9.6 (95% CI 1.6, 56.9; p<0.009) for AA vs non-AA. The AA women were significantly more likely to present for treatment with a higher stage (II or III) cancer than non-AA

women (Table). The women who presented with cancers within 12 months represented a diverse population. Some of these patients represented true interval tumors, some were undergoing high-risk screening, and others underwent imaging for other reasons and had an incidental finding.

Conclusions: AA women in a screened population were more likely than non-AA women to present with larger tumors, higher anatomic stage cancers, and higher-grade cancers if their presentation was within 12 months of their last imaging.

Table. Breast cancer presentation within 1 year of mammography with respect to ethnicity

Having MMG <1yr prior to cancer presentation	N	Age, median (IQR) yr	Tumor grade, n (%)			Tumor size, median (IQR) mm	Cancer stage, n (%)			
			1	2	3		0	1	2	3
All	33	59 (49, 68)	6 (18.1)	15 (45.5)	12 (36.4)	14 (3.8, 29.5)	6 (18.1)	16 (48.5)	5 (15.2)	6 (18.1)
AA	16	62 (49, 67)	1 (6.3)	6 (37.5)	9 (56.3)	24.0 (9.0, 32.8)	2 (12.5)	5 (31.3)	5 (31.3)	4 (25.0)
Non-AA	17	54 (49, 68)	5 (29.4)	9 (52.9)	3 (17.7)	7.5 (1.8, 14.0)	4 (23.5)	11 (64.7)	0	2 (11.8)
p-value		0.55			0.04	0.02				0.04

1144205 - The impact of COVID-19 on breast cancer care: A qualitative analysis of breast surgeons' perspectives

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Background/Objective: While studies have documented delays in breast cancer (BC) treatment during the COVID-19 pandemic due to restrictions in access to the operating room, there have been no studies on the experience of breast surgeons during the COVID-19 pandemic. This information is valuable in identifying research priorities and in developing mitigating strategies for future pandemics. Our objective was to understand the perspectives of breast surgeons regarding the impact of the COVID-19 pandemic on the diagnosis and treatment of BC.

Methods: Purposeful and snowball sampling were used to identify breast surgeons in Ontario. One-on-one qualitative semi-structured interviews were conducted exploring the impact of the pandemic on BC treatment, psychosocial well-being, and the future state of BC care. Audio-recorded interviews were transcribed verbatim and coded thematically. Transcripts were iteratively coded using a grounded theory approach to guide identification of significant themes.

Results: There were 10 breast surgeons (5 community and 5 academic with 8 female and 2 male participants) included in the study. The major themes the emerged from the data included interdisciplinary and intradisciplinary collaboration, surgical innovation and creativity, variability in care dependent on location, psychosocial impacts on health care practitioners and patients, and inequities in cancer screening and care. Breast surgeons reported increased collaboration and communication between health care practitioners during the pandemic including a rapid uptake of virtual care and patient-related rounds such as tumour boards. There were also innovations in how breast cancer surgery was performed (e.g., increased use of regional anesthesia) and treatment approaches (e.g., wider utilization for neoadjuvant endocrine therapy for early-stage disease). Psychosocial impacts were significant for both surgeons and patients. Surgeons observed that their patients were more anxious and stressed, with uncertain surgery dates as a significant contributing factor. In particular, they noted anxiety out of proportion to the stage of diagnosis, especially among those with a diagnosis of early-stage cancer or high-risk lesions. Surgeons also self-reported significant mental stress from a multitude of factors, including personal, professional, and financial issues. Lastly, surgeons identified significant disparities within BC screening and presentation disproportionately affecting patients based on ethnicity, geographic location, and inherent marginalization. The pandemic may have further exacerbated these disparities.

Conclusions: Breast surgeons perceived opportunities to enhance BC treatment through increased collaboration and innovation. However, they also expressed concern regarding worsening disparities in access to BC screening and treatment for marginalized communities. This adds to the growing literature on the impact of the COVID-19 pandemic on cancer care with the added important nuance of understanding the lived experience of frontline cancer care providers.

1143467 - Ethnic/racial disparities in endocrine therapy compliance following intra-operative electronic brachytherapy for treatment of early-stage breast cancer

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Background/Objective: Ethnic/racial (E/R) disparities found in breast cancer patient treatment outcomes reflect dissimilarities in surgery, radiation, and medical therapy. Single-fraction, intra-operative radiation therapy (IORT), given at the time of breast-conserving surgery, eliminates E/R disparities in radiation therapy initiation and duration but does not address E/R disparities in subsequent medication compliance. Ipsilateral breast tumor recurrences (IBTR) based on E/R and endocrine therapy (ET) compliance were analyzed in the IRB-approved, single-arm, prospective multi-institution ExBRT trial (NCT01644669), designed to determine the efficacy and outcome of a single 20 Gy fraction of electronic brachytherapy delivered at the time of lumpectomy for early-stage breast cancer.

Methods: Between May 2012 – July 2018, 1200 patients of all E/R groups were consented and enrolled in the ExBRT trial. Medical therapy recommendations were guided by local standards of care. Patients with estrogen receptor (ER)-positive (+) tumors received ET recommendations (tamoxifen, anastrozole, letrozole, and/or exemestane). Patients were classified as “Compliant with ET” if they completed a 60-

month ET course or were compliant with ongoing ET, “Discontinued ET” if they stopped ET prior to completing a 60-month ET course, or “Declined ET” if they did not initiate ET. Data collection and retrospective chart review included demographics, histopathology, medical therapy, IBTR, and survival.

Results: A total of 1200 patients successfully completed single-fraction IORT treatment per intra-operative protocol. Risk-adjusted post-IORT whole-breast radiation was given to 95 patients, not included in this analysis. There were no IBTR in the risk-adjusted subset. There were 42 (3.7%) IBTR in the 1105 patients treated with single-fraction IORT per intra-operative protocol, with 3 ITBR being ER-negative patients. There were 1049/1105 (94.5%) patients who were ER+ and received ET recommendations. E/R cohorts, ET compliance, and IBTR are presented in the Table. Although IBTRs were greater in the “Discontinued ET” and “Declined ET” cohorts, this did not reach statistical significance (Chi square test p-value=0.579). There was 1 breast cancer-related death.

Conclusions: Spanish/Hispanic/Latinos and Asians/Pacific Islanders were more ET compliant, while African Americans and Native Americans were less compliant than Caucasians in preliminary ExBRT trial results at a median 4.0-year follow-up. African American and Caucasian early-stage ER+ breast cancer patients compliant with ET each experienced a 2.6% IBTR rate. Spanish/Hispanic/Latinos and Asian/Pacific Islanders had higher IBTR despite better ET compliance, consistent with other published studies.

Table. Ethnic/racial disparities in endocrine therapy (ET) compliance following intra-operative electronic brachytherapy for treatment of early-stage breast cancer

E/R	ER+	Compliant With ET	Discontinued ET	Declined ET	IBTR – ET compliant	IBTR – ET discontinued	IBTR-ET declined
Caucasian	837	498 (59.5%)	143	196	13 (2.6%)	7 (5.0%)	11 (5.6%)
African American	66	35 (53.0%)	10	21	1 (2.6%)	1 (10.0%)	
Spanish/ Hispanic/ Latino	75	46 (61.3%)	18	11	3 (6.5%)		1 (9.1%)
Asian/ Pacific Islander	35	28 (80.0%)	1	6	1 (3.6%)		
Native American	5	2 (40.0%)	1	2			
Other/ Unknown	31	21 (67.7%)	3	7		1 (33%)	
TOTAL	1049	630	176	243	18 (2.9%)	9 (5.1%)	12 (4.9%)

1144398 - Disparities in breast cancer screening among uninsured women of west Texas

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Background/Objective: Early detection through appropriate screening is key to preventing mortality from breast cancer. The Access to Breast and Cervical Care for West Texas (ABC24WT) program offers no-cost mammography to underserved women in West Texas [Council of Government (COG) regions 1, 2, and 7]. The objective of this study is to delineate the factors associated with the lack of screening uptake in this vulnerable population.

Methods: The ABC24WT Program database was queried from November 1, 2018, to June 1, 2021, for sociodemographic variables, mammogram screening history, and results of current screening to identify high-risk groups. Statistical methods of independent samples t-test, Pearson's chi-squared test, and logistic regression were used to describe the significant relationship between sociodemographic and outcome variables.

Results: There were 2,064 women from the ABC24WT Program included in the study. Of the 1,519 mammograms performed, women between the ages of 40 and 49 years represented the highest percentages of BIRADS 4 (n=21, 42.0%) and BIRADS 5 (n=7, 28.0%) reporting on current screening when compared to other age groups [P=0.049]. Women aged 40 to 49 years also received more biopsies (n=45, 43.7%) than other age groups and comprised 28.6% (n=10) of cancers diagnosed (n=35, 34.0%) [P=0.031]. Baseline compliance at the time of program contact, measured as at least 1 screening in the past 5 years was 42.0% (n=576). Compliant patients were less likely to require biopsies (n=24, 36.9%) on current screening than previously non-compliant patients (n=35, 53.8%) [P= 0.028]. Lack of screening compliance was significantly higher for COG-1 and 2, compared to COG-7 [284(51.4%), 352(51.2%), and 56(43.1%); P=0.063]. There was no significant association between compliance and age, income, settlement, or race. "No-show" rate for current screening was significantly higher in COG-1 (n=179, 24.2%) than COG-2 (n=93, 10.5%) and COG-7 (n=4, 2.5%) [P<0.001]. The overall rate of cancer diagnosis was 23.04 compared with the national mean of 5.08 per 1,000 mammograms. Participants with a monthly household income of less than $800/person/month were more likely to result in a cancer diagnosis following biopsy (n=24, 70.6%) than higher incomes (n=10, 29.4%) [P=0.021]. Women 40-59 years represented 57.1% (n=20) of all cancers versus 11.4% (n=4) for <40 years and 31.4% (n=11) for >60 years [P=0.031]. "No-show" and cancer diagnosis were not associated with race, region, or settlement.

Conclusions: Women residing in COG region 1, and those under 50 years of age are less likely to get screening mammograms and more likely to be diagnosed with cancer in west Texas. This finding highlights the importance of mammographic screening beginning at the age of 40, which contradicts USPSTF guidelines.

Genetics

1147754 - Genetic variant identification, a missed opportunity? ASBrS vs NCCN criteria

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Background/Objective: National and societal guidelines play a critical role in qualifying patients for germline genetic testing. These guidelines' purpose is to better identify individuals who are at risk for carrying germline genetic variants responsible for cancer predisposition and enable health care providers to intervene. As more pathogenic germline mutations are identified, the impact on patient care cannot be overstated.

Methods: Patient data were obtained from the Informed Genetics Annotated Patient (iGAP) Registry, an IRB-approved, patient-consented, multi-centered prospective registry that includes cancer patients undergoing genetic testing and unaffected patients with pathogenic mutations. A total of 1480 subjects were assessed with National Comprehensive Cancer Network (NCCN) High Risk Assessment for Breast, Ovarian, and Pancreatic Hereditary Genetic Testing guidelines and the American Society of Breast Surgeons (ASBrS) Guidelines for Genetic Testing for Hereditary Breast Cancer (version up to date at time of screening, from 2019-2022). Of these 1480 subjects, 552 did not meet NCCN BOP criteria and did meet ASBrS criteria for Genetic Testing. Of these, 528 completed a Germline Genetic Test.

Results: Of the 528 subjects who did not meet NCCN BOP criteria but did meet ASBrS criteria, the average age was 65.2 years old. Every subject in this cohort had a personal history of breast cancer, but only 278 (52.7%) had a known family history of cancer. These subjects were 74.4% Caucasian (400), 8.3% Asian (44), 5.4% Hispanic (29), and 3.7% African/Black (20). Seventy-three of these subjects had positive germline genetic test results (13.8%), and 252 had a Variant of Uncertain Significance (49.6%). All of these subjects met the ASBrS criteria for genetic testing based on their personal history of breast cancer. These subjects also did meet other guidelines for genetic testing, including United States Preventive Services Task Force (USPSTF) (110, 20.8%), and NCCN Colorectal (18, 3.41%).

Conclusions: Germline genetic testing impacts patient care. Current national guidelines may miss a significant number of patients with germline mutations and variants of unknown significance. More studies are needed to evaluate the current underutilization of germline genetic testing and perhaps ASBrS guidelines should be considered.

1144934 - Should definitive breast surgery be delayed pending genetic testing?

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Background/Objective: According to the consensus guidelines of the American Society of Breast Surgeons, genetic testing should be made available to all patients with a personal history of breast cancer regardless of family history. Patients identified as having a pathologic mutation in the gene such as BRCA1, BRCA2, CHEK2, PALB2, and ATM are at a substantially elevated risk of having breast cancer compared to the general population. Identification of such mutations prior to surgery may impact the type of surgery that is selected. Acquiring this information after surgery may result in change in local therapy or additional surgery. However, not every patient may be able to delay surgery pending genetic panel results. The type of tumor, the genomics of the tumor, and a number of other factors such as coordination with plastic surgery, availability of genetic counseling, as well as operating room availability may increase the necessity for a prompt surgical procedure.

Methods: We evaluated the relationship between genetic testing results and surgical procedures in 244 consecutive patients with breast cancer from January 2018 through February 2021. There were 240 female and 4 male patients (age range from 23 to 86, mean age 56.1). This was an IRB-approved retrospective study. All patients were counseled by both a breast surgeon and a genetic counselor regarding family history and tumor markers. Patients who were identified as having pathologic mutations associated with increased or potentially increased risk for breast cancer were stratified based on whether their mutations were identified prior to surgery. Patients were then sub-stratified based on the type of surgery they underwent.

Results: Of the 244 patients, 102 (41.8%) patients had surgery before their results were known, and 142 (58.2%) after. Thirty-one (12.7%) patients were found to have positive mutations. Sixteen (51.6% of the mutation group and 6.6% of the overall group) had mutations related to increased risk for breast cancer. Fourteen (87.5%) of the 16 had surgery after their genetic mutation had been identified. Two (12.5%) underwent surgery prior to results. In the known group, 11 (78.6%) underwent bilateral mastectomy as the initial procedure. One (7.1%) had lumpectomy only, and 2 (14.2%) had lumpectomy followed by bilateral mastectomy. In the unknown mutation prior to surgery cohort, 1 had bilateral mastectomy as the initial procedure, and 1 had lumpectomy followed by bilateral mastectomy as a subsequent surgery.

Conclusions: While having genetic testing results prior to definitive surgery is optimal, the vast majority of patients will make satisfactory treatment decisions based on counseling alone using historical factors and patient preference. Three patients in the entire group underwent a second surgery with 2 elective in the known group and only 1 based on a change from delayed genetic testing results.

1148077 - Breast cancer patients categorized as high-risk of recurrence and/or basal-type molecular subtype by MammaPrint and BluePrint, respectively, should universally undergo germline genetic testing

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Background/Objective: With the rise of somatic testing, more physicians are using panels to understand the genetic profile of breast cancer to help aid in clinical management. Agendia, a molecular diagnostics company focused on breast cancer, has developed 2 tests to support clinical decisions. MammaPrint analyzes 70 genes associated with breast cancer recurrence and reports whether an individual has a low (1.3%) or high (11.7%) risk for recurrence. BluePrint analyzes 80 genes to identify the breast cancer's molecular subtype: Luminal A (low-risk), Luminal B (high-risk), HER2 (respond well to HER2-targeted therapies), and Basal-Type (aggressive subtype). However, little is known about the relationship between the results of Agendia's tests and the likelihood of identifying an underlying germline variant. We hypothesize that individuals in the High-Risk category on MammaPrint, and individuals with Basal subtype are more likely to have positive germline genetic results indicating the presence of a pathogenic or likely pathogenic variant.

Methods: Patient data were obtained from the Informed Genetics Annotated Patient Registry (iGAP), an IRB-approved, multi-centered longitudinal observational study designed to capture genetic and genomic test results and their utilization and impact on treatment practices and outcomes to help determine the most effective use of testing in real-world patient populations and to support access to advances in precision medicine. Of the 2,439 subjects currently enrolled in the registry, 1,231 have been diagnosed with breast cancer (50.47%). There were 267 individuals who underwent tumor profiling through Agendia's MammaPrint and/or BluePrint as well as germline genetic testing. Descriptive statistics were used to assess and compare data of these populations.

Results: Results indicate that of the 267 individuals who were tested through Agendia's MammaPrint (239) and/or BluePrint (127) panels and underwent germline genetic testing, 135 (56.49%) were classified as High-Risk for recurrence on MammaPrint, and 104 (45.51%) were identified as having a Low-Risk for recurrence. Individuals with a high-risk of recurrence had an 10.04% positive germline variant rate compared to the low-risk group with a 5.44% positive rate. There were 127 individuals with breast cancer who were tested and categorized through Agendia's BluePrint panel. Eight were classified as Basal type, 2 as HER2 type, 58 as Luminal A type, 35 as Luminal B type, and 24 a Luminal type unspecified. Individuals with Luminal A type had the highest positive germline rate of 45.67%, compared to HER2 (1.57%), Basal (6.30%), Luminal B (27.56%), and Luminal unspecified (18.90%).

Conclusions: The iGAP real-world evidence database revealed that individuals categorized as having a high risk of breast cancer recurrence through Agendia's MammaPrint were identified to harbor a pathogenic or likely pathogenic variant 10.04% of the time. An even higher likelihood (45.67%, 27.56%, and 18.90%) was seen in individuals with a Luminal A, Luminal B, and Luminal unspecified molecular subtype, respectively. These data argue that germline genetic testing should be offered to every individual, regardless of age, identified as having a high risk of breast cancer recurrence and/or a Luminal-type molecular subtype on Agendia's tests. Identification of a pathogenic or likely pathogenic variant has clinical management, familial, and potentially reproductive implications.

1147971 - Racial/ethnic groups have different clustering of common cancer genes

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Background/Objective: Racial/ethnic disparities have been well-documented in access to cancer screening and treatment as well as treatment outcomes. Less is known regarding the proportion of higher and lower penetrance genetic pathogenic variants in these populations.

Methods: Patient data were obtained from the Informed Genetics Annotated Patient Registry (iGAP), an IRB-approved, multi-center longitudinal observational study designed to capture genetic and genomic test results and their utilization and impact on treatment practices and outcomes. Patients self-declare race/ethnicity for iGAP. Choice of multi-gene panel testing lab is physician directed. Variant classification is determined by the performing genetic testing lab and reported as negative, variant of uncertain significance (VUS), or pathogenic/likely pathogenic. Descriptive statistics were used to assess and compare data from these populations and germline genetic testing results including higher and lower penetrance pathogenic variants.

Results: BRCA1/2 Pathogenic Variant/ total number of Pathogenic Variants rates: Caucasian 50/262 (19%); Hispanic 20/47 (43%); Black 8/16 (50%). The Hispanic/Black racial groups have similar percentages of BRCA1 and BRCA2 pathogenic variants. However, Caucasians have considerably more pathogenic variants in lesser penetrant genes.

Conclusions: Racial/ethnic groups varied by proportion of lower penetrance pathogenic variants, with Caucasians having the highest numbers. Further studies are needed to understand whether these differences are a result of disparate access to testing, true population differences or other factors.

1147165 - Clinical utility of universal germline genetic testing for patients with breast cancer

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Background/Objective: Germline genetic testing guidelines have historically been based on age at diagnosis, personal and/or family history, and/or risk assessment tools, such as BRCAPRO, to guide recommendations. In 2019, the American Society of Breast Cancer Surgeons recommended genetic testing for all patients with a personal history of breast cancer. However, the clinical utility of expanding germline genetic testing guidelines for all breast cancer patients is currently under consideration. This study examined the impact of universal germline testing of breast cancer patients on short-term health outcomes with respect to clinical decision-making and treatment intervention.

Methods: Female breast cancer patients from 20 community and academic sites participating in a previously described registry were assessed as in-criteria (IC) (N=476) or out-of-criteria (OOC) (N=476) for the 2017 National Comprehensive Cancer Network criteria and tested with an 80-gene germline panel. Clinicians completed a case report form (CRF) for all enrolled patients, documenting patient demographics, clinical information, and data regarding treatment, disease management, and cascade testing recommendations. Patient characteristics, clinical recommendations and outcomes were compared against genetic testing results and evaluated for significance. Statistical significance is indicated by a two-tailed P-value <0.05.

Results: Prevalence of pathogenic/likely pathogenic germline variants (PGVs) was distributed similarly among IC (8.8%) and OOC (8.4%) patients. No significant association was found between patients meeting the BRCAPRO threshold for recommended testing and those with PGVs (P=0.86). There was no single clinical feature, such as young age at diagnosis, that captured all patients with PGVs. Clinicians reported at least 1 treatment recommendation for 70.4% of patients with PGVs, with an average of 2.3 recommendations per patient. For the 29.6% of remaining patients, clinicians reported that the genetic testing results did not impact patient management, or they were not able to evaluate at the time of the CRF completion. Clinicians reported that they perceived testing to have a positive impact on health outcome for 62.5% of patients with PGVs. Clinicians treated variants of uncertain significance (VUS) and negative results similarly and appropriately, in that no clinical recommendations were made based on test results for most patients (97% and 99%, respectively).

Conclusions: Clinicians incorporated identification of clinically actionable PGVs into recommendations and shared decision-making with beneficial clinical impact. Despite the United States Preventive Services Task Force guidelines endorsement, BRCAPRO is a poor predictor of PGVs in patients with breast cancer. Our results indicate that multigene panel testing of all female patients with a personal history of breast cancer has the potential to improve patient care and outcomes.

Table. Prevalence of pathogenic germline variants (PGVs) among patients who did (IC) and did not meet (OOC) 2017 National Comprehensive Cancer Network criteria for germline genetic testing, by patient clinical feature (N=952)

Clinical Feature	IC Group (N=476)		OOC Group (N=476)		
Germline Testing	PGV-positive	PGV-negative*	PGV-positive	PGV-negative*	P Value†
All patients— no. (%)	42 (8.8)	434 (91.2)	40 (8.4)	436 (91.6)	0.91
PGV Penetrance‡ (no.)					
High Risk	20		7		
Moderate Risk	13		18		
Low Risk	4		12		
Recessive	5		3		
Age (yr) at initial breast cancer diagnosis — no. (%)	Median (Range) 54 (22–93)		Median (Range) 60 (46–89)		N/A
≤45	15 (10.3)	130 (89.7)	N/A	N/A	N/A
>45	27 (8.2)	304 (91.8)	40 (8.4)	436 (91.6)	1.00
≤65	34 (9.1)	338 (90.9)	24 (7.8)	282 (92.2)	0.58
>65	8 (7.7)	96 (92.3)	16 (9.4)	154 (90.6)	0.66
Time of breast cancer diagnosis — no. (%)					
Recently diagnosed (within 12 mo. of testing)	31 (9.2)	306 (90.8)	34 (10.2)	299 (89.8)	0.70
Previously diagnosed (>12 mo. prior to testing)	11 (7.9)	128 (92.1)	6 (4.2)	137 (95.8)	0.22
Ethnicity — no. (%)					
Non-Hispanic white/Caucasian	32 (9.0)	323 (91.0)	30 (8.5)	325 (91.5)	0.89
Non-white/Non-Caucasian§	9 (7.9)	105 (92.1)	8 (7.1)	104 (92.9)	1.00
Not provided/Other‖	1 (14.3)	6 (85.7)	2 (22.2)	7 (77.8)	1.00
Cancer history — no. (%)					
History of prior cancer	5 (9.8)	46 (90.2)	2 (3.7)	52 (96.3)	0.26
No history	37 (8.7)	386 (91.3)	37 (8.8)	383 (91.2)	1.00
Not provided	0 (0.0)	2 (100.0)	1(50.0)	1 (50.0)	1.00
Family cancer history — no. (%)					
Reported positive family history	33 (8.9)	339 (91.1)	19 (7.7)	228 (92.3)	0.66
Reported no positive family history	8 (7.9)	93 (92.1)	21 (9.4)	203 (90.6)	0.83
Not provided	1 (33.3)	2 (66.7)	0 (0.0)	5 (100.0)	0.38
Hormone receptor status — no. (%)					
Triple negative: ER-negative, PR-negative, HER2-negative	7 (11.7)	53 (88.3)	3 (17.6)	14 (82.4)	0.68
HER2-negative	22 (8.0)	253 (92.0)	22 (7.9)	257 (92.1)	1.00
HER2-positive	7 (12.3)	50 (87.7)	6 (8.5)	65 (91.5)	0.56
ER-positive	32 (9.3)	311 (90.7)	31 (8.1)	354 (91.9)	0.60
ER-negative	8 (9.6)	75 (90.4)	7 (12.7)	48 (87.3)	0.59
Not provided/Other¶	2 (4.2)	46 (95.8)	3 (8.8)	31 (91.2)	0.64
Risk model score — no. (%)					
BRCAPRO <10%	30 (9.4)	288 (90.6)	34 (8.1)	384 (91.9)	0.60
BRCAPRO ≥10%	10 (9.3)	98 (90.7)	0 (0.0)	18 (100.0)	0.36
Score not provided	2 (4.0)	48 (96.0)	6 (15.0)	34 (85.0)	0.13

*Includes patients with variants of uncertain significance (VUS)
†Comparing pathogenic germline variant (PGV) positive rate in in criteria (IC) versus out of criteria (OOC)

1148616 - Germline genetic testing among women <45 yo with DCIS vs invasive breast cancer in a large integrated health care system: Improving the susceptibility testing care delivery process

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Background/Objective: Germline Genetic Testing Among Women <45 yo with DCIS vs Invasive Breast Cancer in a Large Integrated Health Care System : Improving the Susceptibility Testing Care Delivery Process

Methods: In our large, community-based, integrated health care system, germline genetic testing (GGT) was offered to patients who are <45 yo with ductal carcinoma in situ (DCIS) from September 2019. Eligible patients were identified at the weekly case conference and referred to the genetics department for pretesting counseling and testing. Our aims were to compare the rate of pathogenic variants (PVs) in DCIS vs Invasive Breast Cancer (IBC) in pts <45 yo and evaluate factors influencing care delivery when age was used as the testing criterion.

Results: A total of 62 DCIS and 498 IBC patients were identified. Genetic counselors had visits with 96.8% of DCIS and 94.8% of IBC patients for pretesting counseling. The median time from diagnosis to genetic counseling appointment was 7 days for DCIS vs 6 days for IBC. Patients with IBC were more likely to elect to have GGT ($p<0.0316$). For patients with DCIS, the prevalence of PVs for 1 of the 10 breast cancer (BC)-related genes was 5.77% vs 14.19% in IBC ($p<0.0908$); for all PVs, it was 13.46% for DCIS vs 19.14 % in IBC ($p<0.3185$). Family history of cancer was statistically significantly more common for IBC patients with a BC-related gene ($p<0.0001$) but not among DCIS. Neither previous personal history of other cancers nor race differed by prevalence of PV. Overall, racial disparity was seen in genetic testing ($p=0.0293$) as patients were lost to follow-up or declined genetic referral or testing.

Conclusions: Although there was a trend toward higher prevalence of PV in IBC among women <45 yo, no statistical difference was seen in PVs in BC-related genes or overall PVs between DCIS vs IBC. Family history of cancer was associated with the prevalence of PV in IBC but not in DCIS. There was an incremental drop in black patients during the testing process leading to an overall lower rate of testing. Based on the study results, we plan to pilot breast cancer clinicians ordering GGT at the time of DCIS or IBC diagnosis for <65 yo patients. We will evaluate its impact on testing uptake, associated racial disparities, the time from diagnosis to test results, and downstream effects.

1148067 - Racial/ethnic groups have different clustering of variants of uncertain significance

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Background/Objective: Racial/ethnic disparities in access to genetic testing have been well established. This lack of testing not only leads to missing potentially lifesaving identification of pathogenic variants, but may also lead to more variants of unknown significance due to lack of broad population-based adjudication of these variants.

Methods: Patient data were obtained from the Informed Genetics Annotated Patient Registry (iGAP), an IRB-approved, multi-center, longitudinal observational study designed to capture genetic and genomic test results and their utilization and impact on treatment practices and outcomes. Patients self-declare race/ethnicity for iGAP. Choice of multi-gene panel testing lab is physician directed. Variant classification is determined by the performing genetic testing lab and reported as negative, variant of uncertain significance (VUS), or pathogenic/likely pathogenic. Descriptive statistics were used to assess and compare data of these populations and germline genetic testing results indicating variant of uncertain significance.

Results: Number of VUS/total tests (average VUS/subject): Caucasian 740/1163 (6.4); Hispanic 113/147 (7.7); Black 102/114 (9.0); Asian 84/86 (9.8). Variants of Unknown Significance patient rates (patient with VUS/total patients): Caucasian 550/1163 (47%); Hispanic 73/147 (50%); Black 65/114 (57%); Asian 52/86 (60%).

Conclusions: Hispanic, Black, and Asian patients had a higher proportion of subjects with a VUS and had a greater number of VUS genes per subjects compared to Caucasians for all cancer genes examined. Variant adjudication has disproportionately sorted out more uncertain results in Caucasians than Hispanics, Black, and Asians. This leads to greater uncertainty in post-test counseling for these groups as well as attenuated overall benefit from appropriate testing. Variant adjudication in minority groups should be a focus for lab testing companies going forward.

1148434 - The rate of incidental breast cancer in women with BRCA1/2 mutations who undergo bilateral risk-reducing mastectomy

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Background/Objective: BRCA1 and BRCA2 pathogenic mutations are associated with an increased risk of breast cancer. Options for managing this risk include enhanced breast screening (annual mammogram and annual contrast-enhanced breast MRI), endocrine therapy, and BRRM. We sought to evaluate screening methods and rates of incidental breast cancer in BRCA pathogenic mutation carriers undergoing BRRM in the modern era in an attempt to determine the need for axillary surgery in this patient population.

Methods: Consecutive patients with a pathogenic germline BRCA1 or BRCA2 mutation who underwent BRRM between June 2016 and October 2020 were identified. Associations between genetic mutation status, breast cancer screening studies, surgery, and surgical pathology findings were examined.

Results: Of 107 women who underwent BRRM during the study period, 57 (53.3%) had a BRCA1 mutation, and 50 (46.7%) had a BRCA2 mutation. The median age was 44.2 years. Thirty (28.0%) women underwent skin-sparing mastectomy, 54 (50.5%) underwent nipple-sparing mastectomy, and 100 (93.4%) had immediate reconstruction. All women had breast imaging within 12 months of surgery, and

92 (86%) had breast imaging within 6 months of surgery. Three (2.5%) women were found to have incidental breast cancer on surgical pathology. Two had ductal carcinoma in situ, and 1 had invasive breast cancer.

Conclusions: In women with BRCA1/2 mutations who are undergoing recommended high-risk breast cancer screening, the rate of incidental cancer at the time of BRRM is very low. Therefore, axillary surgery is not indicated for this patient population.

1148478 - The breast life in BRCA: Imaging and biopsy burden for BRCA1/2 patients

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Background/Objective: For patients with a germline BRCA1/2 mutation, the lifetime risk of breast cancer may be as high as 70%. Given this, breast cancer screening guidelines recommend increased surveillance with annual breast MRI and annual mammograms. We sought to characterize the burden of imaging and biopsies for patients with BRCA1/2 mutations without a diagnosis of breast cancer who elect to undergo imaging surveillance, potentially for decades.

Methods: In a retrospective institutional cohort, patients with a germline BRCA1/2 mutation without a diagnosis of breast cancer were identified. Patients who had undergone previous bilateral mastectomies were excluded. The cohort was further limited to those patients with at least 1 imaging test for the period between 7/1/2019-6/30/2021, due to availability of granular imaging data during this timeframe. The number of imaging tests were stratified by modality (MRI, ultrasound, mammogram), and the number of biopsies were assessed.

Results: Of the 669 patients in our institutional cohort of germline BRCA1/2 mutation carriers, 88 patients met our inclusion criteria. The median age was 46.5 (IQR 34.5-59.5). The majority of patients were non-Hispanic White (86.5% vs 4.5% non-Hispanic Black, 3.4% Hispanic, and 5.7% other/unknown), female (97.7% vs 2.3% male), and privately insured (69.3% vs 12.5% Medicare, 2.3% Medicaid, and 15.9% other/unknown). The median number of imaging tests performed was 3 (IQR 2-4; detailed report in the Table). Although 12.5% of patients did not undergo any mammograms, 87.5% underwent at least 1 mammogram, and 15.8% underwent 3 or more mammograms during a 2-year period when only 2 mammograms would be recommended for standard screening (# of mammograms: 0=12.5%, 1=35.2%, 2=36.4%, 3=10.2%, 4=4.5%, 5=1.1%). Notably, 2 MRIs would also typically be performed during a 2-year period of screening, yet 20.5% of patients did not undergo any MRIs (# of MRIs: 0=20.5%, 1=43.2%, 2=35.2%, 3=1.1%). While ultrasound is not a routine screening recommendation, 36.4% of patients underwent at least 1 ultrasound (# of ultrasounds: 0=63.6%, 1=27.3%, 2=6.8%, 3=2.3%). Overall, 15.9% of patients underwent more mammograms, and 1.1% underwent more MRIs than typically recommended for screening alone, while 47.7% underwent fewer mammograms, and 63.6% underwent fewer MRIs over the same follow-up. During the 2-year study period, 17% of patients underwent 1 needle biopsy, and 1.1% of patients underwent 2 needle biopsies. Overall, 9 patients (10.2%) were diagnosed with a breast malignancy during the study period.

Conclusions: In a short (2-year) follow-up period, patients with a germline BRCA1/2 mutation without a previous diagnosis of breast cancer (or history of bilateral mastectomies) were often found to undergo both more and less imaging than expected. Notably, our results were likely impacted by the ongoing COVID pandemic; however, nearly 1 in 5 patients (18.1%) underwent at least 1 needle biopsy during this same follow-up. Patients with germline BRCA1/2 mutations may benefit from more detailed counseling on how many imaging tests and biopsies may actually be performed when undergoing surveillance.

Table. Summary of the number of breast imaging tests and needle biopsies performed in an institutional cohort of patients with a germline BRCA1/2 mutation (N=88)

	Number of Tests/Biopsies Performed			
	0	1	2	3 or more
Mammograms	11 (12.5%)	31 (35.2%)	32 (36.4%)*	14 (15.9%)
Breast MRIs	18 (20.5%)	38 (43.2%)	31 (35.2%)*	1 (1.1%)
Breast Ultrasounds	56 (63.6%)*	24 (27.3%)	6 (6.8%)	2 (2.3%)
Breast Needle Biopsies	72 (81.8%)*	15 (17.0%)	1 (1.1%)	0

*Goal would be 100% of patients would receive the specified number.

1144221 - MUYTH mutations in a breast practice

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Background/Objective: Germline genetic testing has become a critical quality point in caring for breast cancer patients and high-risk patients. Originally, testing panels were extremely limited, with only BRCA1,2 genes tested. Expanded hereditary cancer testing panels have raised the questions of other genes being link to breast cancer risk. This study will summarize 2 large studies looking at the prevalence of the gene mutation MUTYH in a high-risk population.

Methods: Two large studies were investigated. One was the study extracted from the Informed Genetics Annotated Patient Registry (iGAP), a multi-center registry of patients with germline genetic testing, of which 1646 were enrolled over a 2-year time span. The other was a single-practice breast cancer summary including 3438 patients, collected in a 5-year time span. From the private practice, results were also extracted for mutations of Ashkenazi founder background.

Results: In the iGAP registry, of the 30 MUTYH carriers, 27 had breast cancer, and 1 patient developed colon cancer. In these 30 patients, 5 had melanoma, 1 had endometrial cancer, 1 had thyroid cancer, and 1 had lung cancer. In the private practice study, 47 mutations were identified. Thirty-four of these patients were diagnosed with breast cancer. Twenty-seven were of Ashkenazi founder group. None had developed colon cancer. None were double mutations.

Conclusions: MUTYH appears to be a hallmark for breast cancer risk. It was also prominent in the study presented as ASBRS by Dr. Beitch (*J Clin Oncol*. 2019;37(6):453-460.). Clearly, this gene should be escalated to a high-risk gene in risk management of breast patients.

1143262 - Diagnosis, management, and surveillance for patients with PALB2, CHEK2, and ATM gene mutations

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Background/Objective: Deleterious mutations in the PALB2, CHEK2, and ATM genes confer varying degrees of breast cancer risk. Overall, these mutations are less studied than the more common BRCA1 and BRCA2 mutations. Management strategies and surveillance recommendations are largely based on patient characteristics and other risk factors such as family history. We hypothesize that patients with knowledge of such mutations at the time of a cancer diagnosis have differing management than patients who are unaware. This study aims to characterize the genetic testing patterns, management decisions, and surveillance strategies of patients with PALB2, CHEK2, and ATM mutations at our institution.

Methods: A retrospective chart review was performed on patients found positive for PALB2, CHEK2, or ATM gene mutations from June 1, 2011 to May 31, 2020 after genetic consultation at our institution. Data obtained included age at genetic testing, ethnicity, insurance status, family history, personal breast cancer history, menopausal status, surgical history, imaging surveillance, clinical surveillance, breast biopsies, and development of new breast cancer or recurrence. Testing indications, management decisions, and surveillance strategies were noted.

Results: We identified 62 patients with gene mutations. Fourteen (23%) patients had a PALB2 mutation, 30 (48%) patients had a CHEK2 mutation, and 18 (29%) patients had an ATM mutation. Mean age at genetic testing was 51.6, range 22-89. The majority of patients testing positive were over 40 (81%). About half of the patients (53%) were post-menopausal. Half of the patients (31) had a history of breast cancer. Of these, 23 were diagnosed and treated for breast cancer years prior to any genetic testing, while 8 patients learned of their mutation status at the time of their cancer diagnosis. Of these 8 patients, 4 did not seek treatment at our institution, and 3 of the remaining 4 underwent bilateral mastectomy. All 3 patients had a significant family history of cancer, were under 45 years of age, Caucasian, and privately insured. The remaining 1 patient opted for lumpectomy and surveillance. Thirty-one patients had no history of breast cancer. After genetic diagnosis, 22 patients had an initial consultation but did not seek further follow-up or surveillance at our institution. Of the 9 patients remaining, 3 (2 PALB2, 1 ATM) proceeded with bilateral prophylactic mastectomy within 2 years of diagnosis. The patients who continued clinical follow-up averaged follow-up for 23 months with average frequency of mammography every 10.7 months and average frequency of MRI every 9.2 months.

Conclusions: Few patients at our institution are diagnosed with PALB2, CHEK2, and ATM gene mutations. Of the small proportion of patients who continued to follow with us, most with breast cancer underwent bilateral mastectomy, whereas only a third of patients without cancer had preventive surgery. Clinical follow-up greater than 2 years was uncommon. Areas of intervention can include capturing such patients for long-term follow-up. More clinical information is needed regarding the management of PALB2, CHEK2, and ATM gene mutations.

Imaging

1146966 - COVID-19 and screening mammography rates

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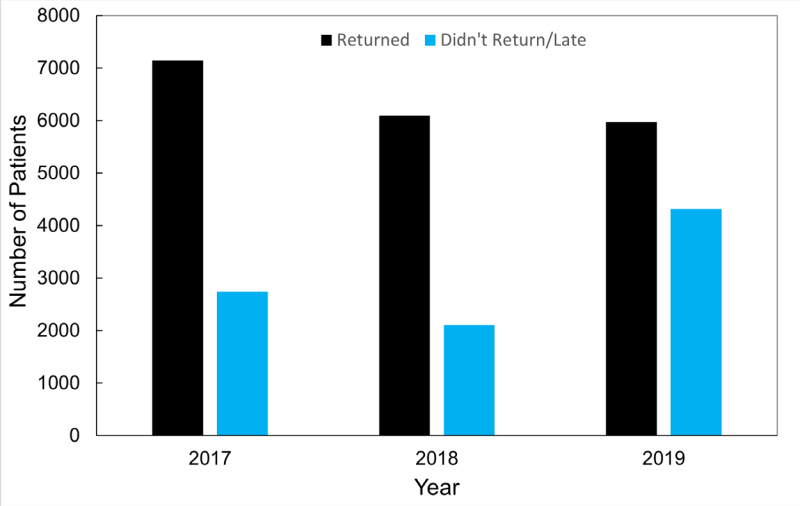
Background/Objective: The full impact of the COVID-19 pandemic on patient adherence to screening mammography is unknown. In this study, we examined patients established in a screening program across multiple centers within the state of Indiana to identify how rates of mammography screening changed compared to historical data. In particular, we were interested in which demographics were most heavily affected by the pandemic. We anticipated those over 65 would be most likely to not return for screening mammography, given this demographic is at higher risk for serious complications from COVID-19 infections.

Methods: We used demographic and clinical data collected at time of patient imaging at 3 breast imaging centers across the state of Indiana associated with the Ascension Healthcare system located in Indianapolis, Carmel, and Fishers Indiana. Data were obtained from 2017-2019 and included patient demographics and follow-up date for screening mammogram or additional imaging performed. Additional data sets included screening mammograms obtained during 2019-2021 and included patient demographics and imaging performed at initial encounter. The study population, the COVID-19-impacted cohort, was designated as patients undergoing screening mammograms during the first 4 months of 2019 and expected to return for routine annual screening during the first 4 months of 2020, the beginning of the pandemic. Groups were compared with z-test of 2 proportions to identify significance, and logistic regression analysis was performed with demographic data on the cohort of interest.

Results: We noted a 34% increase in the total number of people who did not return for scheduled screening mammography. No-return rates among most self-reported races were increased regardless of age and median income. Logistic regression was significant for patients self-reporting as white and over 65 as those most likely to not return to screening mammography. Screening mammography rates increased as centers within Indiana reopened but they still lag, particularly among those aged 50-64.

Conclusions: There were large decreases in return rates for screening mammography at the beginning of the COVID-19 pandemic. Identifying the groups most heavily affected by the pandemic help to inform us which groups are being disproportionately affected with regard to breast cancer screening. We can use this information to direct efforts in helping patients return to routine cancer screening. We next plan to identify if there is a difference in mammography screening among demographics of vaccinated vs unvaccinated individuals.

Figure. Total number of patients who returned for screening mammography



1147940 - Evaluation of an optical coherence tomography imaging platform together with an artificial intelligence tool to detect alterations in breast tissue

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Background/Objective: Optical imaging using optical coherence tomography (OCT) can be utilized to recognize alterations in breast tissue. Computer-aided artificial intelligence tools may aid in the quick recognition of areas suspicious for neoplastic alterations in the OCT images. The objectives of our study was to establish the OCT image characteristics of commonly encountered benign and malignant breast lesions by directly correlating the features in OCT images with conventional histopathological findings in the imaged tissue. We also evaluated an AI tool for alerting towards suspicious areas in the OCT images that could potentially represent foci of neoplastic alterations in the breast tissue.

Methods: Fresh breast tissue fragments (0.5 to up to 1.5cm) were obtained from surgical resections and imaged using a commercially available wide-field OCT platform (OTIS, Perimeter Medical Imaging AI, Toronto, Ontario, Canada). Correlation with hematoxylin and eosin (H&E)- stained tissue sections of routinely processed imaged tissue was used to establish the OCT image characteristics of commonly encountered benign and malignant lesions. The OCT image data were then used to evaluate the performance of an artificial intelligence (AI) tool in the detection of foci suspicious for malignancy. False-positive and negative alerts were investigated by correlating the AI detection alerts, OCT images, and histological features of the tissue and the causes of such results were determined.

Results: A total of 78 residual breast-tissue fragments (3 ductal carcinoma in situ; 24 invasive ductal, 1 mucinous, 8 invasive lobular, and 1 metaplastic carcinoma; and 41 benign samples) obtained from 34 patients were imaged using the OCT platform. The OCT image characteristics including features such as the extent of light reflection (hyporeflective, nonreflective, or hyper-reflective), shadowing,

enhancements beyond the lesion, and the degree of definition at the edge of the lesion that differed between benign and malignant specimens. The sensitivity of the AI tool was 94.6%, and the specificity was 60.9%. The positive predictive value was 68.6%, and the negative predictive value was 92.5%. Accuracy was 58.3%. The false-positives (16/41) were attributable to overlapping optical features between benign and malignant alterations in breast parenchyma. The OCT findings with proliferative fibrocystic changes mimicked invasive tumor while dilated ducts, expanded lobules resembled intraductal carcinoma on OCT images. The false-negatives (2/37) included a case of low-grade mucinous carcinoma and a case of low-grade invasive ductal carcinoma not otherwise specified type that were not detectable on OCT images.

Conclusions: Direct correlation of OCT images with histology aided in the understanding of salient microarchitectural features commonly encountered in OCT images of benign and malignant breast lesions. The utilization of an AI-based detection tool can help screen large OCT image datasets for suspicious features and rapidly highlight regions of specific interest. Recognition of the possibility of encountering false-positive and false-negative interpretations of OCT images with or without an AI tool due to overlapping image characteristics between benign and malignant alterations in the breast tissue needs to be recognized.

1147425 - Development and validation of a convolutional neural network to identify regions of interest in lumpectomy margins using optical coherence tomography

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Background/Objective: Optical coherence tomography (OCT) is the optical analog of high-frequency ultrasound and produces real-time, high-resolution imaging with a tissue penetration depth up to 2mm. Multi-reader studies of OCT have demonstrated the ability to differentiate normal breast parenchyma from neoplasms including DCIS and invasive carcinoma, with greater than 85% sensitivity and specificity. Intraoperative evaluation of breast lumpectomy specimens using OCT may aid in achieving negative margins at the time of primary surgery and avoid second visits for re-excision of positive margins. Artificial intelligence analytical tools can be trained to recognize regions of interest (ROI) in OCT images of lumpectomy margins that are suspicious for malignancy. The purpose of this study was to develop and validate an automated convolutional neural network (CNN) to screen OCT images of lumpectomy margins to identify ROIs.

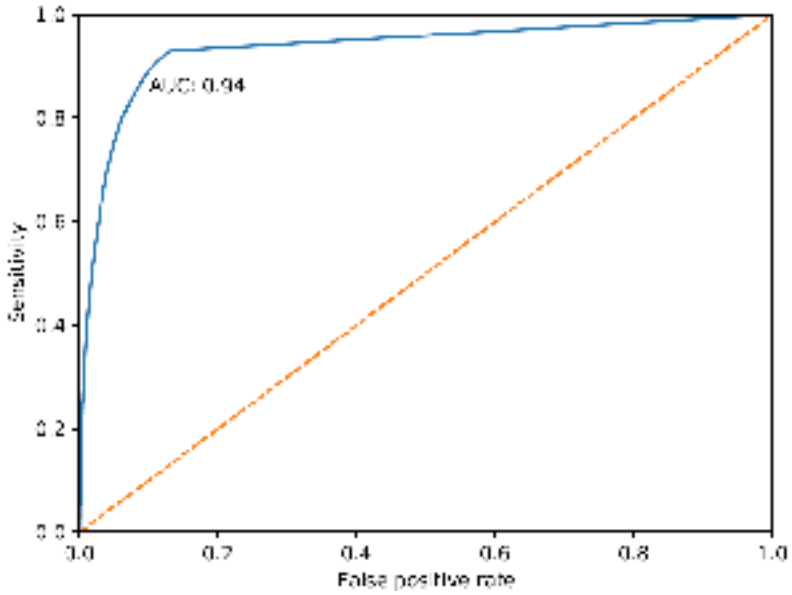
Methods: Following IRB approval/patient consent, the margins of lumpectomy specimens from 126 patients with ductal malignancy were imaged using OCT. Images were then compared to the corresponding permanent histology and annotated by board-certified breast pathologists to create a training set of 25,000 control ROIs. A CNN algorithm was developed with 3 convolutional layers, a 3x3 kernel, and 3 fully connected layers to perform binary classification of images as “suspicious” or “non-

suspicious" for malignancy. A weighted loss function was implemented to balance the training data available for non-suspicious vs. suspicious images and to tune sensitivity and specificity. Once trained and properly weighted, the CNN was tested in a prospective study using OCT images of margins from 29 lumpectomy specimens from 29 patients with biopsy-proven ductal carcinoma in situ (DCIS), invasive ductal carcinoma (IDC), or both. Results from the CNN were compared to permanent histology.

Results: The patient population was 61.5 ± 7.3 years old, 100% female, with Stage 0-I disease. Disease types included invasive ductal (n=20), invasive lobular (n=2), ductal carcinoma in situ (n=27), mixed (n=74), atypical ductal hyperplasia (n=24), as well as benign findings including subjects with atypical lobular hyperplasia (n=19), lymphatic invasion (n=13), lobular carcinoma in situ (n=12), usual ductal hyperplasia (n=35), and duct ectasia (n=17). Following primary surgery, fresh lumpectomy specimen margins were scanned using OCT, and image volumes were analyzed by the CNN. Approximately 1.9 M OCT ROIs were assessed in testing, identifying 101,099 ROIs as suspicious for malignancy. Three hundred eighty-four (384) ROIs were correctly identified, yielding a 70% true-positive and 5.2% false-positive detection rate; the sensitivity and specificity were 70% and 96%, respectively. The receiver operating curve is shown below.

Conclusions: Automated analysis of OCT images using a trained CNN to identify regions of interest suspicious for DCIS or IDC in breast lumpectomy specimens is feasible, demonstrating a high concordance with permanent pathology. These findings indicate the utility of artificial intelligence for screening OCT images with potential utilization for intraoperative evaluation of the status of breast lumpectomy margins immediately following resection before permanent pathology. A pivotal prospective clinical trial will be necessary to evaluate breast specimens in real time to determine if this application may improve re-excision rates in lumpectomy.

Figure. Receiver operator curve (ROC)



1146024 - Utility of infrared spectroscopic imaging for digital assessment of cavity shave margins in breast-conserving surgery

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Background/Objective: The cavity shave margin (CSM) technique has been successfully utilized to reduce re-excision rates in breast-conserving surgery (BCS), especially in practices with high-margin positive rates. While several techniques and devices have been evaluated, all have limitations, especially those requiring additional surgeon training. Under the current practice, shave margins are submitted for standard histopathological evaluation with results often taking several days. This can lead not only to delay in adjuvant treatment, but it also increases the potential for compromised cosmetic outcomes, added health care costs, and decreased patient satisfaction. Consequently, it is important to be able to assess CSM intraoperatively with automatic results that do not require additional surgeon training or interpretation. By coupling infrared (IR) spectroscopy with artificial intelligence (AI) algorithms, these problems can be solved. The underlying principle of this approach is that the pattern of absorption of IR light provides the chemical signature for tissue identity and physiology. By using AI models, the subtle differences in the spectra can be employed for tissue classification.

Methods: A total of 101 tissue microarray (TMA) cores from 47 different patients, along with 21 full surgical specimens (3 BCS and 18 CSM) from Carle Foundation Hospital in Urbana, IL, were processed and analyzed using the standard histochemical procedures and IR spectroscopic imaging. The TMA cores were used to develop AI models for delineating malignant and benign regions. This was achieved via a cascaded approach, where the first segmentation of tissue types resulted in fat, stroma, and epithelial compartments, and the second segmentation resulted in malignant and benign epithelial compartments. The final image is then generated by combining the results from both stages.

Results: The AI models were first validated on the TMA cores to confirm accurate tissue designation. Once this was established, the pixel size was optimized to balance the tradeoff with acquisition time, reducing it from a month to a week and finally to a few hours. The AI models were recalibrated at this pixel size (AUC value higher than 0.97 for each class) and applied to the full surgical specimens. Comparison of the clinical decision with the IR decision is presented in the Table. The patient-level sensitivity and specificity for tumor detection was observed to be 85.71% and 71.4%, respectively.

Conclusions: IR spectroscopic imaging coupled with trained AI models can assess margin status without the need for surgical training and interpretation. This label-free, tissue-preserving approach has the potential to achieve better clinical and cosmetic outcomes and significantly reduce health care costs, resulting in improved care and patient satisfaction. Future research will further optimize this technology for immediate, real-time intraoperative results with greater than 90% sensitivity.

Table.

Location	Pathological Result	Clinical Decision	IR Decision
Deep Margin	no tumor seen	negative	negative
Superior Margin	no tumor seen	negative	negative
Lateral Margin	ADH	negative	negative
Anterior Margin	IMC+DCIS	positive	positive
Medial Margin	no tumor seen	negative	negative
Inferior Margin	no tumor seen	negative	negative

1147594 - Use of ultrasound and Ki-67 Proliferation Index to predict breast cancer tumor response to neoadjuvant endocrine therapy

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Background/Objective: Prediction of tumor shrinkage and pattern of treatment response following neoadjuvant endocrine therapy (NET) for estrogen receptor-positive (ER+), HER2-negative (HER2-) invasive breast cancers have had limited assessment. We sought to examine if ultrasound (US) and Ki-67 proliferation index predict pathologic response to treatment with NET and to determine how the pattern of treatment response may impact surgical planning.

Methods: Postmenopausal women with ER+, HER2- breast cancer enrolled on the FELINE trial (prospective, randomized, multi-center, placebo-controlled trial comparing NET with Aromatase Inhibitor ± CDK4/6 inhibitor) with an US at baseline and end of treatment (EOT) were included. Participating patients had Ki-67 proliferation index obtained at baseline, day 14, and final surgical pathology. A retrospective analysis was performed on patients with final surgical pathology to determine residual tumor bed cellularity (RTBC). Baseline US, EOT US, and pathologic tumor size were compared to determine if EOT US predicted final pathologic tumor size and pattern of treatment response. US response to treatment was defined as complete response (CR) with resolution of the target lesion, partial response (PR) with ≥30% reduction, stable disease (SD) with <30% reduction to <20% increase, or progressive disease (PD) with ≥20% increase. Patients with CR or PR on imaging and ≤70% residual tumor bed cellularity (RTBC) were defined as having a contracted response pattern. A non-contracted response was defined as SD on imaging with ≤70% RTBC on final surgical pathology.

Results: One hundred three FELINE patients were included. Although day 14 decrease in Ki-67 proliferation index was sustained at the time of surgery ($p<0.001$), this was not predictive of EOT US findings or RTBC. Tumor size on final surgical pathology correlated with size on EOT US ($p=0.024$). Of the 48 patients who had RTBC assessed, a contracted response pattern was seen in 17 patients (35.4%): 1 with CR and 16 with PR. Although 26 patients had SD on imaging, 22 (45.8%) had a RTBC ≤70%, confirming a non-contracted response pattern. Thus, EOT US correctly predicted pattern of treatment response 75% of the time when considering contracted and non-contracted pattern. The remaining 4 patients with SD and 5 patients with PD had no pathologic response to treatment.

Conclusions: Ki-67 proliferation index does not predict change in tumor size or RTBC on final surgical pathology, but size on EOT US does correlate with final surgical pathology and can be used for surgical planning. Neoadjuvant endocrine therapy does not routinely result in a contracted response pattern of the tumor bed, so caution should be taken when using NET for the purpose of downstaging tumor size for improved cosmesis or converting borderline mastectomy/lumpectomy patients.

1147937 - Virtual reality and breast cancer surgery: Better imaging analysis for better surgical planning

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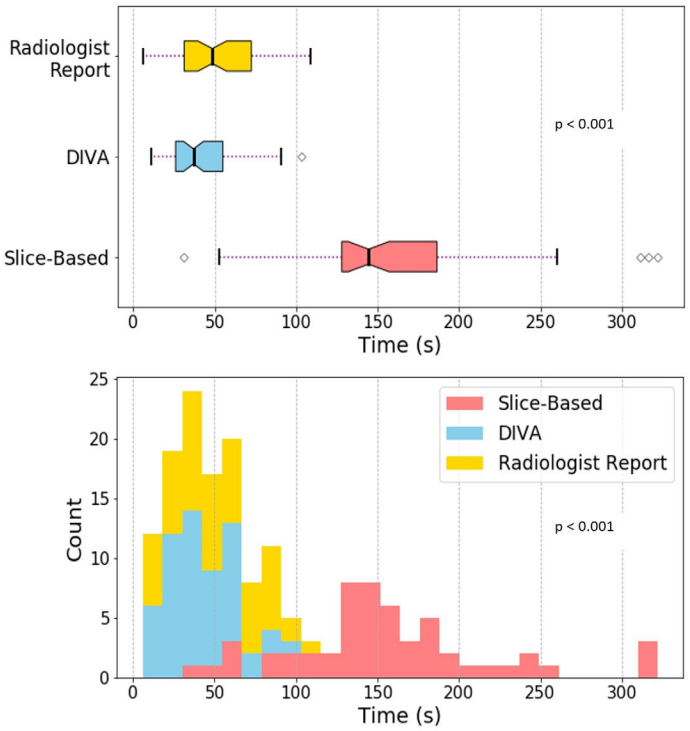
Background/Objective: Surgery remains a major pillar of breast cancer treatment. For a lumpectomy, a perfect representation of breast morphology (geometry, volume), tumor, and its location is mandatory to get an efficient carcinologic and aesthetic resection. This mental projection can be difficult to build from medical images, classically visualized as 2D slices, especially for young surgeons with limited radiological training. Virtual reality is one of the most accessible and instinctive modes of 3D visualization (El Beheiry, et al. *J Mol Biol*. 2019;431(7):1315-1321). Notably, the DIVA software is a 3D visualization tool which uses virtual reality to allow interaction with 3D reconstructed medical images (El Beheiry, et al. *J Mol Biol.* 2020;432(16):4745-4749.). The aim of this study was to evaluate the speed and accuracy of surgeons using DIVA for medical image analysis of breast MRI sequences relative to standard image slice-based visualization.

Methods: This study was a single-center study performed at the Curie Institute on 25 breast MRIs from patients treated for breast cancer. Eighteen junior and senior surgeons used 2 modalities to analyze breast MRI: a 2D interface (standard medical imaging on the internal PACS, via Carestream), and a 3D interface in the form of virtual reality, via the DIVA system. We compared speed and accuracy of breast MRI analysis with the 2 methods.

Results: Time to determine the number of lesions and their location was significantly lower with the DIVA system than with the 2D interface, regardless of the surgeon seniority ($p<0.01$). Results were more significant for young surgeons who better analyzed number of lesions ($p=0.49$) and location ($p = 0.01$) with the DIVA system. Regarding the surgical strategy, the DIVA system allowed a better prediction of the surgical procedure.

Conclusions: The DIVA system is an effective tool to facilitate breast MRI analysis in breast cancer patients. The visualization of tumors inside of the breast is faster and more accurate, allowing a better planning of the surgical strategy. It could also be a didactic tool for training and education to both students and patients. Some studies already described the usefulness of virtual reality in carcinological and reconstructive breast surgery (Gómez-Cía, et al. *Int J Comput Assist Radiol Surg*. 2009;4(4):375-382.; Rancati, et al. *Minerva Chir*. 2018;73(3):341-344.; Tomikawa, et al. *J Am Coll Surg*. 2010;210(6):927-933.; Vos, et al. *J Surg Oncol*. 2015;111(2):178-184.).

Figure. Analysis time for different viewing modalities for the entire group. (Above) Box plots of the time necessary to analyze the MRI scans in study for entire group of surgeons using the slice-based visualization and DIVA approaches (N = 52); (below) histograms of the same data



1148224 - The impact of nodal basin ultrasound in the management of early-stage breast cancer based on receptor status

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Background/Objective: The nodal basin ultrasound is an important tool in guiding treatment modalities for patients with early-stage breast cancer. Our program implemented routine nodal basin ultrasound for all newly diagnosed invasive breast cancer patients in 2013. Our previous study demonstrated our institutional experience with routine use of nodal basin ultrasound leading to longer time to surgery and higher rates of neoadjuvant chemotherapy but lower rates of axillary dissection and potential downstaging. We sought to further demonstrate the impact of nodal basin ultrasound in subset analyses regarding distribution of receptor status, number of positive axillary lymph nodes and pathologic staging.

Methods: Patients with clinical Stage I and II breast cancer were retrospectively reviewed from 2009-2012 and 2015-2018. Pre-intervention group was defined as patients with clinical Stage I-II breast cancer in 2009-2012 prior to the addition of routine nodal basin ultrasound. Post-intervention group was defined as patients with clinical Stage I-II in from 2015-2018 after the addition of routine nodal basin ultrasound. Chi square and Mann Whitney U Tests were used for statistical analysis.

Results: We identified 565 patients in the pre-intervention group and 1226 patients in the post-intervention group. There was no statistical difference in the distribution of ER+, triple-negative, and HER2+ patients between pre- and post-intervention. There was no statistical difference in the total number of axillary sentinel lymph nodes (Median 2 vs 2, p=0.452), while there was a significant difference in the number of positive axillary lymph nodes between the pre- and post-intervention (Median 2 vs 1, p<0.0001). We found a statistical difference in the distribution of pathologic staging between pre and post intervention in the ER+ patients (Stage 0: 0.6% vs 1.2%, Stage I: 50.4 % vs 60.6%, Stage II: 23.9% vs 20.8%, Stage III: 6.1% vs 2.0%, p<0.001). There was no significant difference in the rates of neoadjuvant chemotherapy between pre- and post-intervention for triple-negative breast cancer patients (90.4 % and 81.1%, p=0.076).

Conclusions: This study demonstrates decreased axillary burden regardless of receptor status and potential downstaging in ER+ patients after the adoption of routine axillary ultrasound in the management of early-stage invasive breast cancer. The nodal basin ultrasound can be an important tool for the management of early-stage breast cancer patients, particularly when accounting for the different receptor statuses.

Table. Receptor status in patients with early-stage breast cancer and its pathological staging

Receptor Status	Pre intervention (2009-2012)		Post intervention (2015-2018)		*p*
	n/N	Percent	n/N	%	
ER+/PR+	397/565	70.3%	900/1226	73.4	0.167
ER+/PR-	52/565	9.2%	118/1226	9.6%	0.777
ER-/PR-/HER-	73/565	12.9%	143/1221	11.7%	0.466
HER+	75/565	13.3%	179/1221	14.7%	0.436

Pathological Staging	Pre intervention (2009-2012)		Post intervention (2015-2018)		*p*
	n/N	Percent	n/N	%	<0.001
0	3/427	0.6%	13/916	1.2%	
1	266/427	50.4%	656/916	60.6%	
2	126/427	23.9%	225/916	20.8%	
3	32/427	6.1%	22/916	2.0%	

1148576 - Tissue optical imaging as an emerging technique for intraoperative margin assessment in breast-conserving surgery

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Background/Objective: Re-excision surgery for close-positive margins occurs on average in 25-30% of patients undergoing breast-conserving surgery (BCS). Optical technologies offer the ability of extracting morphological information from breast tissue using light-tissue interactions. By harnessing this knowledge, innovative intraoperative margin assessment (IMA) tools can be developed for oncological margin control to prevent further procedures. This systematic review focuses on the biomedical applications of light scattering in tissue optics for intra-operative breast tissue characterisation.

Methods: An electronic search of MEDLINE, EMBASE, and SCOPUS databases was conducted using a stringent search strategy. Modalities included in the search strategy were elastic scattering spectroscopy, diffuse reflectance spectroscopy (DRS), hyperspectral imaging (HSI), and spatial domain frequency imaging (SFDI). Inclusion criteria included human in-vivo or ex-vivo breast tissues that presented data on diagnostic accuracy. Only papers written in the English language were utilised. Exclusion criteria included papers describing the use of contrast agents, frozen samples, and the use of other imaging adjuncts such as computed tomography.

Results: Following PRISMA guidelines, 27 studies were selected from the 4162 retrieved from the literature search depicted in the Table. All work thus far was on ex-vivo specimens. The selected studies were categorised into 3 groups a) diffuse reflectance spectroscopy (n=16); b) HSI (n=9); and c) SFDI (n=2). Only 11 out of the 27 studies described devices that provided an image of the whole field of view; the rest were probe-based. Sensitivity for cancer detection varied from 61% to 100%. Wavelength ranges varied from 300 to 1650nm. Extended wavelength ranges to include the near infrared (NIR) region improved accuracy of cancer detection, had better depth penetration, and was able to identify ductal carcinoma in situ (DCIS).

Conclusions: Further work on IMA tools must take into consideration several factors to create a rapid, non-contact device that confers accuracy in discriminating between malignancy and normal tissue. Firstly, the wavelengths of light used must be selected carefully. The use of the near-infrared range allows better depth penetration of tissues and identifies DCIS, which is a common cause of positive margins. Spatial resolution is crucial to identify small regions of DCIS. Speed and data processing time will be crucial to a surgical workflow pattern.

Table.

(DRS = diffuse reflectance spectroscopy; DRS & IFS = diffuse reflectance spectroscopy & intrinsic fluorescence; HSI = hyperspectral imaging; SFDI = spatial frequency domain imaging)

Probe based				
Author	*Modality*	*Wavelength*	*Sensitivity/Specificity*	*Accuracy*
Boer et al (2016)	DRS	400 - 1600		AUC = 0.94
Quincy Brown et al (2013)	DRS	450 - 600	74%/86%	
Zhu et al (2006)	DRS	350 - 600	83%/78%	
Evers et al (2013)	DRS	400 - 1600	90%/88%	
Boer et al (2018)	DRS	400 - 1600	93%/87%	
Bydlon et al (2010)	DRS	450 - 600	Not available	
Wilke et al (2009)	DRS	Not specified	79%/66.7%	
Quincy Brown et al (2010)	DRS	381 - 630	79%/66.7%	
De Boer et al (2019)	DRS	400 - 1600	N/A (paper looking at how Neoadjuvant chemotherapy affects spectral readings)	
Palmer et al (2003)	DRS & IFS	300 - 600	70%/92%	
Ramanujam et al (2009)	DRS & IFS	Not specified	79%/89%	
Keller et al (2010)	DRS & IFS	400 - 800	85%/96%	
Zhu et al (2005)	DRS & IFS	300 - 440	61.5%/82.35% at 300nm	
Volynskaya et al (2008)	DRS & IFS	300 - 800	100%/96%	
Breslin et al (2004)	DRS & IFS	300 - 600	70%/91%	
Keller et al (2007)	DRS & IFS	400 - 850	78%/99%	
Imaging based				
Manen et al (2019)	HSI	450 - 950		44%(4 out of 9 tumours identified)
Aref et al (2020)	HSI	415 - 1000	Not available	
Pourezza et al (2013)	HSI	380 - 780	98%/99%	
Pardo et al (2016)	HSI	510 - 785	98%/97%	
Kim et al (2013)	HSI	380-780	97.3%/95.9%	
Kho et al (2019)	HSI	953 - 1645		Invasive Ca 93%/DCIS 84%
Kho et al (2019)	HSI	450 - 1650	80%/93%	
Kho et al (2019)	HSI	450 - 1646		P <0.01
Aboughhaleb et al (2020)	HSI	420 - 620	95%/96%	
McClatchy et al (2019)	SFDI	380 - 780	90%/81%	84%
Laughney et al (2013)	SFDI	658, 730, 850, 970	79%/93%	

1148498 - Stage IV cancer patients and screening mammography: It is time to stop

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Background/Objective: National guidelines state that radiographic screening for breast cancer should be based on lifetime risk with consideration for stopping screening if life expectancy is less than 10 years. Patients diagnosed with Stage IV metastatic cancer have a shortened life expectancy, and the benefit of routine breast cancer screening in this population is limited. The aim of this study was to evaluate the extent to which metastatic cancer patients continue to undergo routine breast cancer screening.

Methods: A large, single-institution review of all patients diagnosed with Stage IV cancer from 2015-2019 was conducted to identify the incidence of screening and diagnostic breast imaging performed. Cancer types evaluated included gastrointestinal, alimentary tract, lung, kidney/bladder, gynecologic,

skin, and thyroid. Stage IV breast cancer was not included. The number of screening and diagnostic mammograms performed per patient since Stage IV cancer diagnosis were collected and compared to determine at what time-point after Stage IV diagnosis breast cancer screening was performed. Charts were reviewed, and patients who had mammograms, diagnostic work-up, biopsies, surgery, and new breast cancer diagnosis were recorded. Cancer survival was determined from date of metastatic diagnosis to date of death. Results were then compared to the National Cancer Database (NCDB) and Surveillance, Epidemiology, and End Results (SEER) survival data to evaluate trends and outcomes.

Results: A total of 790 patients were identified, of which 109 patients had received at least 1 screening mammogram (SM) since the date of their Stage IV cancer diagnosis (14%). Overall, 71% of the SMs were ordered by primary care providers. Of the 109 SM patients, 25 required a diagnostic mammogram (23%), 8 breast biopsy (7%), and 1 breast surgery (0.92%). None of the patients had a breast cancer identified. In the SM cohort, 2 patients had metastatic spread to the breast identified of their known Stage IV non-breast cancer. SM was most commonly ordered in Stage IV gynecological cancers (30%), with more common cancers still seeing a high percentage of patients screened (lung cancer 10%, colorectal cancer 16%) (Table). Overall, patients who underwent SM were found to have a higher 5-year survival versus those who were not offered SM (38% [95% CI 26-56%] vs. 4.0% [95% CI 1.5-11%]). At least half of the SMs were ordered within the first 2 years after Stage IV cancer diagnosis. If our rate of 14% SM is extrapolated to the NCDB Stage IV cancer incidence data from the same years, this would amount to 18,161 patients nationally undergoing SM each year.

Conclusions: Despite low overall survival for patients diagnosed with metastatic cancer, SM was performed in 14% of this population at our institution, and resulted in additional imaging, biopsies, and surgery. Additionally, more than 50% of the SMs were ordered within 2 years of Stage IV cancer diagnosis, when prognosis is yet unclear. Importantly, no new breast cancers were identified. Breast surgeons are encouraged to educate patients and their providers regarding the risks and lack of benefit of SM in the setting of Stage IV cancer.

Table. Screening mammograms (SMs) by cancer type

Stave IV Cancer	Total Patients	Screening Mammograms [n (%)]	5-year Survival (%)*
Gallbladder	7	1 (14.3)	2.5
Pancreas	94	6 (6.4)	3.0
Liver	2	1 (50)	3.9
Stomach	12	1 (8.3)	5.4
Lung	272	28 (10.3)	6.4
Esophagus	6	1 (16.7)	8.6
Kidney	47	1 (2.1)	12.3
Colon/Rectum	155	24 (15.5)	15.6
Cervix	16	2 (12.5)	17.4
Vagina	1	1 (100)	21.3
Ovary	59	21 (35.6)	30.1
Hypo/Oropharynx	6	1 (16.7)	38.1
Thyroid	22	5 (22.7)	59.0
Endometrial	43	9 (20.9)	-
Fallopian Tube	8	5 (62.5)	-
Skin	16	2 (12.5)	-

*Average 5-year survival rates in women from 2009-2013 using Surveillance, Epidemiology, and End Results (SEER) Program Data

1148153 - 3D mammograms: Are they superior to 2D digital mammograms?

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Background/Objective: Breast tomosynthesis, also known as a 3D mammogram, is a breast radiograph that combines multiple x-ray images to create a single 3D image. Breast cancer is the second most common cancer diagnosis in women. The thought is that with the new tomosynthesis technology, we are not only detecting breast cancer earlie,r but also reducing the need for further imaging compared to the original 2D mammogram screening. If we are able to diagnose breast cancer earlier with screening 3D mammograms, we can successfully treat and cure more women with breast cancer. The present study intended to compare 2D vs 3D screening mammograms and delineate whether 3D imaging is indeed superior to the 2D counterpart.

Methods: We performed a retrospective study, collecting data from 15 different hospitals in the west Florida area. We selected all female and male patients between the ages of 30-70 years old who underwent a mammogram from January 2017 until November 2020. De-identified data were retrieved via chart review by our institution's data analyst. A total of 31,437 patients were selected. We then stratified the data into the different BI-RADS score categories and analysed the proportion of patients with a BI-RADS score of 0, 1/2, and 5. Pearson Chi-square statistical analysis was utilized to compare the statistical difference between the 2D and 3D group.

Results: The 2D and 3D groups were stratified into the different BI-RADS categories as shown in the Table below. There was no statistically significant difference in the proportion of patients with BI-RADS 0, 1, 2, or 5 between the 2D and 3D mammogram groups.

Conclusions: In our study, we hypothesized that 3D screening mammograms were superior to 2D in their ability to diagnose and rule out a breast cancer diagnosis. We intended to compare the ability of 2D and 3D mammograms to screen for breast cancer by comparing the proportion of patients with the different BI-RADS scores. We decided to utilize BI-RADS 0 as an analysis point because it signifies a need for further imaging. 3D imaging did not decrease callbacks in our study. BI-RADS 1 and 2 is considered a normal study. We would have expected a higher proportion of BI-RADS 1 and 2 in the better imaging modality; however, there was no difference in our study. Finally, BI-RADS 5 indicates a likely malignancy, and we hypothesized that a better imaging study would have a higher proportion of BI-RADS 5. We did not find that 3D screening mammograms increased cancer detection compared to 2D modality. We did not find a difference between the 2D and 3D groups in our study, but there were some flaws that may have led to these results. Breast tomosynthesis may be the better imaging modality; however further studies are needed to prove this hypothesis.

Table. Proportion of BI-RADS scores in 2D vs 3D mammograms

Type * birad_group Crosstabulation

			birad_group			
			0	1/2	5	Total
Type	Type = 2D	Count	2421$_a$	27796$_a$	90$_a$	30307
		% within Type	8.0%	91.7%	0.3%	100.0%
	Type = 3D	Count	84$_a$	1044$_a$	2$_a$	1130
		% within Type	7.4%	92.4%	0.2%	100.0%
Total		Count	2505	28840	92	31437
		% within Type	8.0%	91.7%	0.3%	100.0%

Each subscript letter denotes a subset of birad_group categories whose column proportions do not differ significantly from each other at the .05 level.

1148213 - Preoperative breast MRI increases detection without increasing mastectomy in the setting of oncoplastic breast-conserving surgery

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Background/Objective: In the work-up of breast cancer, mammography and ultrasound have traditionally been the gold standard of imaging. Breast magnetic resonance imaging (MRI) has become widely available across the United States. The high sensitivity of breast MRI in detection of malignancy has increased the use of preoperative MRIs in patients with newly diagnosed breast cancer. However, in the literature, use of breast MRI has also been shown to be associated with an increase in mastectomy rates. Though the effect of MRI on preoperative surgical planning has been controversial, its effects within the oncoplastic breast-conserving setting have not been reported. We evaluated the effects of preoperative MRI on type of surgical resection in an oncoplastic practice.

Methods: This retrospective, single institutional study evaluated patients with ductal carcinoma in situ (DCIS) or invasive breast cancer who underwent primary surgical resection from 2018 to 2021. Male patients, patients treated with neoadjuvant systemic therapy, or those with pathologic genetic mutations were excluded from the study. Patients were divided into 2 cohorts: those who had a preoperative MRI (MRI) and those without (noMRI). Patient demographics, clinicopathologic features, imaging findings, and type of surgery were reported using a prospective institutional database approved by the local IRB. These characteristics were compared using Chi-square analysis and Fischer's exact test.

Results: A total of 236 patients with DCIS or invasive breast cancer were included in this study. Of these, 180 (76.3%) patients underwent a preoperative MRI, and 56 (23.7%) patients did not. Younger age ($p<0.0001$) and higher mammographic breast density ($p=0.01$) were significantly associated with the preoperative use of MRI. Pathologic diagnosis, hormone receptor and HER2 statuses, and clinical

stage were similar among the 2 groups. Seventy-one (39.4%) patients in the MRI group had additional finding on their MRI (median=1.0, range=1 - 5). Mean span of disease in the MRI group was 21mm (SD 18.41mm) compared to 17.1mm (SD 16.4mm) in the noMRI group (p=0.13). Proportion of patients undergoing partial mastectomy was not significantly different between the 2 groups, 97.2% in the MRI group and 100% in the noMRI group (p=0.59). The number of findings on MRI or span of disease was not associated with mastectomy. All 5 patients in the MRI group who underwent mastectomy, did not have a change in operative plan.Forty-six (26.2%) patients in the MRI group and 10 (17.9%) patients in the noMRI group underwent re-excision. Of the MRI patients who underwent re-excision, 31 patients were treated as extreme oncoplastic surgery, defined as breast-conserving surgery in a patient with traditional indications for mastectomy (disease span >5cm and/or multifocal disease). Extreme oncoplastic patients have been shown to have an association with a higher risk of requiring re-excision.

Conclusions: Routine use of preoperative breast MRI resulted in increased number of finding and/or increased span of disease. However, in the era of oncoplastic surgery, routine MRI use did not increase mastectomy rates.

Table. Diagnostic work-up and treatment characteristics

	MRI		No MRI		
Characteristic	n	%	No MRI	%	p value
n	180	76.3%	56	23.7%	
Histology					0.2743
IDC	116	64.4%	40	71.4%	
ILC	28	15.6%	4	7.1%	
DCIS	36	20.0%	12	21.4%	
Hormone Receptor Status					0.8910
Positive	168	93.3%	52	92.9%	
Negative	7	3.9%	3	5.4%	
Unknown	5	2.8%	1	1.8%	
HER2					0.9088
Positive	16	8.9%	3	5.4%	
Equivocal	5	2.8%	1	1.8%	
Negative	126	70.0%	42	75.0%	
Unknown	33	18.3%	10	17.9%	
Clinical Stage					0.7293
0	38	21.1%	12	21.4%	
I	116	64.4%	39	69.6%	
II	25	13.9%	5	8.9%	
III	1	0.6%	0	0.0%	
IV	0	0.0%	0	0.0%	
MRI findings					*N/A*
0	11	6.1%			
1	98	54.4%			
2	38	21.1%			
≥3	33	18.3%			
MRI Finding					*N/A*
Unilateral	160	88.9%			
Bilateral	19	10.6%			
Unknown	1	0.6%			
Type of Surgery					0.5948
Partial Mastectomy	175	97.2%	56	100.0%	
Mastectomy	5	2.8%	0	0.0%	

1142996 - Impact of pretreatment axillary ultrasound on axillary lymph node dissection in patients with HER2-positive breast cancer and no palpable adenopathy

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Background/Objective: There is no standard recommendation for the use of pretreatment axillary ultrasound (PTUS) during the workup of breast cancer. For non-metastatic disease, the NCCN recommends "ultrasound as necessary" without discussing the axilla. HER2-positive cancers have high rates of lymph node metastasis at diagnosis. Neoadjuvant chemotherapy (NAC) can be used to downstage the axilla, but many patients still require axillary lymph node dissection (ALND) despite the morbidity and lack of survival benefit. Our goal is to identify the impact of PTUS on recommendations for NAC and ALND for HER2-positive patients. We hypothesize that PTUS will decrease ALND via NAC/axillary downstaging.

Methods: An IRB-approved review of a breast disease repository from 2014-2021 was performed. The retrospective cohort design measured PTUS and its impact on NAC and ALND. Eligible patients were women 18 and older with HER2-positive invasive breast cancer and no palpable adenopathy (PA). Chart review supplemented repository data. ANOVA was used to compare continuous variables and chi-square to compare the frequency of outcomes. Significance was set at an alpha of 0.05. A multivariate logistic regression model was used to control for factors influencing PTUS use. Statistical analysis was performed with Stata v16.

Results: A total of 178 patients were identified. Eighty (44.9%) underwent PTUS; 10 had a positive node discovered prior to treatment. Of the 10, 8 (80%) underwent NAC, and 3 (30%) later underwent ALND. Of the 70 that had PTUS and didn't have a positive node prior to treatment, 27 (39%) underwent NAC, and 5 (7%) had a positive node on pathology. Of the 98 with no PTUS, 15 (15.3%) underwent NAC, and 7 had a positive node on pathology. Six (6.5%) had no axillary surgery. PTUS patients had clinically larger tumors ($p=0.03$) that were more likely to be palpable (55% vs. 39.8%, $p=0.04$). Positive nodes were found prior to treatment more commonly in PTUS (confirmed by needle biopsy, 12.7% vs 1%, $p<0.001$). PTUS patients were more likely to undergo NAC (42.8% vs. 15.3%, $p<0.001$), have pathologically positive nodes (21.1% vs. 7.5%, $p=0.01$), and require ALND (17.3% vs. 5.1%, $p=0.01$). Despite controlling for a palpable breast mass and clinical T stage, PTUS patients were significantly more likely to undergo ALND (OR 7.2), although the confidence intervals were extremely wide (adjusted 95% CI: 1.33 to 38.70).

Conclusions: We hypothesized that PTUS would decrease ALND via NAC/axillary downstaging but found the opposite. Our institution has not standardized use of PTUS, but we discovered bias factoring in which patients had this included in their work up (higher clinical T stages and palpable tumors). These patients were more likely to have positive axillary nodes and later require ALND. Controlling for these, we found the effect persisted; women who underwent PTUS were still more likely to have ALND despite the increased use of NAC. Though sample size is too small to draw generalizable conclusions, in the age of Z0011, PTUS may lead to increased use of ALND.

1141032 - Outcomes of abbreviated MRI in a community academic setting

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Background/Objective: Abbreviated magnetic resonance imaging (Ab-MRI) was introduced as an alternative to traditional breast MRI. In comparison to digital breast tomosynthesis (DBT) for women with dense breasts, ab-MRI detects more invasive cancer. Ab-MRI has been evaluated in women with high lifetime risk of breast cancer or dense breasts but has not been evaluated in women across all breast densities and risk profiles.

Methods: Patients were identified across a single health system who had undergone Ab-MRI from January 2020. Ab-MRI were performed with an acquisition time of <20 minutes and included at T2-weighted acquisition and a T1-weighted acquisition before and after bolus injection of contrast (0.1 mL/kg of body weight of gadobenate dimeglumine). Women had to be >30 years of age, up to date with screening mammogram, and paid $299 cash to undergo ab-MRI. Continuous variables were analyzed as means (SD) and categorical variables as frequencies (percent). Sensitivity, specificity, positive predictive value (PPV), and negative predictive values (NPV) were calculated and 95% CIs provided. All analyses were done in Stata 16.0.

Results: A total of 93 patients were identified for a total economic cost of $27,807, and a mean age of 52 (SD 10.1). Of these, 92.5% were Caucasian, and 0% were black. There were 97.9% of patients who were from high socioeconomic status (SES), 2.2% medium, and 0% in low SES. Mean Gail score was 14.3 (SD 7.2) with 83.6% of participants with a lifetime risk of breast cancer <20. Breast density varied on mammograms with 0% A, 3.5% B, 36.1% C, and 60.5% D. Providers identified reason for suggesting Ab-MRI as dense breasts (36.6%), family history (24.7%), and palpable mass (12.9%). Most common providers ordering ab-MRI were OBGYN (49.5%), breast surgical oncologist (39.1%), primary care doctor (6.6%), and oncologist (1.2%). Ab-MRI had a 15.1% biopsy rate with a 1.1% breast cancer prevalence. Biopsy was performed by MRI guidance (71.4%) and ultrasound guidance (28.6%). A total of 31.2% of women had a change in follow-up screening recommendations after ab-MRI. For those who had a change in screening, 65.5% were recommended 6-month MRI, 24.2% 6-month mammogram, and 10.3% 6-month ultrasound. PPV of ab-MRI was 7.14 (95% CI:0.18-33.9%), NPV was 100 (95% CI:95.4-100%). Sensitivity of ab-MRI was 100% (95%CI: 2.5-100%, p<0.001), and specificity was 85.87% (95% CI:77-92.3%, p=0.199) compared to 82% and 90% for DBT, respectively. In this cohort, 1 cancer was detected at a cost of $27,807 plus cost of 15 MRI and US-guided biopsies. Historically, 20% of abnormalities detected on breast MRI are true malignancy; however, this was seen in 7.1% of ab-MRI abnormalities.

Conclusions: Implementation of cash ab-MRI protocol screened predominantly white women of high SES with a <20% lifetime risk of breast cancer. One-third of women were recommended a change in follow-up, which predominantly included a 6-month MRI. Ab-MRI had a significantly higher sensitivity but a non-significant lower specificity than DBT and conventional MRI. Ab-MRI may introduce average risk women to unnecessary follow-up and biopsies with a lower cancer detection rate. Ab-MRI should be evaluated closely prior to implementation in a health system.

Table. Comparison of abbreviated breast MRI (ab-MRI) to digital breast tomosynthesis (DBT) for positive predictive value (PPV), negative predictive value (NPV), sensitivity, and specificity

	DBT	Ab-MRI	95% CI	P
PPV	---	7.1%	0.18%, 33.9%	---
NPV	---	100%	95.4%, 100%	---
Sensitivity	82%	100%	2.5%, 100%	<.0001
Specificity	90%	85.9%	77%, 92.3%	0.199

1141393 - Molecular breast imaging: First-year experience at a tertiary breast center

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Background/Objective: Molecular breast imaging (MBI), or breast sestamibi scanning, maybe an adjuvant to detect breast cancer in women with dense breasts or those who are at high risk for developing breast cancer. Current indications for MBI include diagnostic work-up, dense breast tissue, high-risk surveillance, risk stratification, and to evaluate response after neoadjuvant chemo. This retrospective study evaluates the clinical impact of MBI over the first year of its introduction in a large tertiary institution.

Methods: This retrospective study evaluates clinical impact of MBI over the first year of its introduction in a large tertiary institution. All patients who underwent MBI at our center between Aug 2020 and September 2021 were enrolled in the study. Data were retrospectively extracted from patients' electronic medical records.

Results: There were (n=112) MBI studies performed from August 2020 to September 2021. The ages ranged from 27-80 years (median age 52). Indications for MBI was diagnostic=39%, dense breast tissue=46%, and high risk surveillance=15%. MBI was interpreted as BIRADS 0, N=12 (11%); BIRADS 1 or 2, N=95 (74%); BIRADS 3, N=6 (5.3%); BIRADS 4, N=10 (9%); and BIRADS 6, N=1 (1%). All MBI BIRADS 3 or 4 were done for diagnostic purposes. The BIRADS 3 patients are undergoing short-term follow-up. Three patients were diagnosed with a new breast cancer. All of the newly diagnosed patients had a BIRADS 4 MBI, and of these, 2 patients were diagnosed by focused ultrasound biopsy, and 1 was diagnosed by MRI-directed biopsy. MBI identified 3 additional cancers not found by traditional 3-D mammography or ultrasound work-up for a detection rate in this cohort of 2.7% (3/112). One patient was a BIRADS 6 with a known malignancy, and no additional lesions were identified. The 12 BIRADS 0 patients underwent additional ultrasound or spot compression mammograms, 7 of the 12 underwent biopsy which was negative for cancer, 3 had a BIRADS 2 MRI, and 2 were lost to follow-up. MBI results led to an additional 10 biopsies or 9% of the study group, and 3/10 (30%) of the biopsies performed identified a new cancer.

Conclusions: MBI identified 3 new cancers otherwise not detected in our cohort of 112 patients (2.7%). Identification of these new cancers required 10 patients to undergo a breast biopsy for a biopsy detection rate of 30%, which compares favorably to the cancer detection rate based on routine screening mammography. This one-year retrospective study supports the use of MBI in those patients

requiring additional diagnostic work-up after routine screening, dense breast tissue or high-risk surveillance.

1119487 - Timing of breast biopsy and axillary ultrasound does not affect the rate of false-positive axillary lymph node biopsy results

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Background/Objective: In order to determine which treatment option is the best for the type of cancer detected, physicians consider whether breast cancer has already spread to the axillary lymph nodes. This study examined the timing of the axillary ultrasound (AUS) in relation to the breast biopsy to determine if it would affect patient management.

Methods: We obtained a list of all newly diagnosed breast cancers at JW Ruby Memorial Hospital (RMH) or referred to RMH from outside facilities via the tumor registry from 2016-2017. We performed a comprehensive chart review looking at the timing of breast abnormality diagnosis, timing of breast ultrasounds, timing of the breast biopsy, timing of the AUS, and timing of the AUS biopsy. We compared the data between RMH patients and referral patients to determine if there were any differences in false-positive (FP) AUS biopsy pathology results that might dictate patient management. Chi-square analysis was performed on categorical data, and student's t-test was performed for continuous variables. Significance was determined to be $p<0.05$.

Results: We identified a total of 447 RMH patients and 135 referral patients. Of the RMH patients, 117 (26.2%) had abnormal axillary ultrasound results compared to referral patients who had 59 (43.7%) ($p<0.0001$). Of the RMH patients with an abnormal AUS, 112 (96.6%) underwent ultrasound-guided lymph node biopsy compared to referral patients (n=47, 79.7%) ($p<0.0001$). Of the patients from RMH who underwent delayed AUS after breast biopsy, the mean time to AUS was 124 days (n=20) compared to 41 days in the referral patients (n=78) ($p=0.4114$). True-positive (TP) and false-positive (FP) RMH AUS biopsy results were 64.8% and 35.2%, respectively compared to 61.5% and 38.5% for referrals, respectively ($p=0.6717$).

Conclusions: Delay in AUS after breast biopsy does not correlate to an increase in FP sentinel lymph node biopsy results between our academic center and outside referrals. Thus, obtaining an AUS prior to breast biopsy is comparable to waiting until after the breast has been biopsied. These results demonstrate that there would be no change in patient management based on the timing and results of the AUS and breast ultrasound.

Table. Results

	Ruby Memorial Hospital	Outside Referrals	P Value
Patient number	447	135	
Abnormal AUS	117 (26.2%)	59 (43.7%)	<0.0001
US Guided LN Bx (Abnormal ultrasound group)	112 (96.6%)	47 (79.7%)	<0.0001
Mean time to AUS (Delayed group)	124 days (n = 20)	41 days (n = 78)	0.4114
True Positive AUS Bx	64.8%	61.5%	0.6716
False Positive AUS Bx	35.2%	38.5%	

1140417 - Can axillary ultrasound identify patients who do not need an axillary dissection for positive nodes after neoadjuvant chemotherapy?

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Background/Objective: Patients with invasive breast cancer and regional nodal metastasis are commonly treated with neoadjuvant chemotherapy (NAC) with a goal of downstaging the axilla to avoid an axillary lymph node dissection (ALND). However, ALND is recommended for patients who do not have a nodal pathologic complete response (n-pCR). The Alliance 11202 trial is evaluating whether ALND can be avoided in these patients. We hypothesize that patients who have a single, ultrasound-suspicious, non-palpable lymph node (LN) at initial diagnosis, who do not achieve n-pCR, will have N1 disease on surgical pathology; this subset can possibly be spared a completion ALND.

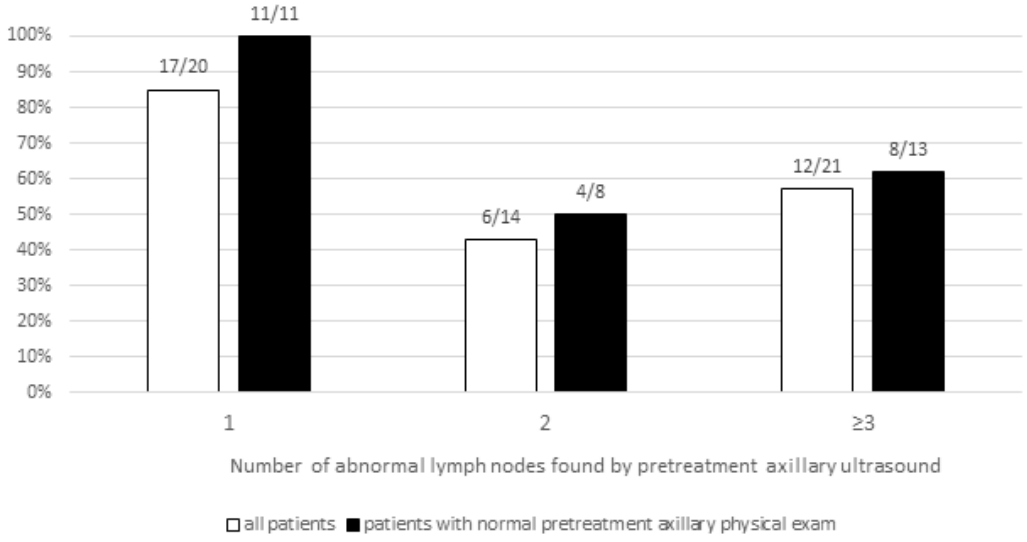
Methods: A retrospective review was performed using our institutional database. Eligible patients were treated from 2012 to 2020, had suspicious axillary lymph node(s) on their initial ultrasound with subsequent needle biopsy demonstrating a LN metastasis, were treated with NAC, did not experience a n-pCR, and went on to ALND (defined either as surgeon documentation of an ALND, or at least 10 LN removed). Suspicious LNs on ultrasound were defined as diffuse cortical thickening >3mm, focal cortical thickening, replacement of the fatty hilum, or loss of nodal features. For this study, patient's age, race, tumor size, tumor type, tumor grade, biomarkers, findings on ultrasound, and lymph node disease burden at surgery were reviewed.

Results: Eighty-one patients were identified who had a pre-chemotherapy positive LN, and did not experience n-pCR. Of those, 55 patients had an ALND or at least 10 LNs removed during the sentinel lymph node biopsy (SLNB) and were the subject of this analysis. On pre-chemotherapy ultrasound, 20 patients (36%) had 1 suspicious LN, 14 (25%) had 2 suspicious LNs, and 21 (38%) had >3 suspicious LNs. After chemotherapy, 35 patients (64%) had ypN1 disease, 16 (29%) had ypN2 disease, and 4 (7%) had

ypN3 disease. Of the 20 patients with 1 abnormal LN on initial US, 17 (85%, 95% CI 61-96%) had ypN1 disease. Eleven patients with 1 abnormal LN on initial US also had non-palpable LNs on pre-chemotherapy physical exam; among these patients, 100% had ypN1 disease (Figure). However, ypN1 disease did not always correlate with negative non-sentinel nodes: in patients with non-palpable LNs and 1 abnormal LN by ultrasound at diagnosis, who had a SLNB or targeted axillary dissection followed by an ALND, 75% (6 of 8 patients), had disease in SLNs and/or clipped LN only.

Conclusions: For breast cancer patients who do not achieve n-pCR after NAC, the combination of pre-treatment normal clinical exam of the axilla and pre-chemotherapy ultrasound showing only 1 abnormal LN is associated with ypN1 disease. It may be reasonable to omit completion ALND in this subset of patients while awaiting the results of the Alliance 11202 trial. These findings should be replicated prospectively. We believe that meticulous scanning of the axilla to document abnormal LNs is important if this information is to be considered in surgical decision-making.

Figure. Percent of patients with ypN1 after neoadjuvant chemotherapy



1138445 - Feasibility of high-resolution ultra-sonography in diagnosis of rupture after aesthetic and reconstructive breast implant surgery

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Background/Objective: Breast implants are medical devices that are used annually by 287,085 people in the United States for cosmetic purposes and approximately 103,485 for reconstruction purposes in 2019. The most common complication of breast implants is rupture. In the diagnosis of implant rupture, many previous studies have reported that the accuracy of ultrasound and MRI is 50-75% in the past. This study was conducted to investigate the agreement of diagnosis for implant rupture using high-resolution ultrasonography.

Methods: This study was conducted based on the medical records of 1218 patients who visited THE W breast center from 1, Sep, 2017 to 31, Dec, 2021, and 65 patients were included for the investigation of accuracy of HRUS. One hundred ninety-six breast implants in 165 patients were diagnosed with breast implant rupture in breast implant ultrasonography. Among them, 65 patient had received explantation with or without implant change due to rupture in THE W breast center. We investigated the agreement between gross finding and preoperative US rupture diagnosis in these patients.

Results: Eighty breast implants in 65 patients were diagnosed with rupture, and the agreement with the gross findings is summarized in the Table. Breast implant rupture is classified into intra-capsular and extra-capsular rupture. Intracapsular rupture included saline rupture and gel bleed of silicone breast implant rupture. Gel bleed shows leaked silicone without shell tearing. Extra-capsular rupture was classified according to the presence of silicone lymph node involvement. This study showed 100% agreement between gross finding of breast implant and ultrasonographic rupture diagnosis.

Conclusions: HRUS is a very useful diagnostic device for diagnosing implant rupture and its scope.

Table. Agreement of breast implant rupture between HRUS and gross finding

Rupture	HRUS (+)	HRUS (-)	Agreement
Gross (+)	80	0	100%
Gross (-)	0	50	100%
Agreement	100%	100%	

Localization

1147373 - Evaluation of the EnVisio Surgical Navigation System for localization and excision of targeted lesions in breast-conserving and axillary surgery

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Background/Objective: Non-wire localization devices include radiofrequency identification, radioactive I-125 seeds, magnetic seeds, and radar localization. Elucent Medical has introduced a novel EnVisio Surgical Navigation system that uses SmartClips that generate an electromagnetic signature. An electromagnetic pad placed under the patient at the time of surgery provides a unique signal for each SmartClip, which is triangulated in the x-, y-, and z-axes using real-time wireless navigation. The purpose of this study is to evaluate the efficacy and feasibility of the EnVisio Surgical Navigation system in localizing and excising targeted breast lesions and axillary lymph nodes.

Methods: This study prospectively examined patients undergoing breast and nodal localization using the EnVisio Surgical Navigation system over a 1-month period at our institution. SmartClips were placed by designated radiologists using either ultrasound (US) or mammogram (MMG) guidance. The technical evaluation focused on successful deployment and subsequent excision of all targeted lesions including SmartClips and biopsy clips. Patient and tumor characteristics, radiography, pathology, and margin status were reviewed for all patients.

Results: Eleven patients underwent localization using 15 devices; these included unifocal disease (n=10), bracketed multifocal disease (n=2), and clipped metastatic nodal disease (n=1). Histopathology (n=12) included atypia (n=1), ductal carcinoma in situ (n=3), invasive ductal carcinoma (n=5), invasive lobular carcinoma (n=1), mixed ductal and lobular carcinoma (n=1), and invasive ductal carcinoma with associated DCIS (n=1). Two bracketed cases were each localized with 2 SmartClips. Mammography was used to localize the majority of cases (n=8), and sonography was used for n=3. All 15 devices were successfully deployed within 5mm of the targeted biopsy clip. All SmartClip devices were identified and retrieved intra-operatively. Three cases included a SmartClip identified outside of the index lumpectomy specimen; 2 clips (n=2) were grossly identified and removed, and 1 clip (n=1) was removed as an additional margin specimen. No patients required a second operation for margin excision. The patient with localized nodal disease required lateral decubitus positioning intra-operatively, which increased the distance between the breast and axillary SmartClips and the underlying electromagnetic pad. In this position, the breast localization was successful, but the nodal localization was difficult to reproduce.

Conclusions: In a limited sample, the EnVisio Surgical Navigation system is a reliable emerging technology for the localization of breast and axillary lesions undergoing surgical excision. Due to the unique localization information provided for each SmartClip with multidimensional feedback, this device might be particularly useful for bracketed lesions. A contraindication to the device is patients who must be placed in a position other than supine. Further comparative studies are required to evaluate its efficacy in relation to the other existing localization modalities.

1146440 - The ability to see: No missed lesions, large series outcomes hematoma ultrasound-guided lumpectomy (HUG)

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Background/Objective: Since the original publication of the hematoma-directed ultrasound-guided (HUG) lumpectomy by our institution, there have been many advances beyond needle localization in terms of intraoperative localization of non-palpable breast lesions. Radioactive seeds and radar localization have increased in use as surgeons attempt to decrease the use of wire localization; however, these techniques still involve the patient undergoing an additional procedure prior to the surgery. Our aim was to evaluate our use of the HUG technique as a reliable method for intraoperative localization of lesions for lumpectomy.

Methods: A retrospective chart review of patients undergoing partial mastectomy or excisional biopsy performed in the operating room under ultrasound guidance was performed. Patients from May 2014 to October 2020 were included in the dataset. A multifrequency linear array transducer was used intraoperatively for all HUG procedures. Patients who underwent initial surgery outside of our institution and were referred for excision of positive margins were excluded. Patients who chose to undergo mastectomy as a primary procedure for the treatment of their breast cancer were also excluded from the analysis.

Results: Intraoperative ultrasound was utilized in 1014 patients who were either undergoing lumpectomy or excisional breast biopsy. Of these, 959 (95%) patients underwent surgery for malignancy, and the remainder (n=55, 5%) underwent surgery for benign diagnoses. Only 9 patients (<1%) required re-excision for positive margins. There were no missed biopsy clips with clip confirmation with intraoperative specimen radiographs.

Conclusions: Our updated experience with HUG supports the utility of the method for intraoperative localization of lesions. As various technologies arise in the effort to aid the surgeon in intraoperative lesion localization, HUG remains an accurate and reliable method for localization and has the added benefit of sparing patients additional procedures.

1146952 - The impact of an electromagnetic seed localization device as versus wire localization on breast-conserving surgery: A matched-pair analysis

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Background/Objective: In breast-conserving surgery (BCS) for non-palpable lesions, several new alternatives to wire localization (WL) have been developed including radioactive seed, magnetic seed, and reflector-guided localization. Electromagnetic seed localization (ESL; EnVisio Navigation System, Eden Prarie, MN) utilizes a percutaneously placed Smart Clip (SC) to provide real-time, three-dimensional navigation during surgery. The system analyzes electromagnetic signatures to display

distance, depth, and direction relative to the electrosurgical tool that it is affixed to. This study was performed to assess the impact of this new technology on operative times, specimen volumes, margin positivity, and margin re-excision rates, versus WL.

Methods: Patients having ESL-guided segmental mastectomy or excisional biopsy were reviewed, and matched one-to-one with patients having WL. Matching was based on surgeon, procedure type with stratification for those having and not having nodal procedures, and pathologic stage or benign pathology. When >1 WL match was found, selection was randomized. Continuous (e.g., operative times, specimen size) and categorical variables (e.g., positive margins, re-excision rates) were compared between patients undergoing WL and ESL using Wilcoxon rank sum tests and Fisher's exact tests, respectively.

Results: Between August 2020 and August 2021, 97 patients underwent partial mastectomy with (n=53) or without sentinel lymph node biopsy (SLNB; n=24) or excisional biopsy (n=20) using ESL guidance at a single institution and were matched to WL patients undergoing surgery between 2006 and 2021. Median operative time for ESL vs WL for lumpectomy with SLNB was 66 vs. 69 minutes (p=0.76) and without SLNB was 40 vs. 34.5 minutes (p=0.17). Median specimen volume was 55cm3 with WL vs. 36cm3 in ESL (p=0.0012). In those with measurable tumor volume, excess tissue excised was larger with WL compared to ESL (median=73.2 vs 52.5cm3, p=0.017). Main segment margins were positive in 18 of 97 (19%) WL patients compared to 10 of 97 (10%) ESL patients (p=0.17). In the WL group, 13 of 97 (13%) had margin re-excision at a separate procedure, compared to 6 of 97 (6%) in the ESL group, (p=0.15).

Conclusions: ESL is superior to WL as it provides more accurate localization, evidenced by decreased specimen volume and excess tissue excised despite similar operative times. Although not statistically significant, ESL resulted in lower positive margins rates and margin re-excision compared to WL. The ESL technology allows for single-tool, three-dimensional localization with the patient convenience of pre-operative placement. Further assessment of ESL as versus other localization technologies should be evaluated to refine which localization technology is most advantageous in breast conservation surgery.

1147019 - Optimization of breast surgery workflow to increase efficiency: Transition to wire-free breast lesion localization

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Background/Objective: One of the limitations of wire-guided breast lumpectomies is that the wire localization and surgery have to occur on the same day – an operational dependency termed "coupling." This coupling between surgery and radiology to coordinate care creates scheduling conflicts and limits the ability to optimize efficiency for each department. The purpose of this study was to investigate whether decoupling localization and surgery using a novel magnetic seed localization system improves efficiency and system capacity.

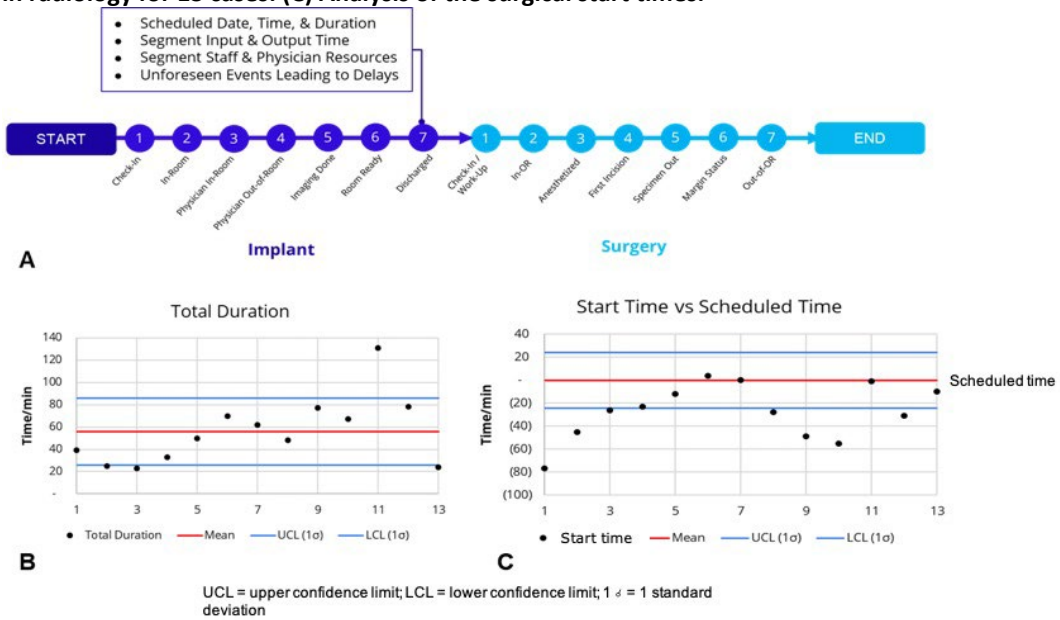
Methods: As part of an ongoing clinical evaluation of a wire-free magnetic seed localization system to allow decoupling between radiology and surgery, a quality improvement study was initiated at the

Princess Margaret Cancer Centre (Toronto, ON, Canada). A total of 13 patients undergoing magnetic seed-localized breast lumpectomies were evaluated. The patient care pathway was mapped and fragmented into segments, including start and end times for procedures, key moments of staffing changes, and resource utilization. The causes and frequency of procedural delays were also measured (Fig 1A). Patients were followed through each phase of care with a check sheet, and data collection was facilitated by a customized, mobile data capture tool. Increased capacity was identified by uncovering additional daily procedural time available with a fully optimized workflow compared to the existing patient care pathway. Summary statistics were recorded for each procedure and used to assess process variability and capacity. Pareto analysis which identifies the relative importance of process issues was used to identify causative factors of delays.

Results: In this pilot study, 13 patients underwent magnetic seed localization as part of the decoupled pathway. For the radiology component, there was high variability in the average total procedure time at 56 ± 30 min (Fig 1B), and a Pareto analysis showed that 95% of the variations occurred before the actual localization procedure due to administrative factors (e.g., missing patient consent, physician not available, etc.). If variation in this segment of the patient journey were reduced, the capacity in the breast imaging department could be increased by at least 1 daily procedural slot (currently scheduled for 45 minutes), creating more than 250 additional procedure slots per year. On the other hand, the variation during surgical procedures was well controlled. Interestingly, the analysis identified that decoupling localization from the surgery date allowed surgical procedures to consistently start 30 minutes earlier than the scheduled time (Fig 1C). No significant delay was documented in operative time, despite the transition to a new magnetic seed localization system, suggesting a rapid learning curve for this type of technology.

Conclusions: The system-level benefit of wire-free breast lesion localization and decoupling includes substantial increases in capacity both in radiology and surgery. However, consistent effort towards quality improvement should be made in order to manifest and sustain these benefits.

Figure. (A) Checkpoints measured within the check sheet instrument. (B) Analysis of the implantation duration in radiology for 13 cases. (C) Analysis of the surgical start times.



UCL = upper confidence limit; LCL = lower confidence limit; 1 σ = 1 standard deviation

1148149 - Placement of radiofrequency identification tag: Is there an optimal tag to target distance?

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Background/Objective: Radiofrequency identification (RFID) tag localization (TL) is a method of localizing non-palpable breast cancers and high-risk lesions. We sought to evaluate if distance between RFID tags and the intended target was associated with positive margins and increased size of the surgical specimen.

Methods: A retrospective cohort analysis was performed on TL excisional biopsies and lumpectomies performed by 6 surgeons at 2 institutions during the first year TL was implemented at each institution. The distance between tag and target was estimated radiographically by measurements taken on craniocaudal and mediolateral oblique mammographic views and averaged. Cases with bracketed lesions, or axillary targets were excluded. Size of the surgical specimen was estimated by calculated volume of specimen using measurements from the pathology report. Associations between the calculated average distance between tag and target, positive margins, and the size of the surgical specimen by volume were analyzed using multivariate analysis.

Results: A total of 397 patients who underwent TL for nonpalpable breast cancer or high-risk lesions were included from 2 institutions. All intended targets were removed. The average calculated distance between tag and target was 4.9mm (range 0-40.6mm). The number of patients who had positive margins after lumpectomy for in situ or invasive breast cancer was 39 (15%). Tag-to-target distance was not associated with positive margins (odds ratio [OR] 1.04, p=0.19). The median volume of surgical specimens excised for an indication of cancer was 30.5cm3, and the median volume excised for atypical or discordant indications was 16.5cm3. Increased tag-to-target distance was associated with increased specimen volume for indications of cancer (OR 1.11, 95% confidence interval 1.02-1.21, p=0.02). For every 1mm increase in tag-to-target distance, there was an 11% increase in the odds that the specimen would be greater than the median observed volume. This association was not found for excisions performed for atypical or discordant lesions (OR 1.02, p=0.69).

Conclusions: An average distance of 5mm between RFID tag and target on mammogram is sufficient to ensure proper localization when utilizing TL for surgical excision of non-palpable breast cancers and high-risk lesions. Minimizing the tag-to-target distance, specifically when utilizing TL for breast cancer, is associated with a decreased volume of excised tissue and may lead to improved cosmesis.

1148687 - Topografic localisation is enough for correct excision following neoadjuvant chemotherapy in nonpalpable breast cancer

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Background/Objective: Image-guided marker clip placement is used commonly for correct excision of the tumor bed, following neoadjuvant chemotherapy (NACT) in locally advanced breast cancer. Particularly in patients showing complete clinical response following NACT, wire-guided localization is necessary to accurately identify the tumor bed. Our study compares clip and wire-guided marking with topographic sketching technique on correct area excision.

Methods: Patients who were included in this study were diagnosed with breast cancer between January 2004 and October 2021 at our clinic, received NACT followed by breast-conserving surgery. Before every patient received NACT, tumor margins were drawn on the patient's breast after thorough examinations. These sketches were then copied to the patient files with vertical and horizontal layout lines passing through the areola. Patient files and photographs showing these sketches were archived. For the topographic sketching (TS) group, this process was repeated preoperatively, and the targeted tumor area was resected with breast-conserving surgery principles. For the radiological marking (RM) group, patients went through wire-guided marking preoperatively with the help of ultrasound or mammography imaging. Resection specimens were examined in both groups to assess the accuracy of the methods. Specimen volumes, perioperative re-excisions, and the necessity to re-operate due to local recurrence were also compared between 2 patient groups.

Results: A total of 83 patients were in the topographical sketching group, while 79 patients were in the radiological marking group and went through wire-guided marking preoperatively. After NACT, 56 (35%) patients showed complete response at their tumors, while 106 (66%) patients showed partial response. For patients in which no palpable lesion could be felt after NACT, correct tumor areas were resected in both groups with 100% accuracy. There were 124 patients who showed unifocal tumor comparing to 38 patients with multifocal tumors. TS group had 20/83 (24%) multifocality, whereas the RM group had 18/79 (23%). Peri-operative re-excisions showed tumors in 11/51 (22%) patients for TS groups, while it was 5/31 (16%) patients for the RM group (p>0,05). One patient from each group required a second step surgery (TS 1.2%, RM 1.2%). Mean specimen volume was 189cm3 (23-652) for RM group; it was 176cm3 (8.8-1003) for TS group, (p=0,73). During the median follow-up of 5 years, 2 patients from each group had surgery due to local recurrence (TS 2.4%, RM 2.5%) (p>0.05).

Conclusions: Our study showed similar accuracy results between topographical localisation and radiological marking of the tumor bed. Both groups showed no significant difference in specimen volumes, necessity to re-operate and local recurrence rates. Topographical sketching is not time consuming, not invasive, and not a costly modality like clip and wire-guided marking.

1143213 - The use of intraoperative ultrasound during breast-conserving surgery: Factors contributing to the use of intraoperative ultrasound and its impact on re-excision rates

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Background/Objective: There are numerous advantages to the use of intraoperative ultrasound (IOUS) for localization of a lesion in breast-conserving surgery. Avoiding use of wire or other insertable localization techniques may improve patient comfort, decrease cost, and facilitate the timeliness of an operation. Furthermore, some studies describe a lower rate of positive margins, decreased re-excision rates, less volume of tissue excised, and improved cosmetic outcome with the use of IOUS. The purpose of this study is to evaluate the utilization of IOUS for tumor localization in breast conservation surgery. We sought to examine the impact of its use on margin positivity and re-excision rates. We examined re-excision rates of IOUS-guided surgeries. Additionally, we aimed to understand what factors contribute to the use of IOUS.

Methods: A retrospective chart review was conducted of patients undergoing breast-conserving surgery for cancer localized by IOUS or wire localization performed by 4 surgeons at multiple centers within a large health care system between 1/2018 and 12/2019. Patients were stratified by localization method. Presenting characteristics such as size, histology, and palpability, as well as surgeons' breast ultrasound certification, were recorded. Re-excision rates were compared among different groups. Statistical methods used were Pearson's Chi Square test and logistic regression.

Results: A total of 324 lumpectomies were performed utilizing IOUS or preoperative wire localization. Of these, 65 cases utilized IOUS, 250 utilized preoperative wire localization, and 9 did not specify type of localization. Overall re-excision rate was lower when IOUS was used versus other methods but did not reach statistical significance (14% vs 27%, p 0.058). For non-palpable tumors, IOUS use was associated with significantly lower re-excision rates (p 0.041). On the other hand, there was no statistical difference in re-excision rates in palpable tumors with the use of IOUS versus preoperative wire localization. On multivariate analysis, a palpable tumor was more likely to be re-excised, and a final diagnosis of invasive ductal carcinoma was less likely to be re-excised. There was no significant difference in re-excision rates among the 4 breast surgeons. However, surgeons with ultrasound certification were more likely to perform IOUS ($p<0.0001$).

Conclusions: Our study showed that the use of IOUS for non-palpable lesions decreased the rate of re-excision. Coupled with other obvious advantages of IOUS over traditional localization techniques, increasing familiarity with and use of IOUS may be advantageous. Surgeons certified in US use, as provided by the American Society of Breast Surgeons, utilized IOUS more frequently. Additional studies on the benefits of IOUS are warranted.

LRR

1144782 – Long-term oncologic outcomes in inflammatory breast cancer patients with supraclavicular nodal involvement

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Background/Objective: Inflammatory breast cancer (IBC) is a rare and aggressive subtype of breast cancer characterized by rapid progression and early metastasis, often to unique nodal locations such as the supraclavicular nodal basin. Previously considered M1 disease, cN3c disease is now considered locally advanced and warrants treatment with intent to cure. The pathophysiology of IBC requires aggressive treatment with trimodal therapy directed by a multidisciplinary team. Optimal local regional management strategies for patients who have persistent supraclavicular nodal metastatic burden have been debated. The objective of this study was to evaluate long-term outcomes of patients with IBC and cN3c disease.

Methods: This study was conducted using a prospectively collected database of all IBC patients treated at a dedicated cancer center from 2007-2019. Surgical patients with either biopsy-proven supraclavicular nodal involvement or who were diagnosed by clinical imaging and complete follow-up were identified. Patients with distant metastatic disease were excluded. Our primary outcome was 5-year overall survival (OS). Baseline patient characteristics and oncologic data were evaluated. Univariate Cox proportional hazards model was used to identify variables associated with overall and event-free survival (EFS). Multivariate Cox proportional hazards models were used to determine predictors for survival. OS was calculated from the time of diagnosis, and EFS was calculated from the day of surgery. EFS and OS were calculated using the Kaplan Meier method. Secondarily, rates of local recurrence and supraclavicular nodal dissection were examined.

Results: There were 61 patients who met our inclusion criteria after excluding those that were lost to follow-up, did not undergo surgery, or had bilateral breast cancer. The cohort was predominantly Caucasian (n=43, 70.5%) with a mean age of 51 years, and had hormone receptor negative/HER2 positive (n=22, 36.1%) cancer. Of these, 98.4% patients completed trimodal therapy, and the mean follow-up was 3 years. All patients underwent surgery, achieved negative margins, and underwent comprehensive radiation to the axillary, supraclavicular and internal mammary nodal basins. While the majority of patients had complete (67.2%) or partial (29.5%) radiologic response in the supraclavicular nodal basins following neoadjuvant therapy, 2 patients had persistent supraclavicular lymphadenopathy measuring >1cm. No patients underwent supraclavicular node dissection. The rate of pathologic complete response in the breast and axillary nodes was 36.1%. Four patients (6.6%) had a locoregional recurrence, with only 1 involving the supraclavicular nodes. The 5-year OS was 61.7% (95% CI 45.8%-74.1%). Increasing age (HR 3.0; p=0.028) and triple-negative subtype (HR 8.3; p=0.009) were associated with poor OS. The 5-year EFS was 52.9% (95% CI 37.4%-66.3%). The presence of >10 positive axillary nodes on final surgical pathology (HR 4.7; p=0.008) predicted poor EFS. (Table)

Conclusions: With aggressive trimodality therapy and a multidisciplinary team approach, IBC patients with supraclavicular nodal involvement experience excellent locoregional control and good survival.

Definitive regional nodal radiation without supraclavicular dissection spares patients' increased morbidity and should be considered even in the setting of residual radiologic supraclavicular disease after neoadjuvant systemic therapy.

Table. Multivariate Cox Proportional Hazard Model

Variable	N (%)	OVERALL SURVIVAL Hazard Ratio (CI)	P value	EVENT FREE SURVIVAL Hazard Ratio (CI)	P value
Age, years					
50 or younger	30 (49.2)	REF		REF	REF
>50	31 (50.8)	3.0 (1.1-7.9)	0.028	1.4 (.57-3.3)	0.475
Receptor Status Subtype					
HR+/HER2-	16 (26.2)	REF		REF	REF
HR+/HER2+	7 (11.5)	.27 (.032-2.2)	0.230	.51 (.10-2.6)	0.415
HR-/HER2+	22 (36.1)	.34 (.064-1.8)	0.201	.88 (.28-2.8)	0.833
HR-/HER2-	16 (26.2)	8.3 (1.7-40.5)	0.009	3.3 (.88-12.1)	0.076
Number of nodes positive					
≤5	38 (62.3)	REF		REF	REF
5-10	6 (9.8)	2.4 (.35-16.7)	0.366	2.2 (.46-10.4)	0.324
>10	17 (27.9)	5.6 (1.3-25.5)	0.024	4.7 (1.5-14.6)	0.008
Breast/Axillary Path Response					
Complete response	25 (41)	REF		REF	REF
Incomplete response	36 (59)	.61 (.16-2.3)	0.459	0.51 (.15-1.7)	0.276

CI: confidence interval; REF: reference group; HR hormone receptor

1148091 - A systematic review and meta-analysis of repeat breast-conserving surgery versus mastectomy for the management of ipsilateral breast cancer recurrence

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Background/Objective: Advances in multimodality management of breast cancer have led to improved oncological outcomes and reduced local recurrence rates. However, 5-15% of patients still experience ipsilateral breast cancer recurrence (IBCR). The surgical management of IBCR in patients previously treated with breast-conserving surgery (BCS) and radiotherapy has traditionally been mastectomy. While this is supported by national and international professional bodies, including the National Comprehensive Cancer Network (NCCN) guidelines, the recent St Gallen International Consensus guidelines no longer consider mastectomy as absolutely obligatory supporting a de-escalated, individualized approach. The aim was to perform a systematic literature review and meta-analysis of the oncological outcomes in patients treated with repeat BCS versus mastectomy for the surgical management of IBCR following previous BCS and radiotherapy.

Methods: This is an ongoing systematic review and meta-analysis registered with PROSPERO international prospective register of systematic reviews (CRD42021286123, https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021286123). In brief, the MEDLINE and EMBASE databases were searched for relevant publications in the English language with no date restrictions. All relevant randomized, cohort, and case-control studies providing sufficient data to assess the oncological outcomes of repeat BCS versus mastectomy for the management of IBCR in patients previously treated with BCS and radiotherapy were included in the analysis.

Results: Only observational studies were available. In a preliminary analysis, 11 publications directly comparing local recurrence rates between patients undergoing repeat BCS or mastectomy were analyzed. The pooled local recurrence rate after repeat BCS was 19.8% (95% CI 14.7-25.4%) and after mastectomy, 11% (95 CI 6.4-16.6%). The risk ratio (RR) for local recurrence following repeat BCS was 2.041 (95% CI 1.42-2.92), with moderate heterogeneity (I2=57.8%). Analysis of 16 publications reporting on overall survival (OS) of repeat BCS compared to mastectomy showed a marginal benefit for repeat BCS (RR: 1.084; 95%CI: 1.002, 1.174), with high heterogeneity (I2=71%). Propensity score matching did not affect OS on meta-regression (coeff: 0.032; 95%CI: -0.177, 0.183). Overall evidence quality ranged from moderate to low.

Conclusions: The preliminary results of this systematic review and meta-analysis show that repeat BCS is associated with higher risk of local recurrence, but this did not translate into worse OS. These data provide further input to support the decision-making process regarding the surgical management of IBCR in patients previously treated with BCS and radiotherapy. Further analyses will focus on defining factors affecting these outcomes and patient subgroups with distinct features.

1148199 - Improved five-year oncologic outcomes following neoadjuvant chemotherapy and locoregional treatment for Stage II-III breast cancer: Real-world data from a contemporary cohort

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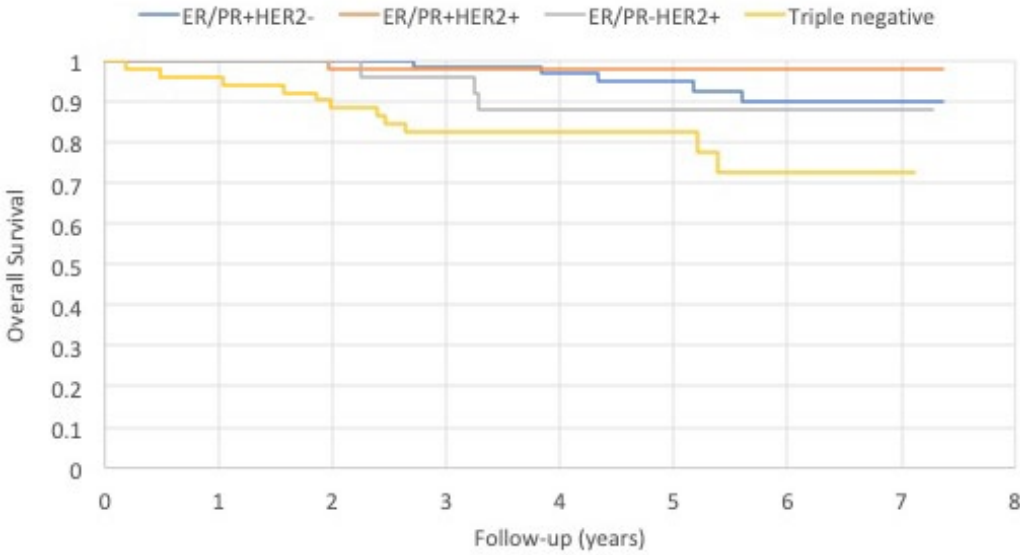
Background/Objective: In an institutional cohort of 103 Stage II-III breast cancer patients treated with neoadjuvant chemotherapy (NAC), surgery and adjuvant radiotherapy between 2009 and 2014, we previously reported 5-year rates of locoregional control (LRC), recurrence-free survival (RFS), and overall survival (OS) of 89, 69 and 77% respectively. Our present study has 2 aims: (1) to determine recurrence and survival outcomes for a more recent cohort of locally advanced breast cancers treated at our institution, and (2) to correlate receptor subtype and pathologic complete response (pCR) with recurrence and survival outcomes.

Methods: We performed a retrospective cohort study of Stage II-III patients diagnosed with breast cancer between January 1, 2014 and December 31, 2017 at an academic metropolitan cancer center who received curative intent treatment with NAC followed by locoregional therapy. The indications for NAC and adjuvant radiotherapy were based on institutional and clinical practice guidelines. Patients presenting with locoregional recurrence or metastatic disease, receiving no or upfront surgery, or receiving neoadjuvant endocrine therapy were excluded. Clinicopathologic data were abstracted from the electronic medical record, including clinical and pathologic stage, receptor status (ER/PR/HER2), surgical procedure, recurrence, and vital status. We generated survival curves using the Kaplan-Meier method, and survival differences were assessed using the log-rank test. P values <.05 were considered significant.

Results: We identified 197 patients with a mean age of 50 years old and a mean follow-up time of 59.4 months (4.95 years). Stratified by receptor subtype, there were 69 hormone receptor (HR)-positive(+)/HER2-negative(-) (35%), 50 HR+/HER2+ (25%), 26 HR-/HER2+ (13%), and 52 HR- /HER2- (26%) tumours. Regarding breast surgery, 71 (36%) underwent breast-conserving surgery, 99 (50%) underwent unilateral mastectomy, and 27 (14%) underwent bilateral mastectomy (7 for bilateral breast cancer and 20 opted for contralateral prophylactic mastectomy). Fifty-one patients (26%) achieved a pCR (ypT0 or ypTis) as follows: 1 HR+/HER2- (1%), 16 HR+/HER2+ (32%), 15 HR-/HER2+ (58%), and 19 HR-/HER2- (37%). Twenty-nine patients (14.7%) experienced disease recurrence: 2 local (1 following lumpectomy and 1 following mastectomy), 2 regional, and 25 distant recurrence. Mean time to recurrence was 25.1 months. During the analysis period, 20 deaths (10.2%) were recorded, 17 of whom were due to breast cancer. For the entire cohort, the 5-year rates of LRC, RFS, and OS were 98, 86, and 92%, respectively. The 5-year RFS for patients achieving pCR versus not achieving pCR were 90% and 84%, respectively, while there was no difference in 5-year OS. Receptor subtype strongly predicted 5-year RFS (89% for HR+/HER2-, 94% for HR+/HER2+, 76% for HR-/HER2+ and 78% for HR+/HER2-, P<.01) and OS (P<.01, see Figure).

Conclusions: With modern systemic, surgical, and radiation therapy, 5-year oncologic outcomes are drastically improving for women receiving NAC followed by surgery and radiation for Stage II-III breast cancer. Locoregional recurrence at 5 years is rare, while RFS and OS are influenced by receptor subtype and achievement of a pCR. These contemporary oncologic outcomes may serve as the standard for comparison to forthcoming oncologic outcomes following de-escalation of surgical and radiation therapy.

Figure. 5-year overall survival stratified by receptor subtype



Lymphedema

1147068 - A meta-analysis to determine the risk of breast cancer treatment combinations on the incidence of breast cancer-related lymphedema

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Background/Objective: Breast cancer patients undergoing axillary dissection are reported to have a 20% risk of developing breast cancer-related lymphedema (BCRL). The incidence of BCRL is widely reported as a result of a single type of treatment, for example due to axillary lymph node dissection (ALND) or sentinel lymph node biopsy (SLNB). However, the management of breast cancer is often multi-modal involving a number of treatments, both surgical and non-surgical. There is a paucity of data in the published literature comprehensively analyzing the risk of BCRL incidence associated with particular treatment combinations. It is important to identify the treatment combinations that pose the greatest risk to patients of developing BCRL. This is critical to inform patients and health care professionals of the risks associated with their own treatment and may enable prioritization of strategies in the primary prevention of BCRL. The aim of this study is to determine the treatment combinations that pose the greatest risk of BCRL development by conducting a meta-analysis of BCRL incidence reported in literature.

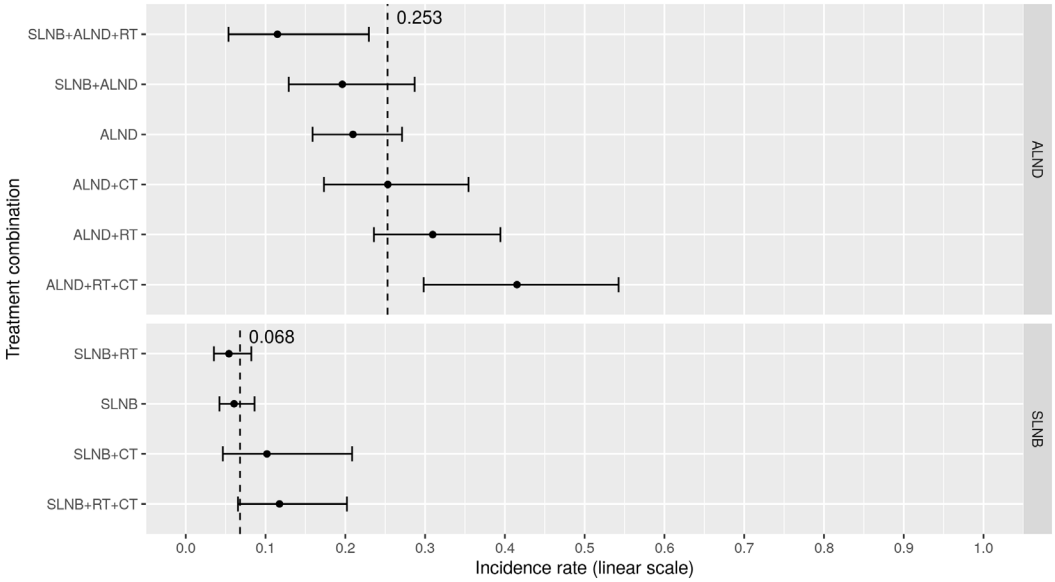
Methods: A systematic review of the literature was undertaken to identify all relevant studies. Four databases were searched including OVID Medline. Sixteen key words and/or mesh terms were utilized including lymphedema, ALND, and SLNB. A total of 2640 reports were screened by 2 independent assessors to identify 246 studies that reported BCRL incidence data as a result of treatment or treatment combination administered. These data were extracted and stratified by treatment or treatment combination type. Employing a random effects model, these data were used to calculate the incidence rates and odds ratio (OR) for BCRL development per treatment type or combination thereof, normalized to the overall risk of BCRL based on the outcomes of all reports.

Results: A preliminary analysis of 51 studies revealed the overall pooled incidence rate of BCRL is 17.3% as a result of all treatment combinations. Treatment combinations including SLNB and those including ALND resulted in overall pooled incidence rates of 6.8% and 25.3%, respectively (Figure). Thus, treatment combinations that included SLNB were associated with a lower incidence of BCRL compared to those with ALND ($p<0.05$). Increasing the number of treatments combined with SLNB lead to a higher risk of BCRL. The highest OR for an SLNB containing treatment combination was found for SLNB, RT, and CT (OR=0.15). Higher odds of developing BCRL were linked with treatment combinations including ALND where the highest OR was found for ALND+RT+CT (OR=6.6).

Conclusions: This meta-analysis highlights that patients treated with treatment combinations including ALND are at a greater risk for developing BCRL; those who are treated with treatment combinations including SLNB understandably are at a lower risk. This study is significant as it elucidates the impact of individual treatment on the incidence of developing BCRL. Importantly, patients may be informed about the individual risk associated with their specific treatment plan. Furthermore, this study is intended to

be used as a guide to determine patient cohorts in clinical trials who would benefit most from novel interventions to prevent BCRL.

Figure. Incidence rate of breast cancer-related lymphedema incidence rate per treatment combination for 51 studies



1148104 - Incidence of lymphedema in inflammatory breast cancer patients following trimodality treatment

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Background/Objective: Lymphedema as a sequelae of breast cancer treatment is a major concern, especially with improving oncologic outcomes. Inflammatory breast cancer (IBC) is a rare and aggressive malignancy where trimodality therapy (neoadjuvant chemotherapy, modified radical mastectomy, and radiotherapy) remains the standard of care. Given the extent of disease and treatment required, IBC patients are highly susceptible for development of lymphedema. The objective of this study is to evaluate the incidence of lymphedema in IBC following trimodality therapy.

Methods: IBC patients treated from 2016-2019 were identified from a prospective institutional database. Patients were excluded if they presented with recurrent disease, underwent bilateral axillary surgery, or were lost to follow-up. Lymphedema was defined by objective perometer measurements (>5% volume increase of affected arm compared to unaffected arm) and/or clinician diagnosis upon chart review. Demographic, clinical/pathologic factors, oncologic outcomes and perometer measurements were recorded and compared among patients who did and did not develop lymphedema. Time to development of lymphedema and treatment received were also captured.

Results: A total of 124 IBC patients were treated and received perometer measurement during the study period. Of these, 82 met inclusion criteria, and 78 patients had at least 2 perometer measurements recorded. The incidence of lymphedema in this patient population was 63.4% (n=52), with 80.7% of these patients (n=42) developing lymphedema within 1 year after surgery. Demographic, clinical, and pathologic features were similar between patients who developed lymphedema and those without lymphedema (Table). Six patients (11.5%) had objective evidence of lymphedema without a documented clinical diagnosis upon chart review. There were 92.3% (n=48) of patients who received lymphedema treatment, which included either physical therapy, compression, lymphovenous bypass, and/or vascularized lymph node transfer.

Conclusions: Inflammatory breast cancer patients are at high risk for lymphedema after cancer treatment, which impacted greater than 60% of patients in this cohort. Strategies to reduce the risk for lymphedema and improve real-time diagnosis of subclinical and clinical lymphedema to direct early management in this patient population should be considered in clinical practice.

Table. Demographic, clinical/pathologic factors, and oncologic outcomes for IBC patients treated with trimodality therapy who underwent lymphedema assessment (2016-2019)

	Entire Cohort	Lymphedema	No lymphedema	p-value
	n=82	n= 52 (63.4%)	n= 30 (36.6%)	
Age:	48 (range 28-81)	48 (range 30-72)	50 (range 28-81)	0.309
<=50	47 (57.3%)	32 (61.5%)	15 (50%)	
>50	35 (42.7%)	20 (38.5%)	15 (50%)	
Race/ethnicity:				0.892
Asian	3 (3.7%)	2 (3.8%)	1 (3.3%)	
Black	5 (6.1%)	3 (5.8%)	2 (6.7%)	
Native American	1 (1.2%)	1 (1.9%)	0 (0%)	
Hispanic	0 (0%)	0 (0%)	0 (0%)	
White	73 (89%)	46 (88.5%)	27 (90%)	
BMI:				0.462
<18.5	0	0	0	
18.5-24.9	13 (15.9%)	7 (13.5%)	6 (20%)	
25.0-29.9	22 (26.8%)	13 (25%)	9 (30%)	
30.0-34.9	25 (30.5%)	19 (36.5%)	6 (20%)	
>35	22 (26.8%)	13 (25%)	9 (30%)	
Tumor subtype:				0.515
HR+/HER2-	34 (41.5%)	23 (44.2%)	11 (36.7%)	
HR+/HER2+	15 (18.3%)	7 (13.5%)	8 (26.7%)	
HR-/HER2+	17 (20.7%)	11 (21.2%)	6 (20%)	
HR-/HER2-	16 (19.5%)	11 (21.2%)	5 (16.7%)	
Clinical N stage:				0.719
N0	3 (3.7%)	1 (1.9%)	2 (6.7%)	
N1	25 (30.5%)	16 (30.8%)	9 (30%)	
N2	10 (12.2%)	6 (11.5%)	4 (13.3%)	
N3	44 (53.7%)	29 (55.8%)	15 (50%)	
Stage:				0.772
III	67 (81.7%)	42 (80.8%)	25 (83.3%)	
IV	15 (18.3%)	10 (19.2%)	5 (16.7%)	
Pathologic N stage:				0.756
N0	39 (47.6%)	24 (46.2%)	15 (50%)	
N1	10 (12.2%)	6 (11.5%)	4 (13.3%)	
N2	16 (19.5%)	12 (23.1%)	4 (13.3%)	
N3	17 (20.7%)	10 (19.2%)	7 (23.3%)	
Number of lymph nodes excised in ALND:				0.119
<10	4 (4.9%)	4 (7.7%)	0 (0%)	
>=10	78 (95.1%)	48 (92.3%)	30 (100%)	
Laterality:				0.831
Right	37 (45.1%)	23 (44.2%)	14 (46.7%)	
Left	45 (54.9%)	29 (55.8%)	16 (53.3%)	
Dominant Arm Affected:				0.531
Yes	42 (51.2%)	24 (46.2%)	16 (53.3%)	
No	40 (48.8%)	28 (53.8%)	14 (46.7%)	
Median follow up (months from surgery)	31.5 (1-56)	35 (8-55)	18 (1-56)	
Recurrence:				0.691
Loco-regional	1 (1.2%)	1 (1.9%)	0 (0%)	
Distant	29 (35.4%)	17 (32.7%)	12 (40%)	
Both	5 (6.1%)	4 (7.7%)	1 (3.3%)	
None	47 (57.3%)	30 (57.7%)	17 (56.7)	
Death:				0.765
Yes	23 (28%)	14 (26.9%)	9 (30%)	
No	59 (72%)	38 (73.1%)	21 (70%)	

1148119 - Lymphedema: Do patients understand it? Do they worry about it?

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Background/Objective: Lymphedema is a potential lifelong sequela of breast cancer treatment. Early recognition of lymphedema may lead to earlier intervention and potential mitigation of disease severity. Prior studies demonstrate that patients express a lack of understanding and general fear of lymphedema. We sought to: 1) evaluate patient worry and knowledge about risk, causes, and prevention of lymphedema, 2) identify the proportion of patients who report receiving lymphedema education and screening at our center, and 3) determine willingness to participate in active screening and prevention programs for lymphedema after completing treatments.

Methods: A survey was sent to patients treated for Stage 0-III breast cancer at a single academic institution. Exclusion criteria included >10 years since diagnosis, missing clinical staging, and excisional biopsy/lumpectomy without axillary surgery. Participants were queried about demographics, prior lymphedema education, knowledge about lymphedema risk factors, worry about developing lymphedema, and willingness to participate in education, screening, and prevention programs. Responses were linked with clinicopathological and treatment information from a prospective institutional database. Ordinal logistic and Poisson regression were used to evaluate the effect of patient-, disease-, and treatment-related factors on worry and knowledge, respectively.

Results: Surveys were sent to 397 patients, and 141 (36%) responded and met eligibility criteria. Mean age was 62 years, and mean time since diagnosis was 5.2 years. Lymphedema was self-reported by 18 respondents (13%). The majority of patients were not at all or only slightly worried about developing lymphedema (89%). Higher levels of worry were more likely in patients with clinical Stage II-III disease (OR=2.63, p=0.03), a history of axillary lymph node dissection (ALND; OR= 4.58, p<0.01), and those who were employed (OR=2.21, p=0.05). Increasing age was associated with lower worry (OR=0.96, p=0.03). Each additional node sampled was associated with experiencing higher levels of worry (OR=1.13, p<0.01). Only 102 (72%) recalled their care team providing lymphedema education. Knowledge about lymphedema was poor, with less than a quarter of respondents answering >50% of the questions correctly. Having a college degree was significantly associated with answering more questions correctly (p<0.01). There was no association between worry and lymphedema knowledge. Of patients without lymphedema, 36% were interested in learning more about lymphedema, and 64% were willing to participate in or learn more about a screening program. Most (66%) felt that information regarding lymphedema should be provided both before and after cancer treatment.

Conclusions: A majority of our breast cancer survivors had limited knowledge about the risk factors for lymphedema. While most patients were not worried about developing lymphedema, higher worry was seen in patients with a higher clinical stage at diagnosis, who had an ALND, and who were younger or employed. Our findings suggest potential targets and timing for patient-centered educational interventions.

1148162 – Fluorescence-guided axillary lymph node dissection in high-burden axillary disease: Interim results of prospective validation study

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Background/Objective: LABC comprises 35-50% of cancers in developing countries. Even after NST, the disease burden remains high. Targeted axillary dissection or SLNB is not feasible from infrastructure or disease perspectives. ALND with or without RT remains the standard of care. The incidence of lymphedema is close to 50% in this subset. Our objectives were 1. identification of arm lymphatics during axillary dissection using fluorescence technology. 2. preservation of the whole length of arm lymphatics under real-time imaging. 3. reduction in disability of arm, shoulder, and hand (short-term and long-term).

Methods: A validation study was conducted. Intervention arm included patients (n=20) of LABC with persistent macroscopic axillary disease after NST. All patients were injected with ICG (0.5ml intradermal and 0.5ml subdermal at 3 to 5cm below axillary crease) at the onset of surgery. The lymphatics of the arm were traced under real-time imaging from the site of injection to the axillary apex. Arm lymphatic-preserving ALND was done. Uninterrupted flow of the arm lymphatics from the point of entry into axilla to its exit at the apex was re-confirmed at the end of the procedure. The comparator arm (age, BMI matched) underwent standard ALND without any image guidance. The limb was measured at fixed points in arm, forearm, and hand up to 12 months.

Results: The arm lymphatic visualization was excellent (IR 100%, FNR 0%).The lymphatic channel preservation was possible in all cases (post ALND IR 100%). The mean lymph node yield and metastasis respectively was 15.3 (comparator 15.8) and 10.1 (comparator 9.8). The short-term incidence of lymphedema was less in the intervention arm compared to control arm (5% versus 20%) at the end of 1 year. The reduction was statistically significant ($p<0.001$).

Conclusions: Fluorescence-guided ALND offers excellent identification of arm lymphatics. The preservation of lymphatics can be confirmed at the end of the procedure. The study aims to evaluate the long-term results (at the end of 2 years). However, the short-term results indicate significant reduction at the end of 12 months. Long-term results are necessary to understand the effect on subset of patients who have received radiotherapy. As the BMI of none of the patients exceeded 32, the failure of identification in higher BMI cannot be addressed in this study. Fluorescence-guided lymphatic-preserving ALND is a valid lymphoedema-reducing procedure. The real-time visualization of lymphatics is responsible for high IR and no FNR. The procedure is effective in high-volume axillary disease.

1143499 - Oncologic safety of axillary lymph node dissection with immediate lymphatic reconstruction

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Background/Objective: In breast cancer patients who require axillary lymph node dissection (ALND), axillary reverse mapping (ARM) to identify arm lymphatics combined with lymphaticovenous bypass (LVB) to re-anastomose the arm lymphatics to axillary veins, can restore continuity of lymphatic flow to reduce the incidence of lymphedema. Previous studies have reported on the oncologic safety of the ARM procedure; however, the oncologic safety of LVB is unknown and has not been reported in the literature. The purpose of this study is to evaluate if immediate lymphatic reconstruction affects oncologic outcomes in breast cancer patients.

Methods: Breast cancer patients who underwent ALND with LVB from September 2016 to December 2020 were identified from a prospective institutional database. Patient demographics, tumor characteristics, treatment, and operative details were recorded. Follow-up included the development of local recurrence in the breast and axilla as well as distant metastasis. Oncologic outcomes were analyzed.

Results: A total of 136 female and 1 male breast cancer patients with axillary nodal disease underwent ALND with LVB (136 unilateral and 1 bilateral). The median age at diagnosis was 52 years (range 29-78). At cancer presentation, 122 patients (89%) had clinically node-positive primary breast cancer, 10 patients (7.3%) had recurrent breast cancer involving the axillary lymph nodes, 3 patients (2.2%) had recurrent breast cancer involving both the breast and axillary nodes, and 2 patients (1.5%) presented with axillary disease only/occult breast cancer. Clinical T category distribution was Tx in 8.8% (n=12), T1 in 21.1% (n=29), T2 in 40.9% (n=56), T3 in 19.7% (n=27), and T4 in 9.5% (n=13). The majority (101/137, 73.7%) of patients were hormone receptor-positive, 34/137 (24.8%) were HER-2 positive, and 18/137 (13.1%) were triple-negative subtype. Chemotherapy was administered in 91.2% (n=125) of patients, with 76.0% (n=95) receiving treatment in the neoadjuvant setting (NAC). Of those treated with NAC, 18.9% (18/95) had a complete pathological response (pCR). The Residual Cancer Burden score was 1 (n=12), 2 (n=23), and 3 (n=35) in those with residual disease. Adjuvant radiation was administered in 92.0% (n=126) of patients. For surgical management of the breast, 103 patients (75.2%) underwent a mastectomy, 22 patients (16.0%) underwent lumpectomy, and 12 patients (8.8%) had axillary surgery only (2 unknown breast primary, 10 isolated axillary recurrence). The ALND procedure, yielded a median of 15 lymph nodes removed (range 3-41), with an average of 3.5 positive (range 0-22). The number of LVB performed were 1 in 48.6% (n=67), 2 in 31.2% (n=43), 3 in 12.3% (n=17), 4 in 7.2% (n=10), and 5 in 0.7% (n=1). At a median follow-up of 2.2 years (range 6 months - 5 years), 1 patient developed a local chest wall recurrence (patient had declined all systemic therapy and radiation recommendations), and 12 developed distant metastases. No axillary recurrences were identified in the cohort at follow-up.

Conclusions: Immediate lymphatic reconstruction in breast cancer patients undergoing ALND is not associated with short-term axillary recurrence and appears oncologically safe.

Male Breast Cancer

1146638 - Prognostic predictors of mortality in male breast cancer: Outcomes in an urban population

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Background/Objective: Male breast cancer (MBC) accounts for 0.5 to 1% of all breast cancers diagnosed annually in the United States and may have different biological characteristics compared to female breast cancer. The purpose of this study is to evaluate prognostic factors in MBC and identify patterns and outcomes of disease that may shed further insight to improving the management.

Methods: We identified 47 male patients with in situ and invasive breast cancer after a retrospective chart review at 2 institutions between 2010 and 2021. Demographics, comorbidities, cancer characteristics, recurrence, and mortality were collected. Cox proportional hazards regression model was used to determine prognostic factors. A Kaplan–Meier curve was used to plot survival probabilities. Analyses were performed using Stata and Statistical Analysis System.

Results: The mean age of patients at presentation was 64.1, 57.5% were African American, and 31.9% were Caucasian. Most patients had invasive ductal carcinoma (89.4%) and presented with T1 or T2 tumors (40.4% and 38.3%, respectively). Three patients (6.4%) had a recurrence, and 8 patients (17%) died. Mean follow-up was 43.2 months. Using mortality as an endpoint, age (>76.1 years) indicated a hazard ratio (HR) of 1.13 (p 0.004). Diabetes mellitus (HR=5.45, p=0.023), atrial fibrillation (HR=8.0, p=0.009), end-stage renal disease (HR 6.47, p=0.023), Eastern Cooperative Oncology Group (ECOG) performance status of 3 (HR=7.92, p=0.024), poorly differentiated grade (HR=7.21, p=0.033), and metastatic disease (HR=30.94, p=0.015) had an increased risk of mortality (Table). Adjuvant hormone therapy tended to have a favorable association with survival (HR=0.22, p=0.070). Overall survival (OS) at 2 and 3 years was 85 and 81%, respectively.

Conclusions: Advanced age, diabetes mellitus, atrial fibrillation, end-stage renal disease, ECOG score of 3, poorly differentiated tumors, and metastatic disease are unfavorable prognostic factors in MBC. Compared to female breast cancer, our MBC population showed poorer survival with a 3-year OS of 81%.

Table. Prognostic factors for mortality in male breast cancer

Prognostic Factor	Hazard ratio (95% CI)	*p-value*
Age	1.13 (1.04, 1.22)	**0.004**
BMI	0.84(0.69,1.03)	0.090
Race	0.59(0.12,2.93)	0.518
Diabetes mellitus	5.45 (1.27, 23.42)	**0.023**
HTN	2.03(0.48,8.55)	0.333
ESRD	6.47(1.30,32.18)	**0.023**
Smoking	1.71(0.34,8.48)	0.512
Atrial fibrillation	8.00 (1.68, 37.60)	**0.009**
ECOG performance status 3	7.92 (1.32, 47.56)	**0.024**
Pathological size (cm)	0.79(0.39,1.60)	0.517
Grade 3 (poorly differentiated)	7.21 (1.17, 44.39)	**0.033**
Metastatic disease	30.94 (1.93, 495.30)	**0.015**
Neoadjuvant chemotherapy	0.69(0.08,6.00)	0.737
Adjuvant chemotherapy	0.21().02,1.80)	0.154
Hormone therapy	0.22 (0.04, 1.13)	0.070
Adjuvant radiation	1.98(0.40,9.88)	0.405

CI = Confidence interval; ECOG: Eastern Cooperative Oncology Group (ECOG)

1138091 - A systematic literature review of the management, oncological outcomes, and psychosocial implications of male breast cancer

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Background/Objective: Although male breast cancer (MBC) is a rare disease, accounting for <1% of all breast cancers, it has significant oncological, survival, and psychosocial implications for patients. The aim of this study is to assess the latest literature in the diagnosis, management, oncological outcomes, and psychosocial impact of MBC.

Methods: A systematic literature review was conducted using the PRISMA guidelines to explore the management of MBC, with particular focus on investigative imaging, surgical management, oncological outcomes, survival, genetic screening, and psychosocial effects. Electronic databases were searched for randomised control trials, cohort studies, and case series involving more than 10 patients. Imaging and surgical techniques, local and distant disease recurrence, survival, genetic screening, and psychosocial implications in the setting of MBC were assessed.

Results: The search criteria identified 199 articles, of which 59 met the inclusion criteria. This included 39,529 patients, with a mean age of 64.5 years (55-71), and a mean follow-up of 66.3 months (26.2-115). Mastectomy remains the most frequently used surgical technique, with an average of 89.6%. Loco-regional and distant recurrence rate was 10.1% and 21.4% respectively. Disease-free survival (DFS) at 5 and 10 years was 66.8% and 54.5% respectively. Disease-specific survival (DSS) at 5 and 10 years was 87.1% and 67.1% respectively. Overall survival (OS) at 5 and 10 years was 72.7% and 50.7% respectively. Genetic screening was conducted in 38.6% of patients, of whom 4.8% and 15.8% were found to be BRCA1 and BRCA2 carriers respectively. Psychosocial studies were conducted mainly using questionnaire and interview-based methodology focusing primarily on awareness of breast cancer in men, support available, and impact on gender identity.

Conclusions: This review demonstrates that men present with later-stage disease and subsequent impact on survival outcomes. There remains a paucity of high-level evidence, and prospective studies are required. There is a need for increasing awareness amongst the public and health care professionals in order to improve outcomes and reduce stigma associated with MBC.

Margins

1146684 - Use of intraoperative tomosynthesis in margin analysis of breast specimens

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Background/Objective: Mammography using tomosynthesis, or 3D mammography, has become the standard of care for screening and diagnostic exams. Until recently, tomosynthesis was not available for assessment of intraoperative breast specimens. Now with the advent of intraoperative tomosynthesis, there is an opportunity to apply this technology to improve surgical accuracy and provide better oncologic outcomes. The purpose of this study is to assess the accuracy of intraoperative tomosynthesis compared to traditional methods of 2-dimensional specimen imaging.

Methods: A retrospective chart review of patients with biopsy-proven breast cancer who underwent lumpectomy with and without the use intraoperative tomosynthesis between 2020 and 2021 was performed. A total of 200 patients were included, representing 2 groups: 100 who underwent intraoperative tomosynthesis (TOM) and 100 who were assessed using traditional methods (TRA). Demographics, cancer characteristics, number of positive margins, and the closest margin (in mm) on pathology were collected. Univariate analysis was performed using chi-2, fisher's exact, student-t test or Mann–Whitney U test for categorical and continuous variables. Analysis performed with STATA v17.0.

Results: The mean age was 63.1 in the TOM group and 62.1 in the TRA group. All were female. There were no significant differences in race, receptor status, Ki-67, subtype of cancer, tumor size, and stage between the 2 groups. The median closest tumor margin in both groups was 3mm, with no statistical difference, p=0.468. The TOM group had a median of 1 additional margin taken, while the TRA group had a median of 2 additional margins taken, a statistically significant difference (p=0.027). Overall, more margins were taken in the TRA group vs the TOM (83% vs 72%, p=0.063). The TOM group had more cases with positive margins than the TRA group, including the total number of cases with positive margins (28% vs 18%, p=0.093), cases with positive IDC margins (6.3% vs. 3.5%, p=0.484), and those with positive DCIS margins (36.1% vs, 23.8%, p=0.121); however, none of these differences achieved statistical significance.

Conclusions: Margin accuracy did not improve with the use of intraoperative tomosynthesis. The TOM group had more positive margins than the TRA group; however, the TRA group took more additional margins than the TOM group. Further investigation is required to determine the benefits of intraoperative tomosynthesis.

Table. Margin accuracy in the intraoperative tomosynthesis group versus the traditional methods group

	Intraoperative Tomosynthesis (TOM)			Traditional Methods (TRA)			Significance
	N	Median	IQR (Q1Q3)	N	Median	IQR (Q1Q3)	*p*
Age at Dx* (years)	100	63.1*	12.0*	100	62.1*	13.6*	0.581
Ki-67**	71	15	10-35	75	20	10-40	0.167
Size (cm)	100	1.2	0.6-2.3	100	1.2	0.7-2.0	0.994
Closest margin of Invasive cancer (mm)***	78	3	1.5-6.0	85	3	1-6	0.387
Number of additional margins taken	100	1	0-2	100	2	1-2	**0.027**

*Age was normally distributed, therefore measure of central tendency were calculated as averages and standard deviations, rather than median and IQR (interquartile range)
**Ki-67 data was only available for 146 of the 200 patients
***Patients with DCIS as primary cancer were excluded from this calculation

1148137 - Utility of MarginProbe in detecting positive margins intraoperatively during partial mastectomies to reduce re-excisions

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Background/Objective: Despite advancements in breast cancer surgery, partial mastectomy re-excision rates for positive margins on final pathology are approximately 25%. MarginProbe is an FDA-approved device for intraoperative margin assessment, which has been shown in several studies to decrease partial mastectomy re-excision rates. Our study aims to compare re-excision rates when using MarginProbe as an intraoperative adjunct to those when it is not used. We also evaluate how often additional excisions due to MarginProbe identified additional hidden malignancy, which would not have been detected on final histopathologic examination alone.

Methods: Patients from a single institution with newly diagnosed breast cancer undergoing partial mastectomy without neoadjuvant chemotherapy were identified. Patients enrolled in the study after June 2019 were included in a prospective group in which MarginProbe was used during partial mastectomy. A retrospective control group of patients undergoing partial mastectomy without MarginProbe use from 2015 to May 2019 with the same breast surgeons was identified. Efficacy of the MarginProbe was evaluated by comparing the partial mastectomy re-excision rates in the control group, which received standard of care intraoperative margin assessment with specimen radiographs or grossly sectioning at the time of surgery, to the re-excision rates in the MarginProbe group. Institution-specific definitions for positive margins were defined as tumor on ink for invasive cancer (IDC), and ductal carcinoma in situ (DCIS) within 2mm of the margin, which were used to determine need for re-excision in both groups. In some cases, re-excisions were not performed if the DCIS was only focal or if present with IDC.

Results: A total of 92 patients with newly diagnosed breast cancer undergoing partial mastectomy from June 2019 to October 2021 were enrolled in the prospective MarginProbe device group. In addition, 300 patients who underwent partial mastectomy from January 2015 to May 2019 were included in the retrospective control group. Twenty-three (25%) of the 92 patients in the MarginProbe device group required re-excisions based on positive margins in final pathology. There were 113 (38.7%) of the 300 patients in the retrospective control group who required re-excision. Implementation of the MarginProbe was associated with a 13.7% absolute reduction in re-excision rate and a 35.4% relative reduction in re-excision rate (p=0.0179). MarginProbe had a 62% sensitivity for detection of all positive margins and averaged 2.4 false-positives per case. In 13 patients, there were 23 shavings with malignant tissue detected by MarginProbe for which the main specimen was pathologically clear. In 15 patients, MarginProbe use prevented re-excision. MarginProbe use added an average of 12.6cc additional tissue removed during partial mastectomy.

Conclusions: MarginProbe use was associated with a statistically significant decrease in re-excision rate following partial mastectomy. These findings suggest that MarginProbe has utility in decreasing re-excision rates while removing only a small amount of additional breast tissue. In 13 cases, MarginProbe use led to malignant tissue removal in shave margins that would have otherwise remained in situ due to negative pathologic margins on the main specimen. Larger studies are necessary to determine if there is clinical significance to taking these additional margins.

1148147 - Defining positive margins for invasive ductal carcinoma with ductal carcinoma in situ

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Background/Objective: Defining negative margins after partial mastectomy remains controversial. Current guidelines suggest that in patients with ductal carcinoma in situ (DCIS) alone, negative margins are achieved when no DCIS is within 2mm of the margin, while negative margins for patients with invasive ductal carcinoma (IDC) plus DCIS are defined as no IDC or DCIS directly involving the margin (no tumor on ink). This study examines whether the current guidelines are adequate to ensure negative margins. We propose that whenever DCIS is present, negative margins should be defined as no DCIS within 2mm of the inked margin, regardless of whether IDC is present.

Methods: A retrospective review was performed from 2015 to 2021 at a single institution identifying patients who underwent partial mastectomy for IDC with DCIS and subsequently required re-excision. Guidelines at that time required re-excision for DCIS within 2mm of the margin, regardless of whether IDC was present. Patients with IDC or DCIS alone were excluded. Final pathology from re-excised tissue was evaluated for residual tumor.

Results: There were 74 patients who met inclusion criteria of IDC with DCIS who had re-excision. There were 48 patients who had re-excision due to a positive margin for DCIS alone, of which 23 (47.9%) had residual disease in the new margins (18 with DCIS and 5 with IDC). Out of the 74 patients who had re-excision, 35 (47.3%) had residual carcinoma in re-excised tissue. Of these 35 patients, 12 had re-excision for IDC and/or DCIS on ink, and 23 had re-excision for DCIS <2mm from the margin. Of these 23 patients,

5 (21.7%) had residual IDC in the re-excised tissue, and 18 (78.3%) patients had residual DCIS. The positive predictive value of a positive margin defined by DCIS <2mm from the margin was 48% for detecting any residual cancer, and 10% for detecting IDC.

Conclusions: The proposed guidelines of requiring no DCIS within 2mm of a margin detected 23 residual carcinomas in re-excision tissue that would have been missed by the current guidelines of no DCIS on ink when there is a diagnosis of IDC. Although residual cancer was found in the re-excised margins, the clinical significance of this is unknown, but it is concerning that 21.7% had IDC. Larger studies with long-term follow-up are necessary.

1148263 - Systematic review of clinical applications of confocal fluorescence microscopy for intra-operative breast cancer diagnostics

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Background/Objective: The mainstay for surgical treatment of breast cancer is breast-conserving surgery (BCS), which has quality-of-life benefits over mastectomy. However, nearly 1 in 5 women will require a second re-excision surgery due to positive resection margins and failed BCS. Imprint cytology and frozen section are well described approaches to evaluate breast margins intra-operatively. Despite this, tissue requires transportation, preparation and expert pathologist interpretation, complicated by sampling errors and time delays. As such more practical intra-operative techniques are demanded. An emerging optical biopsy technique is confocal fluorescence microscopy (CFM), which uses a laser source to scan tissue at cellular depth, and has been reported in breast tissue margin assessment. In the study, we review the literature evaluating CFM diagnostics within breast cancer.

Methods: A systematic review of the literature describing the diagnostic utility of CFM in evaluating intra-operative pathology during breast surgery was performed. MEDLINE (PubMed), EMBASE, and Web of Science databases were used to search the literature. Primary clinical and engineering studies evaluating confocal fluorescence microscopy within breast surgery were included. Xenograft tissue, cultured cell lines, and abstracts were excluded. All data were imported to COVIDENCE and assessed by 3 reviewers (2 breast surgeons, 1 optical engineer). A validated quality assessment tool (QUADAS-2) was used for all clinical papers.

Results: Following exclusion of duplicate articles, 934 articles were screened. A total of 143 full-text reviews were performed, and 56 studies qualified for data extraction. Morphologic and cellular features of benign and neoplastic lesions were identified in the confocal images and were comparable to standard histologic sections. Benign tissue demonstrated adipose tissue, stroma (collagen and elastic fibres), and glandular tissue with fluorescent spaced epithelial nuclei lining a duct. Neoplastic features showed disrupted stroma by enlarged and disorganised ductal epithelial nuclei. Only 7 studies attempted statistical differentiation between tissue types and qualified for QUADAS-2 assessment; CFM systems reported a sensitivity of 81-100%, and specificity of 93-100%. QUADAS-2 study evaluation exhibited high or unclear risk of bias in all domains except the index test and high applicability concerns owing to restrictions applied to the study population and difficulty in acquiring good-quality images of

intra-operative margin status. In total, 16 benchtop CFM systems have been reported and demonstrate large scanning areas of 10x10 mm2 to 2.5x3.5 cm2 in durations between 75 seconds and 13 minutes, respectively. Six fiber-based CFM reported on feasibility of the engineering models and robotics integration.

Conclusions: Several commercial- and custom-built confocal imaging systems have been developed and tested. However, only a few studies suggest that CFM images can identify in situ, invasive tumors and tumor margins. In future, blinded prospective controlled studies, as well as learning curve assessment for pathologists and surgeons' image interpretation, needs to be investigated to assess the possibility of using CFM for real-time intraoperative diagnosis.

1148279 - Portable confocal endomicroscopy for ductal feature characterization: Toward margin assessment in breast-conserving surgery

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Background/Objective: The UK average positive margin re-excision rate following breast-conserving surgery (BCS) is approximately 20%-30%. Cytopathological techniques for immediate margin evaluation to augment intra-operative decisions have demonstrable impact. Probe based Confocal laser endomicroscopy (pCLE) is one promising approach within in-vivo and rapid ex-vivo tissue characterisation, with potential to guide surgeons of margin status during resection. pCLE offers an alternative to imprint cytology and frozen section, which due to challenges of sample preparation and human interpretation may be impractical. Flexible optical fibre bundles use a laser source via small diameter imaging probes, thus taking an optical biopsy of the tissue. The aim of this study was to demonstrate the real-time operability of pCLE in ductal feature characterisation within rapid ex-vivo breast tissue excisions.

Methods: An in-house, high-speed pCLE system was used for rapid ex-vivo human breast tissue scanning with a 0.91mm outer diameter, 3.5µm resolution and image acquisition rate of 120 frames/second. Freshly excised breast tissue was evaluated by histopathologists and then a tissue 'cut out' was allocated for research. Breast tissue was stained with 0.01% acriflavine hydrochloride dye for 1 minute, then scanned immediately using pCLE. Expert analysis of images was performed and co-registered against original tissue histopathology. A spectrum of detailed cellular and microcellular features are described to distinguish normal, benign, and neoplastic tissue.

Results: To date, tissue samples from 15 patients receiving breast cancer surgery have been evaluated [5 normal glandular tissue, 5 fibroadenoma (FAD), and 5 ductal carcinoma in situ (DCIS) with concurrent progressive invasive ductal carcinoma (IDC)]. Histolopathological analysis of excised tissue was performed during oncological resection. pCLE tissue duration was 60 seconds (Figure). Normal tissue constituted a honeycomb arrangement of adipose cells with sheets of parallel collagen fibres constituting stroma and blood vessels. Ducts were visualised with clearly stained and organised nuclei

along with breast lobules with clusters of acini. Clear fluorescent borders between the cells containing interspersed nuclei were seen. FAD was classified by the appearance of stromal and epithelial hyperplasia. Stromal and lobular proliferation was seen, compared to normal tissue. A slit like lobular appearance featured, where branching of ducts into the stroma was observed. DCIS was reported in all malignant breast tissue patients at the peripheries of IDC. In DCIS, we observed disorganised appearance of cells lining the ductal epithelium, strongly fluorescent non-uniform cell nucleus aggregates, but importantly, there was no stromal invasion, and a clear border was visualised. In IDC, its distinction from DCIS was the poor fluorescence of cell nuclei, disorganisation of ductal architecture, and cell nucleus aggregate infiltration within poorly organised collagen sheets (stroma).

Conclusions: We report the results of a flexible pCLE endomicroscope capable of distinguishing normal glandular tissue from benign and malignant breast disease based on ductal features. Unlike white light endoscopy, pCLE miniaturisation offers potential in real-time ductal navigation and cellular tissue characterisation as an optical biopsy screening tool. Additionally, pCLE offers promise as in intra-operative guide to surgeons in margin assessment diagnostics to reduce re-excision rates in BCS.

Figure. Probe confocal endomicroscopy ductal features

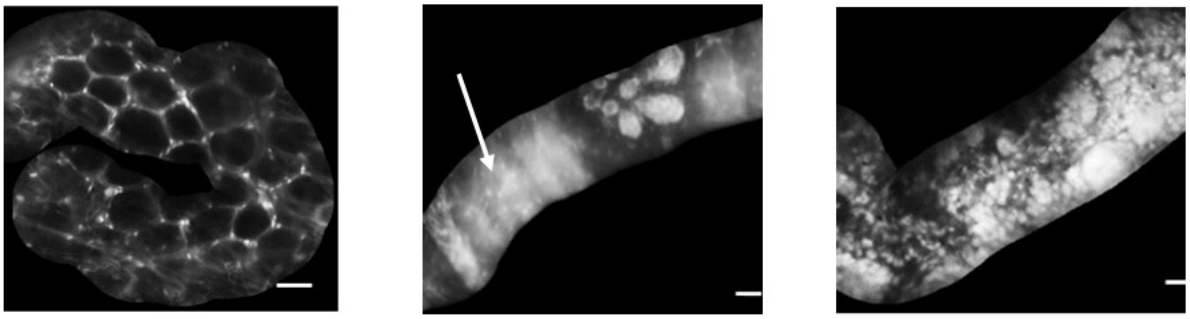

Figure 1. pCLE acquired images: (LEFT) Normal- showing adipose cells containing peripheral fluorescent nuclei at the cell borders. (MIDDLE) Normal- showing stroma of collage sheets/elastic fibres (arrow) and normal glandular tissue containing lobules with clusters of acini. (Right) Invasive Ductal Carcinoma- showing ductal features of enlarged hyperfluorescent epithelial nuclei, disorganisation and invasion into the stroma

1148493 - Clinico-pathological predictors of positive resection margins

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Background/Objective: Re-operative intervention for failed breast-conserving surgery (BCS) due to close positive resection margins is a major international health care challenge. Whilst prior reports suggest ductal carcinoma in situ (DCIS) increases the risk of positive margins, they are limited by patient-level and not margin-level analysis risking gross under-estimation of relative risk. Clinico-pathological predictors of DCIS associated positive resection margins could help improve clinical decision-making regarding surgical strategy and potentially mitigate the risk of positive margins. The aim of this project was to identify predictors of positive radial margins (PRM) and specifically predictors of DCIS-associated positive margins using margin-level rather than patient-level clinical pathological variables.

Methods: Following local approvals (ICNH Trust service evaluation SPS_032), a single-institution, retrospective, observational cohort study was conducted in which a prospectively maintained pathology database was interrogated and identified 909 patients who underwent BCS at our institution between December 1, 2014, to November 31, 2019. Outcome data extracted for each patient from histopathology specimen reports (Cerner®, CoPath®) included tumour or DCIS size, grade, receptor status, and margin status (clear or positive based on an Association of Breast Surgeon UK consensus statement, which defined a positive margin as <1mm for invasive and <2mm for DCIS(1). A total of 5,454 margins were reviewed to extract in granular detail the pathological extent, pathological subtype (invasive vs non-invasive), and grade of disease at each margin. Logistic regression analysis was conducted to determine predictors of a positive margin (including tumour multifocality, lymphovascular invasion (LVI), and comedonecrosis).

Results: The PRM rate was 26.8%, and re-operation rate was 26.3%. The PRM rate increased to 30.9% when US guidelines were applied(2). DCIS was more than 3 times more likely to be the cause of a PRM compared to invasive cancer when following UK guidelines and almost 7 times more likely when applying US guidelines [odds ratio for PRM: DCIS=1.65 (95CI=1.15 to 2.38), invasive=0.79 (95CI=0.56 to 1.13)]. Significant independent predictors associated DCIS positive margins included a larger specimen weight, HER2 positivity, DCIS with comedonecrosis, and larger tumour size (see Table).

Conclusions: Margin-level analysis demonstrates that compared to invasive carcinoma, DCIS accounts for between 3 to 7 times the rate of close-positive margins requiring revisional surgery, which is significantly higher than previously reported. Predictors for DCIS-positive margins include specimen weight, HER2 status, DCIS with comedonecrosis, and the composite size of tumour. To reduce rates of positive margins, consideration should be given to predictors for margin positivity when planning BCS. Future innovations should be directed towards technologies that accurately map the extent of DCIS intra-operatively. This detailed, margin-level approach gives a clearer understanding of the pathology present at a positive margin and therefore may be able to identify predictors with higher accuracy compared to similar studies that use patient-level data, which is based tumour histology from core biopsy or pre-classified data held on national databases.

Table. Multivariate analysis of association with DCIS-positive radial margins comparing UK ABS guidelines to US SSO-ASTRO guidelines

Independent clinico-pathological predictors	UK ABS *P*-value (95%CI)	US SSO-ASTRO *P*-value (95%CI)
Specimen weight (g)	<0.001 (0.001 - 0.003)	-
HER 2 status	-	0.040 (0.005 – 0.221)
Presence of DCIS with comedonecrosis	0.001 (0.067 – 0.264)	-
Composite size of tumour (mm)	<0.001 (0.009 – 0.017)	<0.001 (0.010 – 0.017)

1141208 - Comparison of re-excision rates in patients undergoing BCT with wire localization vs. RFID localization for non-palpable, early-stage breast cancer and DCIS in a community hospital

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Background/Objective: Patients with early-stage breast cancer or DCIS are typically offered breast-conserving therapy (BCT). A variety of techniques are available to localize the breast lesion. Few studies have directly compared wire to radiofrequency identification (RFID) tags for localization of nonpalpable early-stage breast cancer. This study evaluated whether RFID is non-inferior to the previously utilized method of wire localization.

Methods: This retrospective cohort study examined the difference in re-excision rates for breast cancer and DCIS patients who underwent BCT with wire vs RFID localization. Data from 2019 to 2020 were collected from 3 community hospitals and an associated outpatient surgery center. The main outcomes were margin status and re-excision rate. A total of 316 patients were estimated to provide statistical power of 80%. The total number of patients in our study was 360: 221 in the RFID group and 139 in the wire group.

Results: The positive margin rate was equivalent for patients in the RFID and wire groups (4.07% vs. 2.16%, p=0.3817). The re-excision rates were equivalent for patients in the RFID and wire groups (0.5% vs. 0.7%, p=1). The margin status was negative after both re-excisions.

Conclusions: Positive margin and re-excision rates were comparable and low in this large cohort of patients treated by board-certified breast surgeons. RFID can provide a more convenient option for patients without jeopardizing surgical management.

1141627 - Does grade or estrogen receptor status matter? Evaluating high-risk features of ductal carcinoma in situ and positive margins following breast-conserving surgery

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Background/Objective: The rate of positive margins for ductal carcinoma in-situ (DCIS) presents a unique area with potential for care improvement. Re-excision rates have improved since the adoption of guidelines from SSO-ASTRO-ASCO in 2014. Despite these best efforts, DCIS has been shown to have a higher rate of positive margins following breast-conserving surgery (BCS) than invasive breast cancer. We aim to analyze certain factors of DCIS, specifically histologic grade and estrogen receptor status, in patients with positive surgical margins following BCS to determine if there is an association.

Methods: A retrospective review of our IRB-approved institutional database was performed to identify women with DCIS and microinvasive DCIS who underwent BCS by a single surgeon from 1999-2021. Demographics and clinicopathologic characteristics between patients with and without positive surgical

margins were compared using chi-square or Student's t-test. We assessed factors associated with positive margins using univariate and multivariable logistic regression

Results: From 1999 to 2021, 632 patients were identified who underwent breast-conserving surgery for DCIS. After eliminating patients with missing clinicopathologic variables, 615 patients were included in the analysis. Of the 615 patients, 82 (13.3%) of the patients had ER negative disease and 553 (86.7%) had ER positive disease. Histologic grade distribution among the patients are as follows: 146 (23.7%) patients were low grade, 241 (39.2%) patients were intermediate grade, and 228 (37.1%) patients were high grade. Overall, 92 patients had positive margins. Of the 92 patients with positive margins, 66 (71.7%) had ER positive disease and 26 (28.3%) had ER negative disease. Tumor characteristics revealed that 13 (14.1%) were low grade, 33 (35.9%) were intermediate grade, and 46 (50.0%) were high grade DCIS. Patient variables such as age, race, laterality, proliferation indices, or concurrent oncoplastic surgery had no effect on margin positivity rates. Consistent with results of earlier studies, increased tumor size is an independent risk factor for margin positivity (P= <0.001). On univariate analysis both high histologic grade (P= 0.009) and negative estrogen receptor status (P= <0.001) were significantly associated with margin positivity. However, when adjusted in multivariable analysis, estrogen receptor status remained significantly associated with margin positivity (OR = 0.39 [95% CI: 0.20-0.77]; p = 0.006) and histologic grade no longer showed a correlation.

Conclusions: Prior studies have deemed only large tumor burden as a risk factor for positive margins after breast-conserving surgery for DCIS. However, these studies included fewer patients and had modest representation of ER negative DCIS. Our study shows that ER negative DCIS was independently associated with a higher rate of positive margins after breast-conserving surgery, whereas histologic grade has no effect on the rate of positive margins after breast-conserving surgery. Given this information, we can modify our surgical approach to reduce rate of positive margins in patients with ER negative DCIS.

Table. Clinical and pathologic characteristics by ER status

ER -	N	%	Mean
No. Patients	**82**		
Surgery Histology			
Grade			
GX	0	0.0%	
G1	1	1.2%	
G2	11	13.4%	
G3	70	85.4%	
Unknown	0	0.0%	
Margins			
Positive	26	31.7%	
Negative	**56**	**68.3%**	
Unknown	0	0.0%	
N/A	0	0.0%	
-	0	0.0%	
ER			
Positive	0	0.0%	
Negative	82	100.0%	
Unknown	0	0.0%	
N/A	0	0.0%	
Not Done	0	0.0%	

ER +	N	%
No. Patients	**550**	
Surgery Histology		
Grade		
GX	2	0.4%
G1	151	27.5%
G2	233	42.4%
G3	163	29.7%
Unknown	0	0.0%
Margins		
Positive	67	12.2%
Negative	**483**	**87.8%**
Unknown	0	0.0%
N/A	0	0.0%
-	0	0.0%
ER		
Positive	550	100.0%
Negative	0	0.0%
Unknown	0	0.0%
N/A	0	0.0%
Not Done	0	0.0%

NAC

1147832 - Response rates of patients with invasive lobular cancer undergoing neoadjuvant endocrine or chemotherapy

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Background/Objective: There remains a gap in the ideal neoadjuvant approach for patients with invasive lobular carcinoma (ILC). We sought to evaluate the response of patients with ILC treated with neoadjuvant therapy; specifically, to compare the effectiveness of neoadjuvant endocrine therapy (NET) and neoadjuvant chemotherapy (NAC).

Methods: We performed a single-institution, retrospective review of female patients, >18 years with Stage I-III ILC who received neoadjuvant therapy and operative intervention at our institution between 2008-2019. Wilcoxon rank sum test was used to compare continuous patient and disease variables between the NAC and NET groups. For discrete variables, Fisher's exact test or chi square test as appropriate was used.

Results: A total of 139 patients were included; 69 NAC, 70 NET. Overall, 86% were luminal, 59% presented with cT3/T4 disease, and 58% were node-positive at surgery. Patients receiving NAC were younger, less often strongly ER-positive, more frequently node-positive, and had higher Ki-67 and higher grade at diagnosis. Ki-67 median decrease was 13.9 units for NAC and 9.0 for NET (p=0.94). For Luminal B tumors, median Ki-67 decrease was similar following NAC and NET (18.3 vs 16.3, p=0.26). Seven (5%) patients had a pathologic complete response (pCR): 6 (9%) following NAC (4 of which were HER2+) and 1 (1.4%) with NET (p=0.063). Overall, 3/122 (2.6%) patients with HER2Neu-negative tumors had a pCR and 4/17 (23.5%) HER2Neu positive. The shifts in baseline, preoperative clinical, and pathologic T-category and N-category following neoadjuvant systemic therapy are shown in the Figure. Pathologic T-category was unchanged in 72 (51.8%), decreased in 58 (41.7%), and increased in 9 (6.5%) from the clinical stage at diagnosis. N-category at surgery was unchanged in 80 patients, (58%) increased in 40 patients (29%), and decreased in 18 patients (13%) compared to pretreatment clinical N-category. Thirteen of 57 (22.8%) cN0 patients at diagnosis had pN+ disease at surgery, 5 with at least 4 positive nodes. Ten patients who were cN+ at diagnosis converted to pN0 at surgery: 9 (17.3%) following NAC (4 HER2+) and 1 (3.8%) following NET. Of the 69 patients receiving NAC, 17 (24.6%) were HER2Neu overexpressed and most (86.1%) had RCB class II/III residual disease post NAC. There were 4/17 (23.5%) patients receiving NAC who had a pCR versus 2/52 (3.8%) based on HER2Neu status (p=0.029). Breast pCR rates were 35.3% vs 5.9% (p=0.006) in HER2-expressed tumors compared to HER2Neu-negative tumors and 40% vs 11.9% (p=0.057) in the lymph node basin. N-category upstaging was seen in 24/52 (46.2%) of HER2Neu-negative compared with 1/17 (5.9%) of HER2Neu-positive patients.

Conclusions: In HER2Neu-negative ILC, the potential of a pCR with NAC or NET is low, despite frequent decrease in Ki-67. Downstaging is possible; however, the majority of patients' nodal and tumor category remain unchanged at surgery compared with presentation. An increase in pathologic stage compared to

the clinical stage prior to neoadjuvant can occur and is more common in the lymph node basin, likely the result of limitations of imaging.

Figure. Sankey plots demonstrating shifts in T and N stage based on clinical stage at diagnosis, clinical stage following neoadjuvant therapy, and final pathologic stage

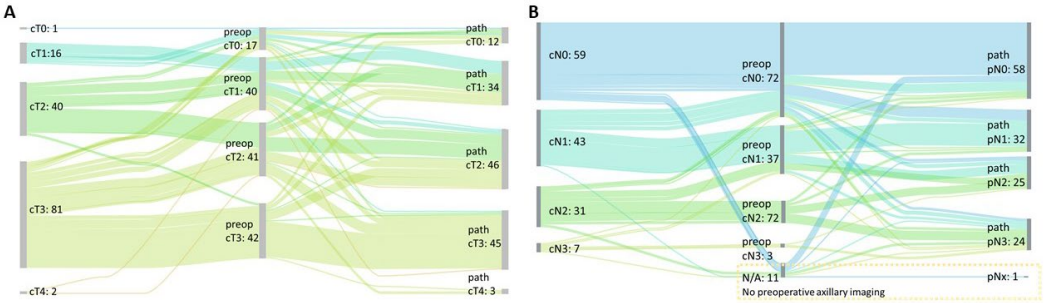

Figure 1: Sankey plot showing clinical tumor (A) and nodal (B) stage at presentation (left), before surgery (preop) and at surgery (pathologic stage). Diagram created using SankeyMATIC.

1148370 - Does tumor lymphocyte infiltration predict response to chemotherapy in luminal B cancers?

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Background/Objective: Genetic and phenotypic characterization of breast cancers continues to evolve and drive decision-making, particularly in the context of the role of chemotherapy. Molecular profiles responsive to chemotherapy are increasingly offered these therapies as neoadjuvant protocols (NAC) allowing for clinical assessment of response, and in some cases, newer treatments for residual disease. Luminal B tumors present a peculiar dilemma due to lack of response to chemotherapy despite high-risk prognostic nature. This study explores if the tumor-infiltrating lymphocytes (TILs) play a role in predicting response to NAC in luminal B tumors similar to HER2-positive and triple-negative disease.

Methods: We performed a retrospective review of patients diagnosed with invasive breast cancer between January 13, 2017, and December 4, 2020, that were Luminal B-type on genomic profiling. Data collected included demographics, clinical stage, and treatment protocol. TIL score was calculated for all patients from treatment-naïve samples; in patients undergoing NAC, residual cancer burden index (RCBI) and post NAC TIL scores were calculated from lumpectomy specimens. Statistical methods of independent samples t-test, Pearson's chi-squared test, ANOVA, and logistic regression were used to describe the relationship between tumor characteristics and outcome variables.

Results: A total of 52 patients presented with luminal B disease during the study period; mean (SD) age was 62.0 years (13.6); 28 (53.8%) patients had upfront surgery, with a mean (SD) TIL score of 6.50 (6.43); 21(75%) patients had a TIL score ≤10, and 7 (25%) patients had a TIL score >10. Mean (SD) pretreatment TIL score in 24 (46%) patients that underwent NAC was 10.83 (16.98); 19 (79.2%) patients had a TIL score ≤10 and 5 (20.8%) patients had a TIL score >10. A pathologic complete response (pCR) was observed in 5 of 24 (20.8%) patients in this group. The clinical node stage (cN Stage) ranged from 0-1 in

the NAC group and demonstrated a significant positive correlation with RCBI (r=0.519; P=0.009). Post-treatment TIL score also showed a significant association with RCB Class (P=0.060). Pre-treatment TIL score and tumor stage (cT Stage) did not show significant predictive value (P=0.553; P=0.451, respectively).

Conclusions: Pre-treatment TILs did not predict response to chemotherapy; however, post-NAC TILs counts were significantly correlated with residual disease in luminal B breast cancers. Locally advanced disease at presentation is less likely to have pCR.

Table. Relationship characteristics between clinical stage, TIL scores, and RCB class

		RCB Class 0 (n=5)	RCB Class I (n=7)	RCB Class II (n=9)	RCB Class III (n=3)	P Value
cT Stage	T1 (n=5)	3 (60.0%)	0 (0.0%)	1 (20.0%)	1 (20.0%)	0.451
	T2 (n=12)	1 (8.3%)	4 (33.3%)	5 (41.7%)	2 (16.7%)	
	T3 (n=5)	1 (20.0%)	2 (40.0%)	2 (40.0%)	0 (0.0%)	
	T4 (n=2)	0 (0.0%)	1 (50.0%)	1 (50.0%)	0 (0.0%)	
cN Stage	N0 (n=9)	3 (33.3%)	5 (55.6%)	1 (11.1%)	0 (0.0%)	0.029
	N1 (n=15)	2 (13.3%)	2 (13.3%)	8 (53.3%)	3 (20.0%)	
Pre-treatment TIL Score		18.37(25.06)	6.00 (10.61)	8.11 (12.33)	17.67 (28.01)	0.553
Post-NAC TIL Score		N/A	2.00 (2.24)	4.44 (2.65)	8.67 (10.02)	0.034

1148103 – Does histology influence response to neoadjuvant therapy in breast cancer patients?

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Background/Objective: Patients with breast cancer (BC) who undergo neoadjuvant chemotherapy (NAC) and have a pathologic complete response (pCR) have improved overall survival. Invasive lobular carcinoma (ILC) has been reported to be less responsive to neoadjuvant chemotherapy (NAC) than invasive ductal carcinoma (IDC). This study sought to characterize the clinical and pathologic response to NAC by tumor histologic subtype and tumor characteristics.

Methods: A total of 396 patients with BC who had NAC from 2008 to 2016 were identified from a prospectively maintained database. Patients with distant metastases were excluded from analysis. Patients were compared for tumor characteristics, treatment received (chemotherapy, endocrine therapy), type of surgery, and clinical and pathologic response to treatment. Multivariable regression was used to identify predictors of pCR, clinical response, locoregional recurrence (LRR), and distant metastases. Cox regression analysis was utilized for survival analysis.

Results: A total of 356 patients undergoing NAC met inclusion criteria, of which 337 (84.7%) had IDC, and 19 (5.3%) had ILC. Patients with ILC were more likely to have higher clinical T stage than IDC (cT3, 36.8% vs. 14.2%; cT4, 10.5% vs. 8.9%, p<0.013), and tumors were more likely to be ER+ (89.5% vs. 56.0%, p=0.004), PR+ (84.2% vs. 44.0%, p=0.001), and HER2- (89.5% vs. 56.9%, p=0.007). Patients with ILC were more likely to have mastectomy (78.9%) than those with IDC (67.6%, p= 0.47). Following NAC,

patients with ILC were less likely to achieve pCR than IDC (10.5% vs. 34.7%, p=0.042). On multivariable regression, HER2+ was associated with higher odds of pCR (OR 5.62, 95%CI 3.19-9.91) and clinical response (OR 4.22, 95%CI 1.16-15.39), while PR+ was associated with lower odds of pCR (OR 0.26, 95%CI 0.12-0.56). Pathologic N3 disease was associated with higher odds of LRR (OR 8.96, 95%CI 1.12-71.70) and distant metastases (OR 8.13, 95%CI 1.96-33.80). On Cox regression, patients who had an axillary lymph node dissection had improved survival (HR 0.50, 95%CI 0.37-0.66), while HER2+ positive patients had worse survival (HR 1.39, 95%CI 1.08-1.79). Patients with IDC had a median overall survival of 42.8 months versus 67.9 months (p=0.07) for those with ILC with a median follow-up time of 67.9 months.

Conclusions: Compared to patients with IDC, patients with ILC had a lower likelihood of pCR and clinical response following NAC. Despite this lack of pCR, there were no differences in overall survival or LRR based on histology. Alternative options for NAC should be considered for patients with ILC.

1148528 - Local regional management of the axilla in node-positive breast cancer patients following neoadjuvant chemotherapy: An evaluation of real-world practice

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Background/Objective: Breast cancer patients with nodal involvement have historically been more likely to undergo axillary lymph node dissection (ALND), even if they have had a complete clinical response (CCR) after neoadjuvant chemotherapy (NAC). Although the Z1071 clinical trial demonstrated the safety of sentinel node biopsy in patients with CCR after NAC, little is known about how this patient population is being treated in the real world. Our objectives were to describe a population of patients in Alberta, Canada who underwent axillary surgery after neoadjuvant chemotherapy.

Methods: Using the Synoptec database, which captures >90% of cancer surgeries in Alberta, we identified a cohort of patients from January 2016-September 2021 who had biopsy-proven nodal disease and subsequently underwent NAC. Patients with previous breast cancer or distant metastases at diagnosis were excluded. Descriptive statistics were used to outline the demographics, tumor characteristics, treatments undertaken prior to surgery, and outcomes.

Results: A total of 13,857 patients underwent surgery for breast cancer during the study period. Of those, 1492 had neoadjuvant therapy, and 911 of those had biopsy-proven, node-positive disease pre-operatively. Thirty-three patients with M1 disease and 28 patients with previous breast cancer were excluded. Of the 850 patients, the median age was 52 (IQR: 44-60) years. There were 584 (68.7%) who had T1/T2 disease, while 177 (20.8%) had T3 disease or greater prior to NAC. There were 395 (46.5%) who were ER/PR-positive and HER2-negative. There were 323 (38.0%) patients who underwent breast-conserving surgery. There were 364 (42.8%) patients in the cohort who had a sentinel lymph node biopsy. In a subset of these patients, 107/255 (41.9%) had a pCR. Of the remaining 148 with positive sentinel node biopsy, only 19 (12.8%) had a completion axillary dissection. There were 34/255 (13.3%) who had recurrence, but only 1 patient of the 236 who did not have a dissection (0.39%) had an isolated regional recurrence.

Conclusions: There is heterogeneity in the surgical management of the axilla for breast cancer patients after NAC in Alberta. Omission of dissection did not result in increased regional recurrence in this limited review.

1148133 - Neoadjuvant chemotherapy for triple-negative and HER2-positive breast cancer: Striving for the standard of care

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Background/Objective: Neoadjuvant chemotherapy (NAC) for triple-negative (TN) and HER2-positive (HER2) breast cancers can decrease extent of surgery, provide important prognostic information, allow response-driven adjuvant therapies, and ultimately improve outcomes. International guidelines recommend NAC as standard practice for TN and HER2 breast cancers, even if node-negative and particularly if T2 or larger. Therefore, our goal was to describe contemporary practice patterns for patients with TN and HER2 breast cancer and identify patient-, disease-, and practice-related factors associated with the receipt of NAC versus surgery as initial treatment.

Methods: A retrospective population-based cohort study of adult women diagnosed with Stage I-III TN or HER2 breast cancer (2012-2019) in Ontario was completed using linked administrative datasets. The primary outcome was NAC as first treatment. All patients underwent surgery within 1 year of diagnosis. The association between NAC and patient and tumour factors and initial consultation characteristics were examined using multivariable logistic regression models.

Results: Of 12,771 patients included, 22.7% (2,899) underwent NAC as first treatment (Table), and 51% (6512/12771) presented with T2 or greater tumours. Patients who underwent NAC first were more likely to have younger age, less comorbidities, higher-stage disease, and their first consultation with at least 1 physician affiliated with a regional cancer center. Of patients who underwent surgery first, 776 (7.9%) were seen by both a medical oncologist and a surgeon prior to surgery. Of those who had surgery first and did not see a medical oncologist prior to treatment, 4,078 (44.8%) had T2-T4 tumours, and 2,463 (27.1%) were node-positive. On multivariable analysis, the following factors were independently associated with increased odds of receiving NAC as first treatment compared to surgery first: rural residence (odds ratio - OR 1.3, 95% CI 1.01 – 1.69), ethnic diversity (5th quintile: OR 1.34, 95% CI 1.06 – 1.68) and instability of residence (4th quintile: OR 1.34, 95% CI 1.08 – 1.65, 5th quintile: OR 1.59, 95% CI 1.28 – 1.98) , tumor size (T2: OR 3.72, 95% CI 3.06 – 4.52, T3: OR 18.4, 95% CI 14.38 – 23.54, T4: OR 81.1, 95% CI 58.61 – 112.37), nodal status (N1: OR 4.14, 95% CI 3.53 – 4.86, N2: OR 1.72, 95% CI 1.31 – 2.26, N3: 2.45, 95% CI 1.73 – 3.47), and first consultation at a regional cancer centre (OR 2.08, 95% CI 1.83 – 2.35).

Conclusions: A considerable proportion of patients with TN and HER2 breast cancer do not receive NAC as first treatment. Of those, most did not get assessed by both a surgeon and medical oncologist prior to initiating therapy. In addition to patient and tumor factors, consultation at a specialized cancer centre was associated with higher odds of NAC. This points towards potential gaps in multidisciplinary

assessment and disparities in receipt of guideline-concordant care. Further insight into variation in use of NAC across institutions and providers is warranted to devise strategies to improve NAC delivery.

Table. Triple-negative and HER2-positive breast cancers: Baseline characteristics by treatment

Variable	Value Sample size	Surgery First N=9,872	Chemotherapy First N=2,899	Total N=12,771	P_Value
Receptors	ERneg_HER2neg	4,244 (43.0%)	1,156 (39.9%)	5,400 (42.3%)	<.0001
	ERneg_HER2pos	1,629 (16.5%)	681 (23.5%)	2,310 (18.1%)	
	ERpos_HER2pos	3,999 (40.5%)	1,062 (36.6%)	5,061 (39.6%)	
Age	<=40	626 (6.3%)	575 (19.8%)	1,201 (9.4%)	<.0001
	41-50	1,737 (17.6%)	833 (28.7%)	2,570 (20.1%)	
	51-60	2,762 (28.0%)	798 (27.5%)	3,560 (27.9%)	
	61-70	2,456 (24.9%)	478 (16.5%)	2,934 (23.0%)	
	71-80	1,555 (15.8%)	172 (5.9%)	1,727 (13.5%)	
	81+	736 (7.5%)	43 (1.5%)	779 (6.1%)	
Rural Residence	0 - Urban (RIO < 40)	9,079 (92.0%)	2,709 (93.4%)	11,788 (92.3%)	0.0193
	1 - Rural (RIO ≥ 40)	781 (7.9%)	185 (6.4%)	966 (7.6%)	
	Missing	12 (0.1%)	*	17 (0.1%)	
Income Quintile at Index	1 - Lowest	1,776 (18.0%)	498 (17.2%)	2,274 (17.8%)	0.7716
	2	1,940 (19.7%)	562 (19.4%)	2,502 (19.6%)	
	3	1,991 (20.2%)	585 (20.2%)	2,576 (20.2%)	
	4	2,050 (20.8%)	597 (20.6%)	2,647 (20.7%)	
	5 - Highest	2,095 (21.2%)	651 (22.5%)	2,746 (21.5%)	
	Missing	20 (0.2%)	*	26 (0.2%)	
Dependency Quintile	1 - Least	1,984 (20.1%)	823 (28.4%)	2,807 (22.0%)	<.0001
	2	1,858 (18.8%)	603 (20.8%)	2,461 (19.3%)	
	3	1,781 (18.0%)	496 (17.1%)	2,277 (17.8%)	
	4	1,820 (18.4%)	483 (16.7%)	2,303 (18.0%)	
	5- Most	2,373 (24.0%)	477 (16.5%)	2,850 (22.3%)	
	Missing	56 (0.6%)	17 (0.6%)	73 (0.6%)	
Deprivation Quintile	1 - Least	2,164 (21.9%)	709 (24.5%)	2,873 (22.5%)	0.0422
	2	2,080 (21.1%)	615 (21.2%)	2,695 (21.1%)	
	3	1,959 (19.8%)	535 (18.5%)	2,494 (19.5%)	
	4	1,842 (18.7%)	546 (18.8%)	2,388 (18.7%)	
	5- Most	1,771 (17.9%)	477 (16.5%)	2,248 (17.6%)	
	Missing	56 (0.6%)	17 (0.6%)	73 (0.6%)	

1148575 - The impact of neoadjuvant chemotherapy on overall survival in patients with early-stage HER2-positive breast cancer

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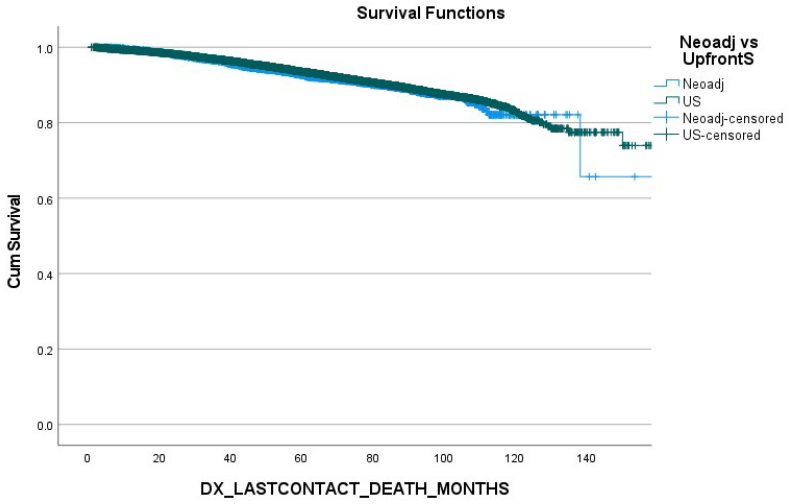
Background/Objective: Human epidermal growth factor 2 (HER2)-positive breast cancer patients account for about 15-20% of all breast cancer cases. Extensive research has demonstrated an increased survival and improvement in outcomes with combination targeted/immunotherapy and systemic chemotherapy regimens in the adjuvant setting. Neoadjuvant combination therapy for early-stage HER2-positive breast cancer is a current topic of active clinical trials, and research now focuses on optimizing regimens to improve survival and reduce recurrence. Here, we sought to review the available data from a large cancer database to determine if there has been a survival impact utilizing neoadjuvant chemotherapy in early-stage HER2-positive breast cancer.

Methods: The National Cancer Database Public User Files (2006-2017) were utilized to identify patients age >18 years old with HER2-positive breast cancer with clinically T1, N0 tumors who underwent neoadjuvant chemotherapy followed by surgery. These patients were compared with similar patients who underwent upfront surgery with adjuvant therapy. The primary outcome was overall survival (OS), and the secondary outcome was the number of positive regional lymph nodes.

Results: A total of 232,020 patients were found to have HER2-positive breast cancer, with 38,642 patients fulfilling the inclusion/exclusion criteria. The mean OS for the neoadjuvant chemotherapy followed by surgery group was 145 months and 151 months for upfront surgery group (p-value=0.1). The number of positive regional lymph nodes were significantly higher in the upfront surgery group compared with the neoadjuvant chemotherapy group (mean 0.36 versus mean 0.34, p-value=0.001).

Conclusions: For patients with early-stage, HER2-positive breast cancer defined as cT1cN0, there was similar overall survival between groups when comparing patients who underwent neoadjuvant chemotherapy followed by surgery and patients who underwent upfront surgery followed by adjuvant chemotherapy. There was a statistically significant difference in the number of positive regional lymph nodes between the 2 groups, although clinically insignificant.

Figure. KMC OS NAC versus up-front surgery



1141243 - Impact of the COVID-19 pandemic on breast cancer patients receiving neoadjuvant chemotherapy

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Background/Objective: During the global pandemic of the SARS-CoV-2 virus ("COVID-19"), expert opinion guidelines were developed to risk stratify breast cancer patients and balance the need for treatment with lack of hospital resources and potential spread of the virus. Previous reports have shown deviations from standard breast surgical oncologic care, namely delayed breast reconstruction and increased use of neoadjuvant therapy during the early months of the pandemic. The purpose of this study is to assess the impact of the pandemic on breast cancer patients receiving neoadjuvant chemotherapy. We compared timing of treatment between patients treated before and after March 2020. We also examined the overall differences between breast cancer patients treated at the university hospital and the county hospital, as well as rates of breast reconstruction.

Methods: A retrospective chart review was performed on 219 patients with Stage I-III breast cancer who received neoadjuvant chemotherapy followed by surgery from 1/2018 to 12/2020 at the university hospital and the county hospital. Data obtained included demographics, comorbid conditions, and insurance status. Time from diagnosis to first chemotherapy treatment, last dose of chemotherapy to surgery, length of entire treatment course, type of breast surgery, and type of breast reconstruction was recorded. Patients were compared between the university hospital (n=115) and county hospital (n=104), and between before (n=151) and after (n=68) the pandemic, with the start of the pandemic defined as 3/2020.

Results: We conducted univariable comparisons using Chi-Square or Fisher's exact test for categorical variables and ANOVA for continuous variables. There was no statistically significant difference in length of time from diagnosis to the start of chemotherapy and time from completion of chemotherapy to surgery when compared between before and during the pandemic. Furthermore, there was no statistically significant difference in the rate of reconstruction when compared between before and during the pandemic. Compared to the patients at the county hospital, those at the university hospital were more likely to be older at the time of diagnosis (56 vs 49 years old, p<.0001) and speak English as their primary language (p<.0001). There was no statistically significant difference in race. Patients at the county hospital presented at a later stage (overall p=0.0008) and were significantly more likely to lack insurance (p<.0001). Patients at the county hospital were significantly less likely to be breast conservation candidates (p<.0001) and had a higher rate of axillary lymph node dissection (36.5% vs 19.2%, p 0.0046).

Conclusions: Our study showed patients treated with neoadjuvant chemotherapy for breast cancer did not have alterations in their treatment timeline or rates of breast reconstruction due to the COVID-19 pandemic. In keeping with prior published data, patients at the county hospital presented with more advanced disease. Other reports show changes in practice patterns during the pandemic; however, these were varied among different geographic regions. Further data are needed to determine the full impact of the COVID-19 pandemic on breast cancer patients.

NSM

1146388 - The age-old question on nipple-sparing mastectomy: Is older age a contraindication?

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Background/Objective: Nipple-sparing mastectomy (NSM) with immediate breast construction is safe and improves cosmesis. Older women are less likely to undergo NSM likely owing to perceived age-related risks, although few studies characterize complications in this subgroup. A better understanding of the risk of complications and contributing factors in this rapidly growing population will inform decision-making and improve selection of older patients for NSM. We evaluated complications after NSM plus immediate reconstruction in older women compared to younger women and risk factors for complications.

Methods: We reviewed NSM between 2009 and 2019 in our institutional database. Rates of early post-operative complications, including infection, hematoma, and skin or nipple necrosis, and complications requiring surgical intervention in women >65 years were compared with younger women. We investigated risk factors for complications using multivariable logistic regression.

Results: We reviewed 2,175 NSM performed in 1,780 women: 1,094 in women 40-49 years, 904 in those 50-64 years, and 177 in those 65 years and older. Compared to younger women, women ≥65 years old had significantly higher rates of diabetes, hypertension, smoking, prior breast cancer, and prior breast radiotherapy (all p<0.001). Older women more often underwent NSM for malignancy (p<0.001) and had an implant-based reconstruction (p=0.007). On univariate analysis (Table), NSM in older women was associated with higher but acceptably low rates of early post-operative complications compared with younger women (14% in ≥65 years vs 12% in 50-64 years and 7.3% in 40-49 years, p<0.001), particularly hematoma (4.5% in ≥65 years vs. 1.7% in 50-64 years and 0.6% in 40-49 years, p<0.001). Rates of reoperation for complications were also higher in older women (16% in ≥65 years vs. 13% in 50-64 years and 9.3% in 40-49 years, p=0.007). However, on multivariable analysis (Table), age was not independently associated with an increased risk of overall early complications, infection, necrosis, or complications requiring reoperation. After accounting for other potential risk factors, post-operative hematoma remained 3 times more likely in women ≥65 years old compared to women <65 years (odds ratio [OR] 2.98, p=0.012). We identified patient factors independently associated with complications requiring surgical revision on multivariable analysis, including breast volume ≥800cm3 (OR 1.74, p=0.003), hypertension (OR 1.61, p=0.004), smoking (OR current smoker 3.09, p<0.001; OR former smoker 1.52, p=0.007), prior radiotherapy (OR 2.08, p=0.001), and post-mastectomy radiation (OR 2.28, p<0.001).

Conclusions: Although early complications and complications requiring revision were higher in older women compared to younger women after NSM, rates were generally low. The risk of reoperation due to complications was not associated with age itself but rather with patient factors such as breast volume, hypertension, smoking, and radiotherapy, more frequent in older women. Further studies focused on functional and quality of life outcomes may help further refine patient selection and facilitate shared decision-making.

Table. Surgical complications after nipple-sparing mastectomy in different age groups

	Univariate analysis							Multivariable analysis[a]	
	40-49 years		50-64 years		≥65 years			Age ≥65 years compared to age <65 years	
	n = 1094	%	n = 904	%	n = 177	%	*p* value	Odds ratio (95% CI)	*p* value
Any early complication	80	7.3%	106	11.80%	25	14.10%	**< 0.001**	1.20 (0.74 – 1.93)	0.459
Infection	43	3.9%	50	5.50%	8	4.50%	0.23	0.70 (0.32 – 1.50)	0.354
Skin or NAC necrosis	41	3.8%	48	5.30%	9	5.10%	0.23	0.87 (0.41 – 1.85)	0.712
Breast skin necrosis	38	3.5%	43	4.8%	8	4.5%	0.34	0.90 (0.40 – 1.99)	0.788
Nipple/areola necrosis	13	1.2%	18	2.0%	3	1.7%	0.35	0.50 (0.14 – 1.75)	0.278
Hematoma	7	0.6%	15	1.70%	8	4.50%	**< 0.001**	2.98 (1.27 – 6.99)	**0.012**
Any complication requiring revision	102	9.3%	116	13%	28	16%	**0.007**	1.06 (0.68 – 1.68)	0.789
Number of revisions 0	993	91%	789	88%	149	84%			
1	75	6.9%	85	9.4%	20	11%			
≥2	25	2.3%	28	3.1%	8	4.6%			

[a]Multivariable analysis includes: BMI, breast volume, hypertension, smoking, prior radiotherapy, and post-mastectomy radiation.

1145065 – Two-stage nipple-sparing mastectomy does not compromise oncologic safety

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Background/Objective: Devascularization of the nipple-areolar complex (NAC) is defined as dissection of the central skin envelope from the underlying breast tissue along the subcutaneous plane. This procedure is performed weeks before nipple-sparing mastectomy (NSM) with the aim of improving blood flow. In our previous study of 109 breasts, there was a significant decrease in ischemic complications (15%) with the 2-stage (2S) compared to 1-stage NSM (37%) (Ju T 2021), among patients whose time interval between procedures was greater than or equal to 20 days. To address the oncologic safety of 2S NSM, we analyzed the pathologic findings of 2-stage NSM and assessed the residual burden of disease on completion mastectomy as a function of time.

Methods: First-stage devascularization of the NAC procedure included sub-nipple biopsy. The study cohort includes patients with known cancer as well as bilateral prophylactic mastectomies. All patients with known cancer on preoperative diagnostic needle biopsy underwent lumpectomy and nodal staging at first stage. The histological findings were compared to the presence of residual disease—defined as any invasive or in situ carcinoma at second-stage completion NSM. Patients who underwent chemotherapy and/or radiation after devascularization, as well as those who delayed their treatment, were excluded from this analysis. Outcomes between the 2 groups were compared using T test, chi-squared, and Fischer's exact tests.

Results: From 2015 to 2021, 143 breasts underwent 2S NSM; 82 were prophylactic (52% bilateral, 48% contralateral prophylactic), and 71 were therapeutic mastectomies. At first stage, 16 breasts had pathology consistent with DCIS, and 55 had invasive carcinoma. Only 2 patients (1.4%) were upstaged from DCIS to IDC on final pathology, and 3 (2.1%) in the prophylactic group were upstaged DCIS. The average median time interval between staged operations for invasive cancer cases was 28.5 days and 36 days for DCIS cases. Completion NSM was performed within 6 weeks for 85% (121) of the breasts analyzed. Microscopic residual invasive and in situ disease was found in 62% of 71 cancer cases at

completion NSM without changing stage of disease established during first-stage surgery. However, invasive disease was discovered at completion NSM in 2 of 16 DCIS cases (Table).

Conclusions: Although 62% of cancer cases had microscopic residual cancer on second-stage NSM, the mean time interval between procedures was 4-5 weeks. Such relatively short intervals between operations are oncologically safe and resulted in upstaging to invasive cancer in a minority of DCIS cases.

Table.

Histology at Devascularization	Final Pathology at NSM	# Cases (%)	Median # of Days	Range of Days
Invasive n=55	Benign	21(38.2%)	28	11-97
	Invasive	15 (27.3%)	30	21-84
	DCIS	19(34.5%)	28	12-84
DCIS n=16	Benign	6 (37.5%)	34	21-49
	Invasive	**2 (12.5%)**	36	31-42
	DCIS	8 (50%)	38	21-82
Prophylactic N=82	Benign	79 (96.3%)	32	11-139
	DCIS	**3 (3.7%)**	29	22-30

1146839 – Nipple-sparing mastectomy with internal mammary artery perforator preservation based on breast MRI reduces ischemic complications

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Background/Objective: Nipple-sparing mastectomy (NSM) is associated with better aesthetic outcomes compared to skin-sparing mastectomy; however, nipple areolar complex (NAC) and mastectomy skin necrosis can represent devastating complications following NSM. Utilizing breast magnetic resonance imaging (MRI), the internal mammary perforator (IMP) has been shown to represent the dominant blood supply to the NAC in the majority of patients with important implications on postoperative necrosis rates. This study utilizes breast MRI to assess the dominant blood flow to the NAC, describes the surgical technique to preserve the IMP during NSM, and analyzes clinical outcomes associated with this approach, with a particular focus on ischemic complications.

Methods: After IRB approval, a prospectively maintained database of all patients undergoing NSM by a single breast surgeon from 2018-2020 formed the study group. In patients with pre-operative breast MRI, images were assessed to determine the dominant MRI blood flow pattern to the NAC. Intraoperatively, MRI data was utilized to facilitate IMP preservation in all patients undergoing NSM (IMP-NSM), with careful dissection especially near the sternal border where the IMP perforates the

pectoralis major muscle into the subcutaneous tissue. The surgical technique of IMP-NSM to preserve the IMP blood flow is described, with evaluation of breast MRI blood flow patterns, surgical findings, ischemic complications, and patient outcomes analyzed.

Results: One hundred fourteen NSM were performed in 74 patients, with mean age and BMI of 49 (range 22-73) and BMI 25.8 (range 19-41), respectively. Immediate breast reconstruction was performed with tissue expanders (48%), implants (11%), and flaps (39%), with the remainder not undergoing reconstruction. Analysis of pre-operative breast MRI demonstrated IMP dominance in 92% of patients. IMP preservation was attempted in all cases of IMP-NSM, and based on MRI blood flow data, the IMP was preserved through identification or correlation with MRI findings in 90/114(85%) of NSM. Post-operative necrosis complications occurred in 11.4%. Compared to the published literature, this represented a statistically significantly lower ischemic complication rate than following NSM without IMP preservation (necrosis 31.4%, $p<0.001$), NSM with assessing MRI blood flow data but not preserving the IMP at surgery (necrosis 24.4%, $p<0.001$), and when doppler US was utilized to attempt to preserve the IMP (necrosis 37%, $p<0.001$).

Conclusions: Based on breast MRI imaging, the IMP is the dominant vascular supply to the NAC in the majority of patients, and can be successfully preserved with IMP-NSM. Other studies have assessed MRI blood flow patterns, or ways to identify and preserve the IMP using doppler for NSM, but the necrosis complications were significantly higher. Therefore, the surgical technique described of IMP-NSM to preserve important blood flow to the NAC is feasible in the majority of patients, and results in a statistically significant decrease in post-operative necrosis complications compared to the literature.

Table. Data for all NSM showing incision type, IMF (inframammary fold) was the most common; Immediate Reconstruction type, TE (tissue expander), DTI (Direct to implant), or Flap; MRI IMP (Internal Mammary Perforator) blood flow patterns, surgical findings of whether IMP preserved, and necrosis complications compared to NSM studies in the literature that reported on the IMP blood vessels.

Incision Type		Right N=62	Left N=52	Total (N=114)
	IMF	26 (42%)	21 (43%)	47 (41%)
	Radial	24 (39%)	16 (33%)	40 (35%)
	Vertical	8 (13%)	7 (14%)	15 (13%)
	Elliptical	0 (0%)	1 (2%)	1 (1%)
	Mastopexy	3 (5%)	3 (6%)	6 (5%)
	Transverse	0 (0%)	1 (2%)	1 (1%)
	Circumareolar	1 (2%)	0 (0%)	1 (1%)
Reconstruction Type		**Right N=62**	**Left N=52**	**Total (N=114)**
	TE	29 (47%)	26 (50%)	55 (48%)
	DTI	5 (8%)	7 (13%)	12 (11%)
	Flap	25 (40%)	19 (37%)	44 (39%)
MRI IMP Dominant		**Right N=62**	**Left N=52**	**Total (N=114)**
	Yes	54 (87%)	36 (69%)	90 (79%)
	No	2 (3%)	3 (6%)	5 (4%)
	Unknown	3 (5%)	4 (8%)	7 (6%)
IMP Preserved		**Right N=62**	**Left N=52**	**Total (N=114)**
	Yes	54 (87%)	43 (83%)	97 (85%)
	No	1 (2%)	1 (2%)	2 (2%)
	Unknown	5 (8%)	4 (8%)	9 (8%)
	Presumed	2 (3%)	4 (8%)	6 (5%)
Ischemia or Necrosis		**N= 114 NSM**	**Reoperation for Ischemia or Necrosis**	
	Ischemia (Epidermolysis)	5 (4.4%)	1	
	Nipple Necrosis			
	Partial	2 (1.8%)		
	Complete	1 (0.9%)		
	Aerola Necrosis			
	Partial	2 (1.8%)		
	NAC Necrosis		1	
	Partial	3 (1.8%)		
	Complete (Necrosis >2/3rds)	1 (0.95%)		
	Skin Necrosis	4 (3.5%)	2	
	Totals	**13 (12.2%)**	**4 (3.5%)**	

Comparisons of IMP-NSM Necrosis Complications to Literature			
Study	**N**	**% (Confidence Interval)**	**P**
AHN 2018			
Divided IMP in all	69/220	34% (25-38%)	P<0.001
Bahl 2016			
MRI Single Blood Flow	13/34	38.2% (22-56%)	P<0.001
MRI Double Flood Blow	27/130	20.8% (14-29%)	P=0.057
Swistel 2014			
No Doppler	37/97	38.1% (28-49%)	
Doppler to Identify/Preserve IMP	36/97	37.1% (28-48%)	P<0.001

1148261 – Wise pattern mastectomy and implant-based reconstruction with full-thickness nipple-areolar complex graft

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Background/Objective: Although a large percentage of women are oncological candidates for nipple-sparing mastectomy (NSM), most women have ptosis, macromastia, or pseudoptosis and are not candidates for a single-stage NSM. Harvesting the nipple-areolar complex (NAC) as a full-thickness graft and then grafting the NAC onto the correct location on the reconstructed breast provides a solution to this problem by allowing the surgeon to modify and reduce the skin envelope and preserve the NAC in a single operation. The purpose of this study was to analyze our experience with the technique of mastectomy and implant reconstruction with full-thickness NAC graft in patients with ptosis in a large case series.

Methods: A retrospective chart review was performed of all patients who underwent Wise-pattern mastectomy and implant reconstruction with free NAC graft from 2010 to 2021. Demographic, clinical, and operative data and complications were reviewed. The NAC was harvested as a full-thickness graft and thinned to the appropriate thickness while preserving the smooth muscle at the base of the nipple necessary for nipple projection. The ductal tissue inside the nipple was removed and sent for pathological evaluation. After completion of mastectomy and implant reconstruction, the NAC recipient site in the correct location was de-epithelialized and the NAC graft was sutured in place.

Results: A total of 457 mastectomies with implant reconstruction and free NAC graft were performed in 286 patients with a mean age of 49.8 +/- 9.6 (+/- SD) years and mean body mass index (BMI) of 28.1 +/- 6.0 kg/m2. There were 8.1% who received postmastectomy radiation, 1.5% had a history of previous whole breast radiation, 18.5% received adjuvant chemotherapy, and 13.3% received neoadjuvant chemotherapy. The majority of reconstructions were prepectoral (88.2%), bilateral (81.5%), and prophylactic (66.5%). Mastectomy skin flap necrosis (MSFN) occurred in 1.8% of reconstructions, infection in 3.1%, capsular contracture in 5.7%, implant loss in 3.3%, dehiscence in 0.2%, seroma in 0.4%, hematoma in 0.4%, and local recurrence in 0.2% of cases. There were no cases of invasive cancer found in the nipple graft specimen; however, 2 cases of DCIS and 1 case of LCIS identified on pathology required removal of the NAC graft and coverage with a skin graft. There were no cases of recurrence in the NAC grafts and no cases of NAC loss due to necrosis. Two cases of MSFN involving the NAC required debridement of the NAC and the surrounding flap. Minor NAC necrosis was managed conservatively with topical medication in 17 patients (3.7%). All patients lost some nipple projection; however, significant loss of nipple projection leading to operative correction with an acellular dermal matrix graft occurred in 14 patients (3.1%).

Conclusions: Patients with ptosis are not ideal candidates for single-stage NSM. Without undergoing a preparatory skin-reducing surgery with delayed NSM, patients with ptosis cannot take advantage of the aesthetic and psychological benefits associated with preserving the NAC. The use of the NAC as a free graft eliminates the anatomical restrictions that come with NSM and allows for a single-stage nipple-sparing procedure in all patients who are oncological candidates.

Table. Demographic and operative characteristics and complications in patients who underwent implant-based breast reconstruction with the nipple-areolar complex harvested and repositioned as a full-thickness graft

	Total
No. of patients	286
No. of breasts	457
Follow up (Months±SD) ‡	23.6±21.4
Demographic	
Age (yrs)(Mean±SD) ‡	49.8±9.6
BMI (kg/m^2) (Mean±SD) ‡	28.1±6.0
Smokers (%)	4.9 (14)
Diabetes (%)	1.8 (5)
Neoadjuvant Chemotherapy (%)	13.3 (38)
Adjuvant Chemotherapy (%)	18.5 (53)
Premastectomy Radiation (%)	1.5 (7)
Postmastectomy Radiation (%)	8.1 (37)
Clinical	
Prepectoral Implant placement (%)	88.2 (403)
Subpectoral Implant placement (%)	11.8 (54)
Unilateral (%)	18.9 (54)
Bilateral (%)	81.1 (232)
Prophylactic (%)	66.5 (304)
Therapeutic (%)	33.5 (153)
Single-Stage (%)	95.6 (437)
Two-Stage (%)	4.4 (20)
Implant Volume (cc)	360.1±124.6
Breast Complications	
Major MSFN (%)	1.8 (8)
Minor MSFN (%)	3.1 (14)
Major Infection (%)	2.8 (13)
Minor Infection (%)	0.2 (1)
Capsular Contracture (%)	5.7 (26)
Implant Loss (%)	3.3 (15)
Dehiscence (%)	0.2 (1)
Seroma (%)	0.4 (2)
Hematoma (%)	0.4 (2)
Local Recurrence (%)	0.2 (1)
Nipple Areolar Complex (NAC) Complications	
Major Necrosis with MSFN (%)	0.4 (2)
Minor Necrosis (%)	3.7 (17)
Loss of Significant Projection (%)	3.1 (14)
Residual Disease (DCIS or LCIS) (%)	0.6 (3)
Recurrence	0
Cases Requiring Removal of NAC (%)	1.1 (5)

1140725 - Outcomes of nipple-sparing mastectomy in the ptotic and non-ptotic breast with staged-immediate reconstruction timing and direct-to-implant technique

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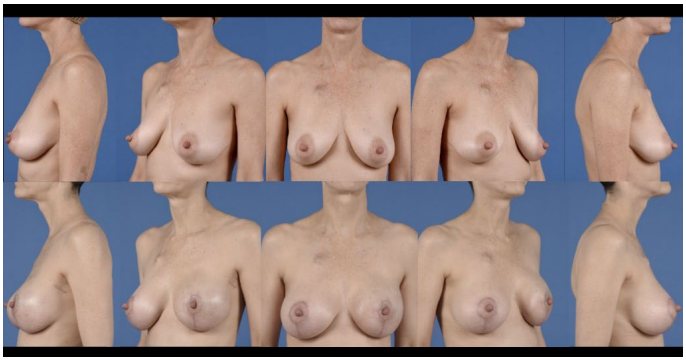
Background/Objective: Direct-to-implant (DTI) breast reconstruction eliminates tissue expansion; however, it may be associated with mastectomy skin flap compromise after placement of full-volume implants. “Staged-immediate” (SI) reconstruction initiates reconstruction about 2-3 weeks after mastectomy. This timing and its use in DTI pre-pectoral (PP) breast reconstruction has not been reported. We aim to describe outcomes of SI DTI PP reconstruction after nipple-sparing mastectomy (NSM) of the ptotic and non-ptotic breast.

Methods: A retrospective review of consecutive patients undergoing breast reconstruction with the technique over a 2-year period was conducted.

Results: Twenty women (35 breasts) were included. Mean patient age, BMI, and follow-up were 48.2 years, 24.9 Kg/m2, and 10 months. Indications for SI timing included preoperatively identified breast ptosis and intraoperative mastectomy skin flap ischemia. Half of patient had grade 2 or higher ptosis identified preoperatively. Intraoperatively, 30% of patients underwent fluorescent angiography (FA), and 35% were transitioned from immediate to SI timing due to clinical or FA findings. Simultaneous breast-shaping procedures were completed with mastectomy in 35% of women, and the same proportion underwent these procedures at implant placement (Figure). Major/minor complications occurred in 20% and 50% of patients, respectively. Two implants were explanted. More than 75% of complications occurred prior to the implant procedure. and no nipple areolar complexes required removal following implant placement. Mean number of procedures to reach reconstruction completion was 2.3. Only 25% of women reconstructed with this technique required revision.

Conclusions: Due to SI timing, the majority of mastectomy-related problems occurred prior to implant placement likely mitigating their effects on reconstruction following NSM, regardless of ptosis grade. Although a second procedure is needed for this reconstructive timing variation, 75% women achieved reconstruction completion at implant placement without further revision. These findings support the utility of SI timing in PP DTI reconstruction following NSM.

Figure. Representative case of the technique employed with grade 2 breast ptosis. Fifty-year-old female with left multicentric invasive ductal carcinoma and Regnault grade 2 ptosis who underwent left NSM with concurrent mastopexy. Two weeks later, the patient underwent SI DTI PP implant reconstruction and contralateral symmetry mastopexy augmentation. No further revisions desired by the patient following the second operative intervention.



Oncoplastics

1146774 – Single- versus dual-surgeon approaches in oncoplastic surgery: A comparison of outcomes

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Background/Objective: Oncoplastic surgery is frequently performed using a single-surgeon approach, with a surgeon formally trained in both breast oncology and plastic surgery; however, dual-surgeon approaches involving a breast surgeon and a plastic surgeon are also used. We sought to determine if outcomes differed when oncoplastic operations were performed using single-surgeon (SS) versus dual-surgeon (DS) approaches.

Methods: A retrospective chart review was conducted of all oncoplastic operations done in a single health system over a 6-year period by either a single oncoplastic surgeon (formally trained in both breast surgical oncology and plastic surgery) or as a joint operation with both a plastic surgeon and a breast surgical oncologist. Primary outcomes studied were rates of positive margins and the overall complication rate; secondary outcomes were mean operative time, loco-regional recurrence, disease-free survival, overall survival, and long-term breast asymmetry. Statistical analysis was performed with Fisher's exact test, Chi-square test, and Student's t-test when appropriate.

Results: A total of 217 patients were identified, of which 117 were single-surgeon cases, and 100 were dual-surgeon cases involving both a breast surgical oncologist and a plastic surgeon. The vast majority of cases were Level 2 volume displacement oncoplastic surgeries. Baseline pre-operative patient characteristics were similar between the 2 groups as there was no difference in mean age (55.2 (SS) vs 54.8 (DS); p=0.8), mean BMI (28.4 (SS) vs 29.9 (DS); p=0.06), and mean Charlson Co-morbidity Index scores (3.5 (SS) vs 3.2 (DS); p=0.07); however the single-surgeon cohort had higher rates of smoking (34.2% (SS) vs 15% (DS); p=0.001) and congestive heart failure (6.8% (SS) vs 0% (DS); p=0.008). There was no difference in tumor stage (p=0.09) or nodal status (p=0.31) between the 2 groups. Rates of positive margins were not significantly different (10.9% (SS) vs. 9% (DS); p=0.81), nor were rates of surgical complications (11.1% (SS) vs. 15% (DS); p=0.42). Rates of locoregional recurrence were also not significantly different (1.7% (SS) vs. 0% (DS); p=0.5). Disease-free survival and overall survival were not significantly different at 1-year, 3-year, and 5-year time points (p=0.20 and p=0.23 respectively). Mean operative time was significantly lower for single-surgeon cases (228min (SS) vs 286min (DS); p<0.001). Additionally, single-surgeon patients had fewer pre-operative clinic appointments (1.6 (SS) vs 3.3 (DS); p<0.001). A significantly lower rate of breast asymmetry was present at 2 years in the single-surgeon approach (20.6% (SS) vs. 42.9% (DS); p=0.042).

Conclusions: Our study is the first to demonstrate that both single- and dual-surgeon approaches to oncoplastic surgery have similar outcomes with regard to positive margin rates and surgical complication rates, and are comparably safe with regard to recurrence and survival. Fewer number of pre-operative surgical visits, a lower 2-year breast asymmetry rate, and a lower mean surgical time favor

the single-surgeon approach. Either approach should be offered to patients as a surgical option to treat breast cancer when appropriate.

1146946 – Closed-incision, negative-pressure therapy in oncoplastic breast surgery: A comparison of outcomes

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Background/Objective: There is a paucity of data demonstrating the utility of closed-incision, negative-pressure therapy (CINPT) in oncoplastic breast surgery. This study aims to discern the impact of closed-incision, negative-pressure therapy on wound healing in the oncoplastic population and hypothesize it will decrease wound complications in high-risk patients.

Methods: This is a retrospective study conducted on 217 patients who underwent oncoplastic surgery with and without CINPT in a single health system over a 6-year period. We used the Prevena CINPT system in patients receiving CINPT. Oncoplastic surgery was defined as breast conservation surgery involving partial mastectomy followed by immediate volume displacement or replacement techniques. Patients receiving CINPT were compared to those in the standard post-surgical dressing group in which skin glue and skin strips were used. Primary outcomes studied were rates of clinically significant complications requiring either medical or operative intervention, including seroma, hematoma, fat necrosis, wound dehiscence, and infection; secondary outcomes were rates of minor complications not requiring intervention. Statistical analyses were performed with Fisher's exact test, Chi-square test, and Student's t-test where appropriate.

Results: A total of 217 patients were identified. Closed-incision, negative-pressure therapy was used in 75 patients; standard post-surgical dressing was used in the remaining 142 patients. Mean age (54.79±11.99 vs 55.39±11.97; p=0.73) and Charlson Co-morbidity Index score (3.48±1.8 vs 3.07±1.73; p=0.11) were similar between the 2 groups. The CINPT cohort had a higher baseline BMI (28.23±4.94 vs 30.55±6.53; p=0.004), ASA level (2.35±0.59 vs 2.62±0.52; p= 0.002), and rate of pre-operative macromastia symptoms (18.3% vs 45.9%; p=<0.001). The clinically relevant complication rate requiring either medical or surgical intervention was significantly lower in the CINPT cohort (16.9% vs 5.3%; p=0.016), as were the number of complications (14.1% vs 5.3% with 1 complication, 2.8% vs 0% with >2 complications; p=0.044). Additionally, the rate of wound dehiscence was significantly lower in the CINPT group (5.6% vs 0%; p=0.036). There was no difference in the rates of seroma, hematoma, fat necrosis, or infection.

Conclusions: The use of CINPT in the oncoplastic population reduces the overall rate of clinically relevant post-operative complications, as well as the rate of wound dehiscence. The CINPT cohort of patients at baseline had higher rates of macromastia symptoms, BMI, and ASA, all of which put them at increased risk for post-operative complications. These findings support current literature which promotes CINPT in patients with high-risk factors to reduce post-surgical complications, and further

extends its use to the oncoplastic population. Closed-incision, negative-pressure therapy should be considered in the oncoplastic population especially in those patients with increased risk for post-operative complications.

1145300 - Extreme oncoplasty: Breast conservation for patients who might ordinarily be treated with a mastectomy

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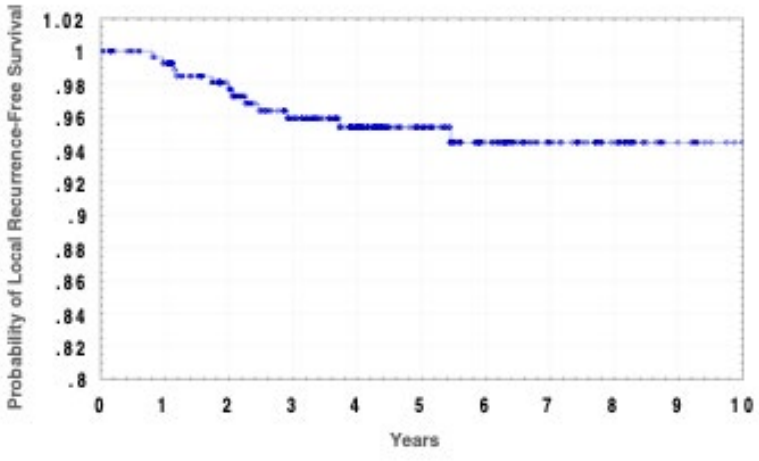
Background/Objective: Extreme oncoplasty is a breast-conserving operation in a patient who does not meet the criteria for breast conservation and would generally receive a recommendation for mastectomy from most surgeons. This includes patients with multifocal, multicentric tumors greater than 5cm, tumors too large relative to breast size, patients with large tumors and a poor response to neoadjuvant chemotherapy, and large recurrences in previously irradiated breasts.

Methods: A prospective database was queried for all patients meeting the above criteria since 2008. Local recurrences were analyzed using the Kaplan-Meier method.

Results: A total of 279 patients met at least 1 of the extreme oncoplasty criteria stated above. There were 12 local recurrences during the observation period. The 6-year probability of local recurrence was 5.6%. For axillary recurrence, it was 1.7%%, and for distant recurrence, it was 5.2%. Overall survival at 6 years was 97.6%. No tumor on ink was obtained during the initial excision in 248 patients (89%), ≥1 mm margins were obtained in 197 patients (71%). Re-excision occurred in 40 patients (14%), and conversion to mastectomy in 8 (2.9%). Median follow-up was 56 months. The average tumor span was 74.2mm. (Range 51-180mm)

Conclusions: Extreme oncoplasty is a relatively new concept in breast surgery that allows acceptable oncologic outcomes while providing the advantage of a superior cosmetic result. In this series, local recurrence-free survival was 94.4% at 6 years. Breast conservation offers a better quality of life compared with mastectomy and a comparable survival. It should be considered in almost all cases where it is technically possible.

Figure. Probability of local recurrence-free survival among 279 patients who underwent extreme oncoplastic surgery



1143993 - Outcomes and safety of oncoplastic breast conservation surgery in patients 70 years and older

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Background/Objective: Oncoplastic surgery (OPS) is an oncologic partial mastectomy with ipsilateral defect repair, using volume displacement or replacement techniques with contralateral surgery to achieve symmetry. This study examines the safety and outcomes of oncoplastic surgery in elderly patients.

Methods: All breast cancer patients undergoing oncoplastic breast conservation surgery at a single institution, with a focus on those aged 70 years and older, were evaluated using a prospectively collected database. The OPS techniques were standard wise-pattern reduction, split reduction, central reduction, and Benelli reduction. Kaplan-Meier method was used to estimate recurrence and survival probabilities.

Results: OPS was performed in 1073 patients. Of these, 231 were age 70 years and older. Average age of the older cohort was 75, with 201 patients aged 70-79, and 30 patients ≥80 years old. Cancer was diagnosed as a palpable mass in 64 patients (28%) and screen detected in 167 (72%). There were 165 with invasive ductal carcinoma, 33 with invasive lobular carcinoma, and 33 with ductal carcinoma in situ (DCIS). The average size of the tumor excised was 22.4mm: T1a = 14 patients, T1b = 39, T1c = 63, T2 = 70, T3 = 12 and Tis = 33. Most tumors were hormone receptor-positive: ER-positive = 212 (92%), PR-positive = 181 (78%). Of 198 invasive cancers, 63 (32%) were Nottingham grade I, 101 (51%) grade II, and 34 (17%) grade III. There were 162 patients who had a negative sentinel lymph node biopsy (SLNB), 34 were positive. Thirty-five patients did not have a sentinel node biopsy. Of 33 DCIS patients, 11 had SLNB, and all were negative. There were 113 (49%) patients who received whole-breast radiation therapy, 96 (42%) received intraoperative radiation therapy, and 22 patients did not receive any radiation therapy. There were 10 local cancer recurrences (6.4% probability at 5 years), 5 in the same breast quadrant, and

5 in a different quadrant (Table). Two patients had axillary recurrences, and 7 developed distant disease. Average length of follow-up was 4.7 years. Overall survival at 5 years was 97.1%. Three patients developed postoperative hematomas requiring drainage, 3 patients returned to the operating room for excision of positive margins, 2 patients developed cellulitis requiring antibiotics, and 1 patient developed an abscess requiring surgical drainage.

Conclusions: Our data indicate that OPS provides oncologically acceptable outcomes and is safe in older patients. Age should not discourage the breast surgeon from offering older patients an oncoplastic approach.

Table.

	Number	5-Year probability
All events Recurrences (All quadrants)	10	6.4%
Recurrences (Same Quadrant)	5	3.3%
Axillary Recurrences	2	1.5%
Distant Recurrences	7	3.2%
Breast Cancer Specific Survival	3 Deaths From Breast Cancer	98.1%
Overall Survival	10 deaths From Any Cause	97.1%

1148082 - Oncoplastic surgery outcomes in older breast cancer population: A matched-cohort comparison study

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Background/Objective: Oncoplastic surgery is a form of breast conservation surgery that involves partial mastectomy followed by either volume displacement or volume replacement surgery. Breast surgery has been described across all age groups; however, prior literature has not explored oncoplastic surgery in the older population. We sought to determine if outcomes differed between patients 65 years and older vs. younger patients who underwent an oncoplastic surgery approach.

Methods: A retrospective chart review of oncoplastic operations done in a single health system was conducted of all patients who underwent oncoplastic surgery over a 6-year period. Patients were stratified based on age, with patients 65 years and older identified and then matched with patients based on BMI. Primary outcomes studied were rates of positive margins and the overall complication

rate; secondary outcomes were loco-regional recurrence, disease-free survival, overall survival, and long-term breast asymmetry. Statistical analysis was performed with Fisher's exact test, Chi-square test, and Student's t-test when appropriate.

Results: A total of 217 patients were identified. Forty-seven (21%) of those cases were for patients greater than 65 years old. In effort to compare age difference, 47 patients under the age 65 were matched based on BMI, with a total of 94 patients analyzed. The older population differed in baseline pre-operative patient characteristics in ASA (2.32 (<65) vs 2.59 (+65); p=0.023), mean Charlson Co-morbidity Index scores (2.17 (<65) vs 5.15 (+65); p=0.023) and grade 3 breast ptosis (29.5% (<65) vs 51.2% (+65); p=0.04), as a factor of intended age differences between the groups. Older patients had higher rates of diabetes mellitus (6.4% (<65) vs 10% (+65); p=0.036), hypertension (21.3% (<65) vs 46.8% (+65); p=0.009), and COPD (0%(<65) vs 10.6% (+65); p=0.05), but not with congestive heart failure (0% (<65) vs 8.5% (+65); p=0.12) or smoking (17% (<65) vs 29.8% (+65); p=0.14). There was no difference in tumor stage (p=0.37) or nodal status (p=0.70) between the 2 groups. Positive margin rates were not significantly different (12.2% (<65) vs. 8.9% (+65); p=0.62), nor were rates of surgical complications (17% (<65) vs. 10.6% (+65); p=0.37). Rates of locoregional recurrence were also not significantly different (0% (<65) vs. 2.1% (+65); p=1.00). Disease-free survival and overall survival were not significantly different at 1-year, 3-year, and 5-year time points (p=0.39 and p=0.47 respectively). Younger patients have significantly higher rates of immediate contralateral symmetry reduction or mastopexy (95.7% (<65) vs. 83% (+65); p=0.045), with no difference in breast asymmetry rates at 2 years (17.6% (<65) vs 20.8% (+65); p=1.00).

Conclusions: An oncoplastic approach is comparably safe in older patients compared to younger patients regarding recurrence, positive margin rates, and survival. Although the older cohort of patients had higher preoperative risk based on ASA and Charlson Comorbidity Index (CCI), there was no difference in surgical complication rates. Oncoplastic surgery should be offered to all patients who are appropriate for such breast conservation as an option, regardless of age.

1148606 - Oncoplastic breast conservation surgery versus mastectomy: A comparison of outcomes in an underserved population

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Background/Objective: Oncoplastic breast conservation surgery (OBCS) has been shown to yield better cosmetic outcomes while maintaining oncologic safety when compared to standard breast conservation; however, the research directly comparing OBCS and mastectomy is minimal, particularly among non-Caucasian patients. This study evaluates the oncologic safety and patient satisfaction of OBCS compared to mastectomy, stratifying data based on race and ethnicity.

Methods: A retrospective chart review was performed for patients treated with breast cancer from 2015-2021 at a single institution. Variables recorded included patients age, race, BMI, date of diagnosis, date and type of surgery, pathology, treatment including chemotherapy and radiation, recurrence, complications including wound healing problems, need for additional surgery, and patient-reported

outcomes using BREAST-Q. The mean, median, and p-value were recorded. For continuous variables, a 2-tailed T test was performed and for categorical variables a Chi squared test. Patient reported outcomes were based on BREAST-Q using their validated scoring sheet.

Results: There were 57 patients who underwent OBCS and 204 patients who underwent mastectomy with reconstruction. See Table for data in the 2 groups. Positive margins were seen in 5 patients (8.77%) in OBCS, 3 of which had a mastectomy, and 8 (3.9%) patients in mastectomy, 6 of which got post-mastectomy radiation (P=0.134). There were 3 recurrences (5.2%) after OBCS, 1 local, 2 distant; and 16 recurrences (7.8%) after mastectomy, 2 local and 14 distant (P=0.507). The median satisfaction with breasts was 84/100 for OBCS and 58/100 for mastectomy (P=0.003). The median satisfaction with outcome was 100/100 for OBCS and 75/100 for mastectomy (P=0.036). Rate of infection was 5.3% in OBCS patients and 22.1% in mastectomy patients (P=0.004). Additional surgery occurred in 19.3% of OBCS patients and 83.3% of mastectomy patients (P<.001). The median number of total surgeries was 1 for the OBCS group and 3 for the mastectomy group (P<.001). There was a weak-to-moderate negative correlation between number of surgeries versus breast satisfaction in the OBCS group (r= -0.4); there was no correlation in the mastectomy group (r=0.03). Finally, there were 5 (8.8%) Caucasian patients who had OBCS and 24 (11.8%) who had mastectomy. Among the mastectomy patients, the median satisfaction with breasts was 63.3/100 for Caucasian patients and 58.6/100 for non-Caucasian patients. The median satisfaction with outcome was 79.3/100 among Caucasian patients, and 71.2/100 among non-Caucasian patients.

Conclusions: OBCS yields better patient satisfaction than mastectomy while still maintaining oncologic safety, as shown by comparable margin status and recurrence rates. Further studies evaluating PROs in diverse populations can help guide patients to more informed choices of surgical options.

Table. Comparison of OBCS vs mastectomy demographics and outcomes

	OBCS	Mastectomy + Reconstruction	P-value
Total # of patients (n)	57	204	
Age (median, range)	55, 39-77	52, 26-82	**0.018**
Race	Caucasian: 5 (8.8%) Non-Caucasian: 47 (82.5%) Unavailable: 1 (1.8%)	Caucasian: 24 (11.8%) Non-Caucasian: 154 (75.5%) Unavailable: 26 (12.7%)	0.053
Medicaid/No insurance	24 (42%)	83 (40.7%)	0.847
BMI (median, range)	32.4, 27.7-38.1	29, 17.3-49.7	**0.0001**
Multifocal Disease	27 (47.4%)	80 (39.2%)	0.269
Clinical stage	0: 15 (26.3%) 1: 22 (38.6%) 2: 14 (24.6%) 3: 3 (5.3%) 4: 0 Unknown: 3 (5.3%)	0: 31 (15.2%) 1: 63 (30.9%) 2: 70 (34.3%) 3: 32 (15.7%) 4: 4 (2.0%) Unknown: 4 (2.0%)	**0.038**
Procedure Type		Nipple Sparing: 55 (27%) Skin Sparing: 149 (73%) Bilateral: 60 (29.4%) Immediate TE: 143 (70.1%) Implant after TE: 43 (30.1%) Autologous Recon after TE: 26 (18.2%) Immediate Autologous Recon: 53 (26%)	
Weights (median, range)	Lumpectomy: 213 g, 37-722 g Ipsilateral reduction: 660 g, 106-2378 g Contralateral reduction: 706 g, 161-3670 g	Mastectomy: 660 g, 106-2378 g	**<.001** **<.001** **0.004**
Positive Margins	5 (8.77%)	8 (3.9%)	0.134
Pathology	IDC: 33 (57.9%) ILC: 5 (8.8%) DCIS: 15(26.3%) (the remainder were mixed)	IDC: 120 (58.8%) ILC: 22 (10.8%) DCIS: 29(14.2%) (the remainder were mixed)	0.900 0.659 **0.031**
Hormone Receptor Status	ER (+): 46 (80.7%) Triple Negative: 9 (15.8%) Her2(+): 4 (7%)	ER (+): 150 (73.5%) Triple Negative: 36 (17.6%) Her2(+): 32 (15.7%)	0.268 0.743 0.093
Tumor Size (median, range)	30.5mm, 0.5 – 120 mm	29 mm, 0 – 140 mm	0.844
Additional Surgery	11 (19.3%)	170 (83.3%)	**<.001**
# of total surgeries (median)	1	3	**<.001**
Complications	Infection: 3 (5.3%) Wound Healing: 19 (33.3%)	Infection: 45 (22.1%) Wound Healing: 90 (44.1%) Flap Necrosis: 52 (25.5%)	**0.004** 0.144
Neoadjuvant Chemotherapy	11 (19.3%)	64 (31.4%)	0.075
Neoadjuvant Endocrine Therapy	9 (45.8%)	14 (6.9%)	**0.036**
Adjuvant Chemotherapy	17 (19.8%)	87 (42.6%)	0.080
Adjuvant Endocrine Therapy	39 Compliance rate = 68.9%	134 Compliance rate = 64%	0.699
Adjuvant Radiation Therapy	45 (78.9%)	75 (36.8%)	**<.001**
Radiation Toxicity (≥grade 2)	2 (4.4%)	6 (8.0%)	0.826
Median Length of Follow-up (months)	24.6	29.9	**0.022**
Recurrence	3 (1 local, 2 distant)	16 (2 local, 14 distant)	0.507
PRO: Satisfaction with Breasts (median)	84/100	58/100	**0.003**
PRO: Satisfaction with Outcome (median)	100/100	75/100	**0.036**
# of Surgeries vs Breast Satisfaction	r = -0.375	r = 0.031	
# of Surgeries vs Outcome Satisfaction	r = 0.002	r = 0.092	

r = correlation coefficient

1148303 - Breast rotational tissue flap: A novel skin-sparing technique that provides satisfactory cosmesis in patients undergoing breast-conserving surgery for large-volume resection in smaller-size breasts

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Background/Objective: As the type of breast surgery does not impact survival, and excellent local control rates can be achieved by lumpectomy with adequate margins, the majority of women choose breast-conserving surgery (BCS). However, patients requiring large-volume resections with smaller breast size have limited options to preserve their breasts without undue cosmetic deformity. Furthermore, complication rates such as infection, clinically significant seroma formation, and contour deformities increase with the volume of resection. We describe a novel technique, breast rotational tissue (BrT) flap, in patients with defects too large for primary closure but who did not want or were ineligible for mastopexy based on breast size or shape.

Methods: A retrospective review of all patients who underwent BCS and BrT flap at our institution between March 2019 and October 2021 was conducted. Of note, during this time period, COVID-19 resulted in a significant decrease in breast cancer services at our institution. Patient demographics and outcome data were collected. The technique of BrT flap is described as follows: after completing the lumpectomy and assessment of the defect, a breast rotational tissue flap is created by evaluating donor pedicle site from either the superior or inferior pole of the defect. The breast tissue is raised off the fascia deeply and then superiorly the breast tissue is split transversely (leaving some tissue under the overlying skin) in the same plane. Finally, the flap is rotated into the defect, and this pedicled flap is anchored in place with sutures. The skin is closed in a layered cosmetic fashion.

Results: A total of 23 patients underwent BrT flap during this time period. The mean age and BMI were 68.8 and 28.1, respectively. Seventeen (74%) patients had IDC, 2 (9%) patients had ILC, and 5 (22%) had DCIS. Pathological tumor sizes were 5 (22%) Tis, 12 (52%) T1, and 6 (26%) T2. Two patients received neoadjuvant chemotherapy. The mean lumpectomy cavity size was 127.3 cm3. Nine patients (39%) had clinically detected seromas initially but none required aspiration and none impacted adjuvant radiation. One patient developed cellulitis that was not associated with a clinically detected seroma. Cosmetic outcomes, however, remained satisfactory in all patients in subsequent follow-up visits.

Conclusions: Breast rotational tissue flap provides a viable method for satisfactory cosmetic outcome, without significant complications, for those women who desire BCS with skin preservation for larger tumor sizes relative to breast volume and who do not desire or are not eligible for mastopexy.

1144277 - A comparison of long-term, patient-reported outcomes after oncoplastic breast surgery and conventional breast-conserving surgery

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Background/Objective: Oncoplastic breast surgery (OBS) combines plastic surgery techniques with conventional breast-conserving surgery (BCS) and helps to increase option of BCS for women with breast cancer. OBS may involve larger resections and sometimes requires a staged approach. Limited data are available on patient-reported outcomes for women who undergo OBS. The objective of this study was to compare the long-term patient-reported outcomes after OBS and BCS utilizing the BREAST-Q patient-reported outcome measure.

Methods: Women undergoing OBS or BCS between 2006-2019 who completed a pre-operative and long-term BREAST-Q survey were identified by an IRB-approved retrospective review of a prospective database. Baseline characteristics were compared between OBS and BCS approaches. Women with OBS were paired with women who had BCS using propensity matching (by age, BMI, race, tumor size, T stage, and multifocality) at the pre-operative and long-term (3 to 5 years post-operatively) timepoints, and Breast-Q scores were compared at each timepoint.

Results: Our study included 2655 women: 106 had OBS, and 2549 had BCS. Women who underwent OBS were younger ($p<0.001$), had higher BMI ($p<0.001$), had unifocal disease ($p=0.004$), and had larger tumors ($p=0.043$) (Table). There was no difference between women in the OBS and BCS groups in nodal stage, tumor histology, re-excision rates, axillary surgery, use of chemotherapy, or use of radiation. After propensity matching, at the time of the preoperative survey, OBS women reported lower breast satisfaction (50.1 vs. 65.6, $p=0.048$) but reported similar psychosocial and sexual well-being as BCS women (Table). In long-term follow-up, both OBS and BCS groups had improvement in breast satisfaction, but women in the OBS group had lower breast satisfaction scores (69.9 vs. 74.6, $p<0.001$). There was no difference in psychosocial or sexual wellbeing scores among both groups.

Conclusions: Women who underwent OBS compared to BCS had similar psychosocial and sexual well-being scores. Women who underwent OBS had larger volume and burden of disease compared to women who had BCS, and may represent a group that would not have been traditional candidates for BCS. We noted that the women in the OBS group had lower pre-operative breast satisfaction scores and, although higher average scores were noted at long-term, scores remained lower than for women in BCS group. Further study is necessary in the identification of factors contributing to lower pre-operative scores for the women in the OBS group and their impact on breast satisfaction scores overall.

Table. Comparison of baseline characteristics and Breast-Q scores between women who underwent oncoplastic breast surgery and conventional breast-conserving surgery

Characteristics	Entire Cohort n = 2655	OBS women n = 106	BCS women n = 2549	p-value
Age, median (IQR)	57.0 (49.0-64.0)	49.0 (43.9-56.5)	57.0 (49.0-65.0)	**<0.001**
BMI, median (IQR)	26.4 (23.1-31.0)	29.1 (25.1-32.4)	26.3 (23.1-30.9)	**0.005**
Tumor size in cm, median (IQR)	1.2 (0.7-1.8)	1.3 (0.6-2.3)	1.2 (0.7-1.8)	**0.043**
Multifocal disease	367 (13.9%)	24 (24.2%)	343 (13.5%)	**0.004**
N stage				0.475
N0	1715 (64.7%)	68 (65.4%)	1647 (64.7%)	
N1	375 (14.2%)	12 (11.5%)	363 (14.3%)	
N2	51 (1.9%)	3 (2.9%)	48 (1.9%(	
N3	23 (0.9%)	2 (1.9%)	21 (0.8%)	
Not evaluated	486 (18.3%)	19 (18.3%)	467 (18.3%)	
Histology				0.905
Ductal	2393 (90.3%)	96 (92.3%)	2297 (90.2%)	
Lobular/Mixed	214 (8.1%)	7 (6.7%)	207 (8.1%)	
Other	43 (1.6%)	1 (1%)	42 (1.7%)	
Re-excision	582 (22.0%)	17 (16.3%)	565 (22.2%)	0.184
Axillary Surgery				0.776
None	494 (18.6%)	19 (18.3%)	475 (18.7%)	
SLNB	1991 (75.1%)	77 (74.0%)	1914 (75.2%)	
ALND	165 (6.2%)	8 (7.7%)	157 (6.2%)	
Chemotherapy	1029 (38.9%)	42 (40.4%)	987 (38.9%)	0.759
Radiation	2340 (88.5%)	98 (94.2%)	2242 (88.2%)	0.060
Propensity Matched Cohort		OBS women	BCS women	p-value
Preoperative Survey				
Mean Breast Satisfaction		50.1	65.6	**0.048**
Mean Psychosocial Well-Being		65.6	77.5	0.089
Mean Sexual Well-Being		53.7	52.5	0.855
Long-Term Follow-up Survey				
Mean Breast Satisfaction		69.9	74.6	**<0.001**
Mean Psychosocial Well-Being		73.7	85.9	0.555
Mean Sexual Well-Being		60.2	69.3	0.058

1143646 - The use of pedicled perforator flaps in oncoplastic breast surgery: The Royal Marsden experience

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Background/Objective: Chest wall pedicled-perforator flaps (CWPFs) can replace resected volume during breast-conserving surgery (BCS)(1). Our aim was to further decrease mastectomy rates in our unit by extending the use of CWPF to include large tumours. We evaluated safety and feasibility of CWPF for 3 indications: breast-conserving surgery (BCS), whole-breast immediate reconstruction after mastectomy, and as a resurfacing procedure for locally advanced breast cancer in selected patients.

Methods: A prospective database of all patients who underwent CWPFs as part of their surgical treatment between 17/05/2017-18/10/2021 was analysed. Patient demographics, indications, surgical technique, and complications were analysed.

Results: Local audit approval was gained. Eighty-five females underwent single-stage CWPF. Median age was 55 years (IQR=34-63), median BMI was 25.5 kg/m2 (IQR=22.1-30.2), 7 (8.3%) patients were current smokers. Indications for CWPF were volume replacement as part of BCS for a primary cancer (n=69, 81.2%), BCS for a local recurrence (n=6, 7.1%), mastectomy and resurfacing for locally advanced breast cancer (n=2, 2.4%), and whole-breast autologous reconstruction in women unsuitable for standard options (n=8, 9.4%). In the group of women who underwent surgery for a primary breast cancer, the alternative would have been mastectomy in 61 cases (88.4%). Fourteen women had undergone neoadjuvant chemotherapy (16.5%), 21 women underwent neoadjuvant endocrine therapy (24.7%). Of the women undergoing breast conservation, (42/75, 56%) required localisation +/- bracketing of the tumour pre-operatively. The most common perforator vessels used were lateral intercostal artery perforator (LICAP) (n=33, 38.8%), followed by LICAP and LTAP (long thoracic artery perforator) combination (n=24, 28.2%), and anterior intercostal artery perforator (AICAP) (n=12, 14%). Median resection specimen weight was 91g (IQR=43-165, maximum=1287g). Median tumour extent was 47mm (IQR=35-67). The mean values for both specimen weight and tumour extent are clinically higher than that described by Schaverien et al(1). Median duration of operation (including tumour resection and axillary surgery) was 150 minutes (IQR 120-190). Median length of stay was 0 days (IQR 0-1), with 53 (62.4%) cases undertaken as day-cases. Of the patients undergoing breast conservation, 16 patients had further surgery for re-excision of margins, 6 were involved margins (8%), and 10 were ≤1mm (13.3%). There were 2 episodes of cellulitis requiring oral antibiotics as outpatients. There were 5 (5.9%) unplanned return to theatre, 1 for haematoma, 2 for distal flap loss, and 2 for skin flap necrosis. There were no complete flap losses.

Conclusions: The use of chest wall perforator flaps for volume replacement during BCS is a safe approach to avoid mastectomy, even in a group of patients who have large tumours. In selected women, CWPF can be utilized for whole-breast reconstruction when other methods of reconstruction are not appropriate/possible. In addition, we describe the safe and effective use of CWPFs for resurfacing of the chest wall for locally advanced breast cancer in carefully selected women. References 1. Schaverien MV et al. Outcomes of Volume Replacement Oncoplastic Breast-Conserving Surgery Using Chest Wall Perforator Flaps: Comparison with Volume Displacement Oncoplastic Surgery and Total Breast Reconstruction. *Plastic & Reconstructive Surgery*. 2020;146(1):14–27.

Table. Patient demographics, oncology data, surgical technique, and complications

Type of chest wall perforator flap	**Anterior flaps (n=17)**	**Lateral flaps (n=68)**
Vessels used (n)	AICAP 12 MICAP 5	LICAP only 33 LICAP and LTAP 24 LTAP 8 TDAP 3
Tumour type (n)		
IDC	2	18
ILC	1	9
DCIS	4	7
IDC and DCIS	10	29
ILC and LCIS	0	0
Other	0	4
Nil (risk reduction surgery)	0	1
Indication (n)		
Breast conservation	17	58
Whole breast reconstruction	0	8
Re-surfacing	0	2
Pre-operative localisation (n)		
Yes	10	32
No	7	36
Axillary surgery (n)		
No	7	12
SLNB	10	41
ALND	0	15
Length of surgery (minutes) Median, IQR	120 (110-140)	170 (140-202.5)
Specimen weight (grams) Median, IQR	40 (34-47)	108 (51-176.5)
Tumour extent (mm) Median, IQR	37 (28.8-48)	52 (36-70)
Re-excision of margins for those undergoing BCS	N=17	N=58
Yes	6	10
No	11	48
Unplanned return to theatre (n)		
Yes	1	4
No	16	64

AICAP – anterior intercostal artery perforator; MICAP – medial intercostal artery perforator; LICAP - lateral intercostal artery perforator; LTAP - lateral thoracic artery perforator; TDAP - thoracodorsal artery perforator; IDC – invasive ductal carcinoma not otherwise specified; ILC – invasive lobular carcinoma; DCIS - ductal carcinoma in situ, SLNB – sentinel lymph node biopsy, ALND - axillary lymph node dissection, IQR – interquartile range;

Other

1143859 - Correlation of breast density grade on mammogram with diagnosed breast cancer: A retrospective review

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Background/Objective: The objective of the study was to determine any association between mammographic density (MD) and breast cancer in the Pakistani population. The study also investigated the relationship between mammographic breast density, clinical characteristics, and molecular tumor markers of disease.

Methods: A retrospective review of data was carried out from Jan 2020 to Dec 2020. Stage 0-III patients with histologically proven breast cancer were included in the study. Mammograms were reviewed, and density grade was recorded in accordance with the Breast Imaging Reporting and Data System (BIRADS) guidelines. Patient age, tumor, and receptor characteristics were studied, and their association with mammographic density was investigated by using Chi square. P-value ≤0.05 was considered statistically significant.

Results: A total of 361 patients were included, with a mean age of 46 years. The frequency of BIRAD categories were as following: Cat A (8.9%), Cat B (43.2%), Cat C (33.5%), Cat D (14.4%), respectively. Cumulative frequency of Cat B and C was 76.7%. There was a statistically significant p-value ≤0.05 association observed between age, ER status, and T-stage versus MD. A majority of patients were in T-stage category 2 or 3, which can easily be picked out on mammogram.

Conclusions: Most breast cancer patients in our population had a mammographic density of B or C, indicating that breast cancer is more common in dense breasts. There is a strong, significant association of mammographic density with age, ER status, and tumor stage in our population. Future studies need to address and confirm MD and its association with subtypes and aggressiveness of breast cancer.

1147033 - Impact of COVID-19 disruptions in health care on breast cancer presentation and treatment

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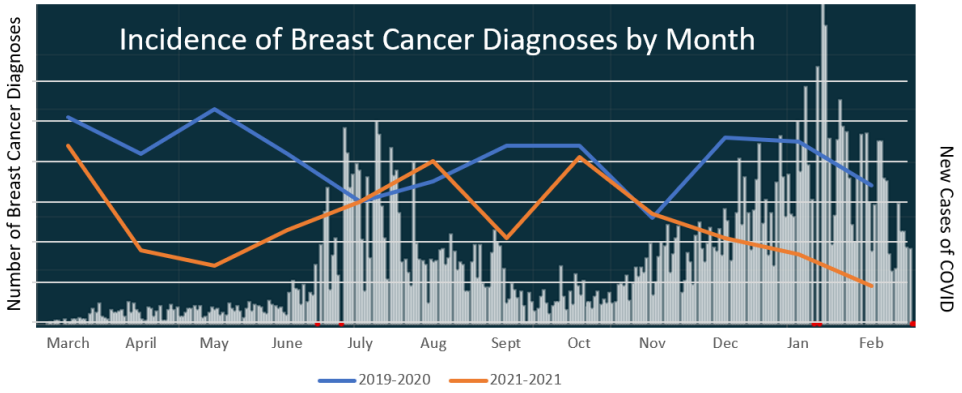
Background/Objective: The COVID-19 pandemic has disrupted patients' access to cancer prevention, diagnosis, and treatment. Contributors to this disruption include patients' fears of infection from in-person hospital or clinic visits, loss of insurance, and suspension of surgeries classified as "elective." However, data regarding the magnitude of impact on breast cancer outcomes are very limited and crucial to mitigating the burden of delayed presentation post-COVID. The purpose of this study is to analyze the incidence and stage of breast cancer diagnoses in our patient population before and during the COVID-19 pandemic.

Methods: We abstracted our local tumor registry data for patients diagnosed with breast cancer between March 2019-March 2021. We compared demographics, payer at diagnosis, clinical and pathologic stage, time from diagnosis to first contact, and time from diagnosis to treatment and surgery performed between patients diagnosed pre-pandemic (March 2019-Feb 2021) and post-pandemic (March 2020-Feb 2021). Descriptive and univariate statistics were utilized.

Results: There were 40% fewer patients diagnosed with breast cancer in the pandemic era compared to pre-pandemic. When broken down by month, the number of patients diagnosed with breast cancer decreased more significantly during peak COVID-19 surges in the community (see Figure). Compared to pre-pandemic, there was a statistically significant decrease in the proportion of Black patients diagnosed with breast cancer in the pandemic era (4.6% compared to 10.5% pre-pandemic, p=0.002) and an increase in patients with Medicaid or who were uninsured in the pandemic era (13.1% and 12.4% vs 9.9% and 9.1% pre-pandemic, p=0.042). There were no differences in clinical or pathologic staging in the pandemic compared to pre-pandemic periods, nor was there a difference in days from diagnosis to first treatment. An equivalent proportion of patients underwent mastectomy between the time periods (38.1% pre-pandemic vs 39% post-pandemic).

Conclusions: In the 12 months following the COVID-19 pandemic outbreak, significantly fewer women have been diagnosed with breast cancer compared to the 12 months prior. Periods of surges correlate with decreases in diagnoses, but we did not see any months with higher numbers of diagnoses to suggest that we are equilibrating with the usual rate of incidence. The disproportionate decrease in breast cancer diagnoses in Black women suggests a disparity in the impact of COVID-19-related health care access on this segment of our patient population, and the increase in the proportion of Medicaid and uninsured patients may reflect the financial impact of job and/or insurance loss associated with the pandemic. We can expect to see increased rates of breast cancer diagnoses and later stage at diagnosis until we catch up with screening. Outreach efforts for screening and early detection need to specifically address effective strategies to engage Black and uninsured patients.

Figure. Incidence of breast cancer diagnosis and new COVID cases



1147200 - Patient and disease pre-operative factors influencing surgical procedure choice for breast cancer treatment

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Background/Objective: To address disparities of care in breast cancer treatment, it is important to understand pre-operative factors that could affect the surgical decision-making process.

Methods: This prospective cohort study evaluates patient-reported outcomes in women undergoing breast cancer treatment at a metropolitan health care system. Each new breast cancer case undergoes tumor board discussion, and patients have same-day consultations with various specialties. Based on their procedure choice, women choose to complete pre- and post-operative Breast-Q© Breast-conserving Surgery (BCS), Mastectomy (M), or Reconstruction ® modules and demographic surveys. Individual effects of pre-operative factors on procedure choice were assessed using ANOVA for continuous variables and chi-squared for categorical. Significant factors ($p \leq 0.05$) were added to a multinomial logistic regression model.

Results: A total of 375 women completed pre-operative surveys (BCS=244, M=39, BR=92). Compared to BR, those chose BCS were older (RRR=1.094, $p<0.001$) with larger BMIs (RRR=1.094, $p=0.001$), without a history of breast cancer (RRR=0.130 (yes vs. no), $p=0.016$), and Stage I disease (RRR=4.920, $p<0.001$). Women making more than $200K (RRR=4.56x105 (vs. 35K), $p<0.0001$) were also more likely to undergo BR. Compared to BCS, women undergoing neoadjuvant chemotherapy (RRR=3.591, $p=0.047$) and Stage II disease (RRR=4.238, $p=0.040$) were more likely to undergo mastectomy alone, whereas race, education, employment, and most incomes did not correlate with procedure choice.

Conclusions: Our data suggest that racial and socioeconomic disparities in procedure type can be addressed by presenting equally effective surgical strategies to all patients in a multidisciplinary model that allows patients to interact with plastic surgeons, radiation oncologists, and surgical and medical oncologists.

1148088 - Androgen receptor expression in breast cancer

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Background/Objective: Androgen receptor (AR) expression in breast cancer has been described in many small series, and clinical trials of targeted therapy are underway. However, it has not been studied in a large, well characterized, recent patient cohort.

Methods: From 2013 through 2015, all breast cancers diagnosed at the main campus of our academic medical center had AR prospectively evaluated at the same time as determination of estrogen receptor (ER), progesterone receptor (PR), and human epidermal growth receptor 2 (HER2). Tumors with more than 1% of cells stained were considered positive. This study compares the demographic, pathological, and clinical outcome features of AR-positive vs. AR-negative tumors.

Results: From 1/1/13 through 12/31/15, there were 1142 consecutive breast cancers who had AR and the other receptors evaluated. AR was the most commonly expressed receptor, 90.8% positive compared to 83.8% for ER and 80.8% for PR. As seen in the table, its expression correlates strongly with that of ER and PR, but not with HER2. Compared to whites, it is less common in blacks, about the same in Hispanics, and more common in Asians ($p<0.001$), and this is true both for luminal and triple-negative subtypes. The mean age was not significantly different between AR-positive and negative groups. As seen in the table, AR expression correlates strongly with low-grade differentiation ($p<0.001$) but did not correlate with tumor size or positive lymph node spread. It was slightly less common in Stage IV disease. Expression by molecular type is as follows: HR+, HER2- 97.1%; HR+, HER2+ 96.7%; HR-, HER2+ 79.5%; HR-, HER2- 50.0%. ($p<0.001$) Although none of the patients in this series were treated with anti-androgen therapy, survival was much better for AR-positive patients: 5-year overall survival was 91% vs 77% ($p<0.001$), and 5-year disease-free survival was 83% vs. 68% ($p<0.001$).

Conclusions: AR is an interesting tumor marker that deserves further study. We will await the results of clinical trials to evaluate its usefulness in clinical practice.

Table.

	AR positive	AR negative	P value
Race/ethnicity			
Non-hispanic White	846/914 (92.6%)	68/914 (7.4%)	<0.001
Non-hispanic Black	87/115 (75.7%)	28/115 (24.3%)	
Hispanic	61/68 (89.7%)	7/68 (10.3%)	
Asian/Pacific Islander	28/29 (96.6%)	1/29 (3.4%)	
Age (mean)	60.25	59.20	0.315
Grade			
1	241/245 (98.4%)	4/245 (1.6%)	<0.001
2	525/544 (96.5%)	19/544 (3.5%)	
3	201/272 (73.9%)	71/272 (26.1%)	
Receptors			
ER positive	931/957 (97.3%)	26/957 (2.7%)	<0.001
ER negative	106/185 (57.3%)	79/185 (42.7%)	
PR positive	838/855 (98.0%)	17/855 (2.0%)	<0.001
PR negative	199/287 (69.3%)	88/287 (30.7%)	
Her2 positive	124/136 (91.2%)	12/136 (8.8%)	0.873
Her negative	913/1006 (90.8%)	93/1006 (9.2%)	
Molecular type			
HR pos, Her2 neg	845/870 (97.1%)	25/870 (2.9%)	<0.001
HR pos, Her2 pos	89/92 (96.7%)	3/92 (3.3%)	
HR neg, Her2 pos	35/44 (79.5%)	9/44 (20.4%)	
Triple negative	68/136 (50.0%)	68/136 (50.0%)	
Tumor size (mean cm)	2.21	2.34	0.936
Lymph Node			
Positive	239/262 (91.2%)	23/262 (8.8%)	0.866
Negative	705/770 (91.6%)	65/770 (8.4%)	
AJCC stage			
1	586/640 (91.6%)	54/640 (8.4%)	0.012
2	340/375 (90.7%)	35/375 (9.3%)	
3	94/103 (91.3%)	9/103 (8.7%)	
4	14/20 (70.0%)	6/20 (30.0%)	
Survival			
5 year overall survival	91%	77%	<0.001
5 year disease free survival	83%	68%	<0.001

1148241 - A prospective comparison of skin staining after sentinel lymph node biopsy, using radioisotope and blue dye (BD) versus superparamagnetic iron oxide nanoparticles (SPIO) tracers

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Background/Objective: Superparamagnetic iron oxide (SPIO) nanoparticles yield comparable detection with the combination of radiosotope and blue dye (RI±BD) in sentinel lymph node detection (SLN) for breast cancer. Postoperative skin staining and MRI artifacts after breast-conserving therapy (BCT) remain challenging in the refinement of the technique and present data suggest that a smaller dose and a deeper, peritumoral injection can address that.

Methods: This is a pre-specified, secondary analysis of the multicenter SentiDose trial, in which SLN detection between 1.5ml SPIO injected subareolarly and within 24 hours to surgery (Cohort 1) versus ml SPIO injected subareolarly or peritumorally 1 to 7 days before surgery (Cohort 2) was investigated. RI±BD were administered according to local routines to control for concordance with SPIO. Women who underwent BCT were followed for skin staining at 6, 12, and 24 months after surgery. Brown and blue skin staining were documented, and follow-up was discontinued at 2 years or in patients without staining.

Results: In total, 270 women (median [interquartile range]: age 65y [15], body mass index, BMI: 26.3kg/m2 [6.4], tumor size 16mm [13], Cohort 1=129, Cohort 2=141) were included. The 2 cohorts were comparable for input variables (age, BMI, tumor location, size, and biology). In total, BD was administered in 191 (70.7%), but more usually in Cohort 1 (56% vs 44%, p<0.001). All patients in Cohort 1 received a subareolar injection, whereas in Cohort 2, 71 (50.5%) received a peritumoral injection. Overall SPIO staining rate was 21.6% at 6 months and decreased significantly over time (15.3% at 12 mo and 8.6% at 24 mo, p<0.001). In patients who received both SPIO and BD (n=191), staining rates were similar (26.7% vs 26.7% at 6 mo, 18% vs 15.9%, p=0.304 and 10.1% vs 7.4%, p=0.383). In univariate analyses, lower skin-staining rates were associated with higher BMI (Spearman's rho= -0.176; 95%CI -0.292, -0.054, p=0.004), peritumoral injection (13.8% vs 86.2% for periareolar, p=0.018), and there was a trend for 1ml dose (41.4% vs 58.6% for 1.5, p=0.075). In multivariate regression, BMI retained significance (Exp(B)=0.907; 95CI%: 0.848, 0.971, p=0.005), and peritumoral injection had a marginal effect (Exp(B)= 0.404; 95CI%: 0.159, 1.030, p=0.058). However, SPIO staining rates in the comparative subgroup with BD for patients who received a peritumoral injection of 1ml SPIO were 12.8%, 7.9%, and 2.6%, respectively. In exploratory analysis, SLN detection rate was higher for Cohort 2 (100% vs 96.9%, p=0.051).

Conclusions: In this prespecified secondary analysis of a multicenter trial, staining rates for SPIO were comparable to BD in a 2-year follow-up. Skin staining after BCT and magnetic-guided SLND is more common in women with lower BMI, possibly reflecting smaller breast size, and after a subareolar injection. In the SentiDose trial, SPIO volume (1 vs 1.5ml) was not associated with significant difference. However, removing the injected tissue is efficient and could address postoperative MRI artifacts. In light of these results, a preoperative peritumoral 1ml SPIO injection is recommended, as it combines optimal detection with minimal skin staining.

1148244 - Patient factors that affect pre-operative patient-reported outcomes in women undergoing breast cancer surgery

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Henry Ford Health System, Detroit, MI

Background/Objective: Understanding the impact of patient, disease, and treatment factors on pre-operative patient reported outcomes (PROs) is important to guide surgical decision-making with breast cancer.

Methods: This prospective cohort study evaluates PROs in women undergoing breast cancer treatment at a metropolitan health care system. New cases undergo tumor board discussion and same-day consultations with various specialties. Women choose to complete pre- and post-operative Breast-Q© Breast-conserving surgery (BCS), mastectomy (M), or reconstruction ® modules and demographic surveys. Individual associations to pre-operative Breast-Q survey scores were assessed using linear regression models (1 for each Breast-Q survey type). Variables significant for at least 1 survey were included in multiple linear regression models.

Results: A total of 375 women completed the pre-operative surveys (BCS=244, M=39, BR=92). Procedure choice, laterality, race, marital status, employment, prior breast cancer, neoadjuvant chemotherapy, or history of radiation or chemotherapy did not impact PROs. Breast satisfaction decreased with higher BMI (est=-0.367, p=0.045) and Stage II disease (est=-11.011 (vs. Stage 0), p=0.008). Lower psychosocial score was associated with younger age (est=0.271, p=0.002), higher BMI (est=-0.367, p=0.014), and income <$35k (est=0.172 (vs. 35k+), p=0.016). Similarly, lower physical well-being of the chest was associated with younger age (est=0.207, p=0.011), higher BMI (est=-0.285, p=0.039), and income <$35k (est=0.218 (vs. 35k+, p=0.039). Sexual well-being decreased with higher BMI (est=-0.545, p=0.004) and income <$35k (est=0.135 (vs. 35k+), p=0.016).

Conclusions: While factors such as age, BMI, and stage of disease are difficult to change prior to surgery, patients with lower income may need special interventions to assist them through the treatment process.

1148320 - Pregnancy-associated breast cancer: A retrospective, single-institution case series

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Background/Objective: Pregnancy-associated breast cancer (PABC) is associated with worse survival vs non-PABC. Given advances in systemic therapy and recent efforts to de-escalate morbid locoregional treatment, we sought to examine presentation and management of PABC in a contemporary observational cohort of patients.

Methods: We identified patients ≥18 years old diagnosed with Stage 0-IV breast cancer during pregnancy or within 1 year of delivery between 2014 and 2020 in our institutional database. Patient demographics, tumor data, treatments, and outcomes are reported.

Results: Fifteen patients were included in the study (median age 36 years, range 23-47; median follow-up 37.6 months, 95% CI 20.4-45.9). Most patients were White (53.3%, n=8), while smaller proportions were Black (33.3%, n=5) or Asian (13.3%, n=2). Of the 15 patients reviewed, 11 (73.3%) were privately insured, and 4 (26.7%) had government-issued insurance (i.e., Medicaid or TriCare). The majority of patients were diagnosed with invasive ductal carcinoma (93.3%, n=14). None had distant metastatic disease at presentation, but,notably, 5 of 15 patients (33.3%) had biopsy-proven lymph node involvement at diagnosis, and more than half (53.3%, N=8) were diagnosed with HER2+ breast cancer. Fourteen of 15 patients received breast surgery, and the only patient who did not had her scheduled surgery canceled due to insurance coverage. There were 71.4% (n=10) of those who received surgery who ultimately elected for mastectomy. Notably, all patients in our cohort received chemotherapy, and all hormone receptor-positive patients (n=8) received endocrine therapy; 66.7% (n=10) received radiation therapy (post-mastectomy n=6, post-lumpectomy n=4). The 1-year unadjusted overall survival (OS) rate was 0.933 (95% CI 0.613-0.990), and unadjusted 5-year OS was 0.856 (95% CI 0.533-0.962). Two of the 15 patients (13.3%) died within 20 months of their initial diagnoses following progression to metastatic disease; both had triple-negative breast cancer.

Conclusions: In our cohort, one-third of patients diagnosed with PABC presented with node-positive disease, more than half had HER2+ disease, and all received chemotherapy, suggesting a high prevalence of locally advanced and biologically aggressive disease. Further research is needed to better understand the most effective treatment options for patients who are diagnosed with breast cancer while pregnant or postpartum. Given the relative rarity of PABC, a centralized, multi-institutional PABC registry could help facilitate better understanding of the disease and delivery of evidence-based care.

1148170 - Digital pre- and post-test clinical decision support tools help providers identify and manage high-risk patients over time

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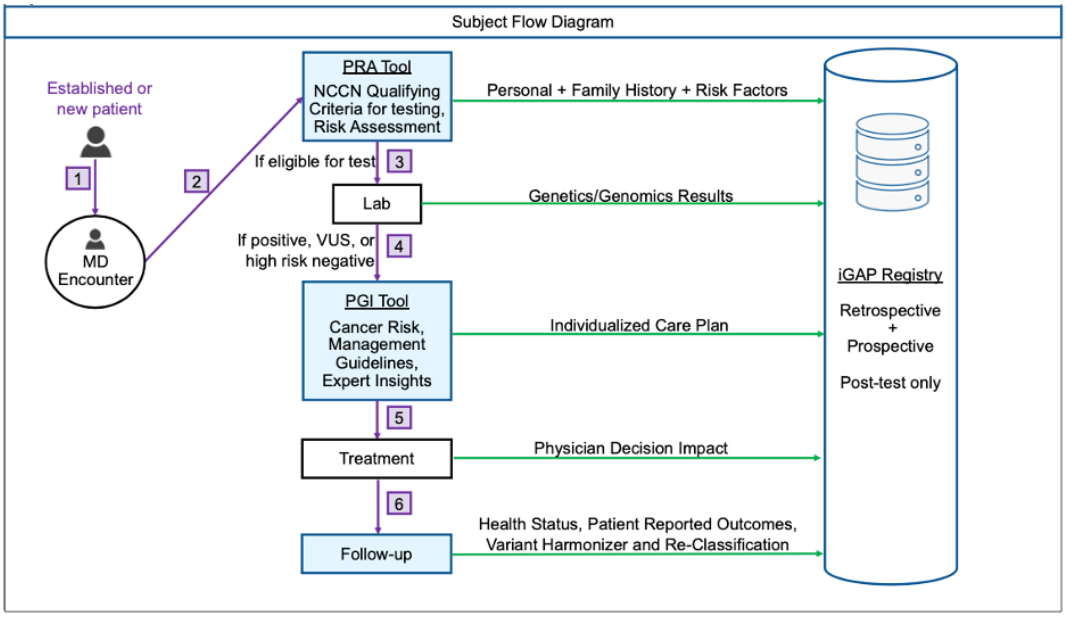
Background/Objective: Digital tools are rapidly shaping the way providers practice medicine and patients consume information. With a national shortage of genetic experts, the adoption of digital tools in oncology has allowed for pedigree construction, genetic risk analysis, and patient education that capitalizes on natural language processing. Barriers to the adoption of precision prevention in oncology still exist largely due to complex and constantly evolving qualifying guidelines for genetic testing and a lack of time and familiarity with management of genetically predisposed patients. In one study, 37% of newly diagnosed breast cancer patients with a pathogenic variant had a family history that warranted genetic testing prior to the diagnosis1. Incorporating digital tools for pre- and post-test clinical decision support allows for providers to identify and manage high-risk patients and refer appropriate patients for genetic services more easily.

Methods: The Medneon Digital Health Platform, both browser and mobile compatible, incorporates a pre-test risk assessment tool (Predictive Risk AssessmentTM) that allows providers to identify patients who meet qualifying criteria for genetic testing and/or genetic counseling by collecting patient and family history. A logic system determines if the patient meets NCCN, ASBrS, and/or USPSTF guidelines. Furthermore, the Tyrer-Cuzick v8 risk calculator and the Breast Cancer Risk Assessment Tool (Gail Model) estimate an unaffected woman's lifetime and short-term risks to develop breast cancer. A letter of medical necessity is generated for patients who meet qualifying criteria for genetic testing and/or breast MRI. Uniquely, a post-test decision support tool (Personalized Genetic InsightsTM) reports gene-disease associations, cancer risks, age-adjusted penetrance curves, NCCN management recommendations, and expert insights, which include primary and secondary sources of literature that are not found in the NCCN Guidelines but are routinely used to manage cancer risk.

Results: As an example, these tools can automatically feed data into a digital case report for the Informed Genetics Annotated Patient Registry (iGAP), a multi-center longitudinal, observational IRB-approved study designed to capture germline genetic and genomic test results and their utilization and impact on treatment practices and outcomes. Currently, there are 2435 enrolled subjects, 1480 whom have completed a risk assessment and utilized post-decision support following return of results. Of these, 1231 have been diagnosed with breast cancer.

Conclusions: It is common for non-genetic providers to express a need for more genetic-focused education to feel better prepared to counsel patients regarding genetic test results2-5. The higher the non-genetic provider's knowledge level, the more confident the provider feels in their information giving6. Digital clinical decision support tools increase provider knowledge and confidence which ultimately allows identified patients to benefit from tailored screening and prevention recommendations. Furthermore, identifying pathogenic variants allows for cascade testing of unaffected relatives, allowing cancer to be prevented or identified early at its most treatable stage.

Figure. Patient flow diagram



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1148295 - The role of skin biopsies in secondary angiosarcoma

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Background/Objective: Secondary angiosarcoma (SAS) of the breast is a rare radiation-associated malignancy with poor prognosis. SAS is predominantly cutaneous with a high risk of local recurrence after surgery alone, suggesting occult skin disease beyond the area of visible abnormality. Thus, additional skin biopsies to characterize the extent of occult microscopic disease might be useful and guide the extent of surgery and radiation. The goal of this study is to evaluate use of additional skin biopsies in SAS and their impact on treatment.

Methods: A retrospective study was performed on 52 patients with SAS at a single tertiary center between 1997-2020. From medical records, data were collected on skin biopsies performed between SAS diagnosis and treatment. A multidisciplinary team (MDT- surgical, medical and radiation oncology, dermatology, pathology, radiology) reviewed clinical notes and photographs at presentation. Biopsies were classified as 'diagnostic' if performed for distinct suspicious visible lesions at varying distance from the primary site of SAS, versus 'scout' if performed of normal appearing skin >1cm from the visible SAS. The MDT determined whether skin biopsies affected surgical or radiation treatment.

Results: Fifty-two patients with SAS were included, 40 with primary disease and 12 with recurrent disease. Median age was 68 years (range: 40-86 years), and median time from initial breast cancer to SAS diagnosis was 7 years (range: 4-29 years). Fourteen patients (27%) underwent ≥1 skin biopsy after diagnosis, median 4.5/patient, range 1-12. Use of additional biopsies did not vary significantly by patient age, years from initial breast cancer to SAS, diagnosis year, extent of breast area involved, or multifocal disease. Among the 14 patients who underwent additional biopsies, 73 biopsies were performed, all diagnostic in 7 patients (50%), mix of diagnostic/scouting in 6 (42.9%), and all scouting in 1 (7.1%), see Table for results by distance from visible disease. Among additional diagnostic biopsies, SAS positivity decreased with distance from visible disease, 86% within primary disease, 83% <1cm away, 57% 1-5cm away, 8% >5cm away (trend $p<0.001$). Among biopsies ≥1 cm away from the primary area of visible disease, scout biopsies rarely showed SAS (1/24=4%) compared to diagnostic biopsies (5/19=26%, $p=0.07$). Biopsies <1cm from the primary area of disease did not change treatment plans, but biopsies with SAS >1cm away led to changes in the surgical plan in 2 patients. One patient had 1 of 6 scout biopsies positive for angiosarcoma in normal appearing TRAM flap skin (1-5 cm from visible disease), resulting in TRAM resection. A second patient had a single diagnostic biopsy with SAS >5cm from primary disease (contralateral breast) resulting in contralateral mastectomy. Skin biopsies did not affect radiation treatment plans in any cases.

Conclusions: In this retrospective series of SAS patients, approximately 1/4 had additional skin biopsies. Diagnostic biopsies appear useful for suspicious lesions >1 cm from the primary area of visible disease that would impact the surgical plan. Scouting biopsies rarely showed SAS but did impact the surgical plan in 1 patient, and their value in SAS requires further study.

Table. Percent of diagnostic and scout biopsies positive for SAS and comparison to distance of biopsies from visible disease

	Diagnostic Biopsies (N=49)		Scouting Biopsies (N=24)	
Distance from visible disease	N	% positive for SAS	N	% positive for SAS
Within	21 (43%)	18 (86%)	NA	
<1cm	6 (12%)	5 (83%)	NA	
1-5 cm	7 (14%)	4 (57%)	18 (75%)	1 (6%)
>5 cm	12 (25%)	1 (8%)	6 (25%)	0 (0%)
Missing	3	0	0	0
All	49	28 (57%)	24	1 (4%)

1148737 - Designing an enhanced recovery after surgery (ERAS) protocol for patients undergoing mastectomy with or without alloplastic breast reconstruction using Consolidated Framework for Implementation Research (CFIR) principles

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Background/Objective: There has been a rise in the use of evidenced-based enhanced recovery after surgery (ERAS) protocols since they were initially introduced in 2010. These protocols focus on key elements that improve patient recovery after surgery. Although ERAS protocols have been described and accepted for post-operative management in several other surgical fields, their utilization in patients undergoing mastectomy with or without alloplastic breast reconstruction is underwhelming. The goal of this study is to explore potential facilitators and barriers to successful ERAS implementation for mastectomy patients at a large academic health center. This will serve as the foundation for implementing and evaluating the impact of a formal ERAS protocol on patient outcomes and hospital cost-savings.

Methods: Structured interviews based on the Consolidated Framework for Implementation Research (CFIR) framework were conducted with stakeholder groups including breast surgeons (n=4), plastic surgeons (n=1), breast clinic nurses (n=4), peri-operative nurses (n=3), post-operative nurses (n=2), and anesthesiologists (n=4). Interviews were conducted via a secure video conferencing platform and focused on topics related to ERAS implementation, including system factors and work processes that might impact successful implementation. Focus group discussions were recorded and transcribed. Directed content analysis was independently performed on each set of transcripts by a breast surgeon and 2 human factors researchers using an established coding structure based on CFIR. Any disagreement among coders was resolved through discussion and consensus.

Results: Stakeholders had multiple criteria for defining successful ERAS implementation. These included traditional “patient outcome” variables (e.g., decreased post-operative nausea/vomiting and narcotic use, improved convalescence, etc.). However, success was also defined as “minimal additional workload” and the “ability to adhere to protocol, given the current complexities of the organization.” A variety of factors were characterized as either barriers or facilitators to “successful” implementation. Many of these were described similarly, with the same factor being described either as a necessary condition (facilitator) or a potential impediment to success if poorly done (barrier). Examples included

the need for “clear communication” across disciplines as well as “clarity of roles and responsibilities” associated with the new ERAS protocol. Other themes were associated with “logistics and resource management” such as the nature and timing of patient education, order set input, and discharge, as well as “patient preferences” or social support. Results of our analyses also revealed a small number of potential unintended consequences (both positive and negative), such as nurses having fewer opportunities for enjoyable interactions with “healthier” patients, who will now qualify for ERAS (potential negative). A positive unintended consequence included “increased flexibility” in scheduling staff across units, due to less variability in process and procedures.

Conclusions: Potential facilitators and barriers to implementation of an ERAS protocol were identified. Designing the implementation process to proactively address these issues will help ensure successful rollout of this protocol with increased user adoption and adherence. Ultimately, these efforts will result in a standardized ERAS protocol and implementation toolkit that will foster the broader dissemination and uptake of this evidence-based intervention.

1148430 - Comparison of treatments and outcomes of patients before and during the COVID-19 pandemic in a rural state

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Background/Objective: The onset of the COVID-19 pandemic led multiple national organizations to endorse triage guidelines for breast cancer patients based on local COVID-19 disease burden and hospital resources. These included the use of neoadjuvant endocrine therapy (NET) to delay surgical intervention for patients with early-stage ER+ breast cancer. There are little data on the impact of short-term NET on surgical outcomes and subsequent chemotherapy use. We compared treatment and outcomes of ER+ breast cancer patients during the early pandemic (EP) compared to the pre-pandemic period (PP).

Methods: All patients with newly diagnosed ER+, Stage 0-III breast cancer first seen or diagnosed between February 15 and May 31, 2020 at 1 community and 1 academic institution were identified by retrospective chart review. A total of 44 patients were identified. These patients were then matched by clinical stage, HER2 receptor status, and age to a cohort of pre-pandemic patients. Patient and tumor characteristics, type and timing of surgical treatment, chemotherapy and endocrine treatment were compared between the cohorts. Stratified exact conditional logistic regression was performed to evaluate group differences in patient, tumor, surgical, and therapeutic characteristics.

Results: The groups were well matched by tumor histology, grade, ER/PR expression, and clinical T and N stage. The PP group had more patients with lymphovascular invasion on biopsy (29% PP vs. 7% EP; p=0.02). Although both groups were equally likely to receive endocrine therapy (82% PP vs. EP 93%, p=0.13), the PP patients were more likely to receive it the adjuvant setting only (94% PP vs. 75% EP,

p=0.01) with the EP group more likely to receive both NET and adjuvant endocrine therapy. Two PP (6%) and 10 EP patients (25%) received NET. Duration of NET was longer in the PP group (mean=32 weeks PP vs. 10.6 weeks EP). The rate of chemotherapy use was similar (39% PP vs. 33% EP, p=0.77), but the EP group was less likely to receive neoadjuvant chemotherapy (58% PP vs. 29% EP, p=0.05). There were no significant differences in time to surgery, type of breast or axillary surgery, receipt of reconstruction, pathologic tumor size, or positive margin rate.

Conclusions: In a rural state with low EP COVID rates, one quarter of ER+ breast cancer patients received short course NET, but did not experience longer time to surgery, changes in surgical or adjuvant therapy, or evidence of upstaging compared to historical controls. The effects seen in treatment of patients early in the pandemic were likely mitigated by prompt return to normal surgery schedule later in the pandemic.

1148087 - A pilot study of a low-cost, mixed-reality human simulation to teach and assess breast cancer communication and procedural skills

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Background/Objective: While simulators accelerate procedural skill acquisition, commercially available breast simulators are expensive and fail to address the essential communication elements associated with the procedure. Therefore, we created, and pilot tested a low-cost mixed reality human simulation to teach and assess breast cancer communication and procedural skills.

Methods: A breast simulator to perform lumpectomy and sentinel node biopsy was constructed for approximately $60. Postmastectomy breast prostheses donated by the local chapter of the American Cancer Society (ACS) served as simulated breasts that were placed upon a plastic mannequin torso. A rectangular hole cut in the mannequin that was filled with foam and a synthetic skin overlay served as the axilla. Felt balls (blue=sentinel and beige=non-sentinel) embedded in the foam served as axillary lymph nodes. Seventeen residents (PGY1 to 4 level) completed the breast simulation. First, residents performed a pre-procedural office visit with a standardized patient (SP). In this part of the scenario, residents were required to deliver the diagnosis of breast cancer and discuss the surgical options for treatment. Then, the residents performed a lumpectomy and sentinel node biopsy using the low-cost breast simulator. Finally, participants executed a post-operative patient hand-off. Residents were assessed during each phase of the scenario using a binary (done/not done) checklist. Residents also completed a pre/post-simulation survey.

Results: More than 70% of residents had performed 5 or fewer breast procedures, while the 3 interns had performed no breast procedures. The resident mean rating of the realism of the simulation was 4.5 (1=not very realistic, 5=very realistic). Resident procedural confidence increased from 2.5 to 3.8 (1=least confident, 5=most confident) and anxiety level decreased from 3.7 to 3.1 (1=least anxious, 5= most anxious) following the simulation. Resident performance in the SP interaction, the procedure and the handoff assessed using a binary checklist is shown in Table.

Conclusions: We have successfully created, and pilot tested a longitudinal simulation to teach and assess breast communication and procedural skills for a fraction of the costs that would be required using commercially available devices. The simulation was well received by the residents, distinguished between resident levels, and improved their confidence and lessen anxiety. Like other modular curricula (i.e., FLS and FES), low cost breast simulations could be a part of a Fundamental of Breast Surgery (FBS) curriculum.

Table. Resident performance

Checklist (# of Items)	Mean # Items Missed			
	PGY-4 (N=2)	PGY-3 (N=4)	PGY-2 (N=4)	PGY-1 (N=7)
SP Interaction (19)	2.0	2.25	3.5	3.7
Procedure (20)	2.0	3.5	8.7	12.7
Handoff (25)	0.5	1.0	5.3	11.0

1148239 - Is there a subset of patients with triple-negative breast cancer (TNBC) in whom adjuvant chemotherapy may be omitted?

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Background/Objective: There is increasing interest in treatment de-escalation in select patients to reduce toxicities associated with treatment without sacrificing treatment efficacy. Identifying characteristics associated with favorable clinical outcomes in patients who omitted adjuvant chemotherapy (AC) may facilitate understanding of patient populations in which chemotherapy de-escalation is feasible. In this study, we sought to 1) identify clinical characteristics associated with risk of distant recurrence in patients with TNBC according to receipt of AC vs. no AC; and 2) identify a patient subset in whom AC may be omitted.

Methods: Our study was approved by our IRB. We included patients diagnosed with TNBC at a large tertiary academic health system between 2009 and 2019 who underwent breast surgery with either breast-conserving therapy or mastectomy, and either received AC or no AC. Patients who received neoadjuvant chemotherapy were excluded. A multivariable linear regression model was used to identify sociodemographic and clinical characteristics associated with distant recurrence. Inverse probability weighted Cox models were used to estimate the average treatment effect of AC on disease-free survival (DFS) and overall survival (OS) while adjusting for patients' age at diagnosis, race, insurance status, pathologic T stage, nodal status, overall pathologic stage, definitive surgery, and receipt of adjuvant radiation therapy.

Results: Of the 940 patients included in this study, 734 patients received AC and 206 did not. On average, patients who did not receive AC were older than those who received AC (mean age 67.9 vs 54.5, $p<0.001$), more likely to have smaller tumors at the time of diagnosis (45.6% vs 40.2% <= 2cm, $p<0.001$) and lower grade tumors (55.3% vs 80.8% grade III, $p<0.001$), less likely to have lymphovascular invasion (12.1% vs 19.0%, $p=0.041$), and less likely to receive adjuvant radiation (48.1% vs 63.8%, $p<0.001$). The presence of 1-3 involved lymph nodes, Stage II or Stage III disease were significantly

associated with distant recurrence, independent of receipt of AC (see Table). Overall, compared to those who received no AC, receipt of AC was associated with a lower hazard ratio of 0.43 and 0.41 in DFS ($p=0.001$) and OS ($p<0.001$) respectively.

Conclusions: Receipt of AC significantly reduces the likelihood of distant recurrence and improves DFS and OS in patients with TNBC. A significant number of patients (n=170), however, remain disease-free (median follow-up 3.2 years) despite AC omission. Further work to correlate novel biomarkers, e.g., the extent of and functional differences of tumor infiltrating immune cells using conventional immunohistochemistry and next-generation sequencing platforms, with clinical outcomes according to receipt of AC is underway. Future clinical trials to assess feasibility of treatment de-escalation in patients with TNBC will require novel prognostic and risk stratification strategies analogous to the 21-gene Recurrence Score assay.

Table. Multivariable logistic regression of variables associated with distant recurrence in the overall cohort and in patients with pathologic Stage I TNBC

	Overall cohort				Pathologic Stage I			
	OR	(95% CI)		P	OR	(95% CI)		P
Chemotherapy								
Adjuvant chemotherapy (Ref.)								
None	1.80	9.87E-01	3.23E+00	0.051	1.61	5.26E-01	4.67E+00	0.387
Adjuvant radiation								
yes (Ref.)								
no	1.31	7.29E-01	2.35E+00	0.368	0.57	3.74E-02	6.37E+00	0.387
Age at Diagnosis								
>60 (Ref.)								
<40	1.44	6.33E-01	3.20E+00	0.376	0.85	1.04E-01	4.91E+00	0.867
40-60	1.42	8.07E-01	2.56E+00	0.229	0.74	2.15E-01	2.65E+00	0.631
Race								
White (Ref.)								
Black	0.65	3.68E-01	1.10E+00	0.115	0.20	1.08E-02	1.01E+00	0.120
Asian/PI	1.22	3.35E-01	3.53E+00	0.731	0.00	0.00E+00	1.68E+30	0.990
Other/NA	2.34	5.09E-01	8.78E+00	0.232	3.23	1.56E-01	2.40E+01	0.316
Insurance								
Private (Ref.)								
Medicare	1.22	6.81E-01	2.17E+00	0.501	0.88	2.34E-01	3.20E+00	0.842
Medicaid	0.32	7.77E-03	3.62E+00	0.451	1.87	2.64E-01	8.20E+00	0.455
Self insured	1.14	4.06E-01	2.76E+00	0.782	0.00	0.00E+00	2.27E+158	0.996
Pathologic T Stage								
pT1 (Ref.)								
pT2	1.08	5.35E-01	2.23E+00	0.835	---	---	---	---
pT3	0.64	1.39E-01	2.45E+00	0.538	---	---	---	---
pT4	1.99	2.45E-01	1.84E+01	0.523	---	---	---	---
No. of involved nodes								
0 (ref.)								
1-3	1.99	1.08E+00	3.64E+00	0.026	0.00	0.00E+00	NA	0.997
>3	1.56	2.55E-01	9.28E+00	0.624	0.00	0.00E+00	NA	0.997
Overall Pathologic Stage								
I (Ref)								
II	3.09	1.22E+00	7.78E+00	0.017	---	---	---	---
III	9.45	1.29E+00	7.19E+01	0.028	---	---	---	---
IV	0.00	0.00E+00	NA	0.984	---	---	---	---
Definitive surgery								
Breast Conservation surgery (Ref.)								
Mastectomy	1.49	8.23E-01	2.71E+00	0.187	5.62	5.21E-01	9.38E+01	0.229

1148598 - Are we overtreating patients with T1a HER2+ breast cancer?: An analysis of chemotherapy use from the National Cancer Database

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Background/Objective: While the utility of systemic therapy (chemotherapy and targeted anti-HER2 therapy) is well defined for patients with locally advanced HER2+ disease for both downstaging and prognostication, its benefit in patients with T1a HER+ cancers is not well understood. These patients have favorable outcomes with 5-year overall survival exceeding 95% without systemic therapy. We sought to investigate practice patterns of chemotherapy use in this population.

Methods: From the National Cancer Database (2013-2018), we identified female patients with HER2+ cancers staged as cT1aN0 or cT1bN0 and stratified by receipt of chemotherapy. With univariate and multivariable analyses, we assessed the clinicopathologic features associated with the receipt of neoadjuvant chemotherapy in patients with cT1a tumors and the receipt of adjuvant chemotherapy in those with pT1a tumors.

Results: Of 5,176 women with cT1aN0 HER2+ cancers, 88 (2%) received neoadjuvant chemotherapy of whom 38% had a pCR in the breast. Younger age and hormone-receptor (HR) negative tumors were factors independently associated with receipt of neoadjuvant chemotherapy (all $p<0.001$). Of 11,688 women with pT1aN0 HER2+ cancers, 5,588 (48%) received adjuvant chemotherapy. Rates of use increased over the analysis period from 39% in 2013 to 53% in 2018 ($p<0.001$). Factors independently associated with receipt of adjuvant chemotherapy included younger age, having a poorly differentiated tumor, exhibiting lymphovascular invasion, undergoing adjuvant radiation (Table, all $p<0.001$). There were no differences in overall survival when comparing those who did and did not receive neoadjuvant (cT1a, $p=0.15$) and adjuvant (pT1a, $p=0.24$) chemotherapy.

Conclusions: The use of chemotherapy in patients with HER2+ T1a cancers is increasing over time and is, as expected, more common among patients with unfavorable clinicopathologic features. Since no prognostic algorithm currently exists, more prospective data is needed to understand which of these patients may derive benefit from systemic therapy and which may safely avoid the morbidity of chemotherapy.

Table. Factors associated with neoadjuvant and adjuvant chemotherapy in patients with T1a HER2+ cancer on multivariable analysis (OR: odds ratio; C.I.: confidence interval; ref: reference category)

Factors associated with receipt of neoadjuvant chemotherapy (cT1aN0)			
	OR	*95% C.I.*	*p*
Age	0.97	0.95-0.9	0.001
Hormone receptor status			
Negative (ref)			
Positive	0.18	0.11-0.30	<0.001

Factors associated with receipt of adjuvant chemotherapy (pT1aN0)			
	OR	*95% C.I.*	*p*
Age	0.96	0.95-0.97	<0.001
Tumor grade			
Well-differentiated (ref)			
Moderately-differentiated	1.28	0.90-1.81	0.17
Poorly-differentiated	2.08	1.46-2.98	<0.001
Lymphovascular invasion			
No (ref)			
Yes	2.80	1.91-4.11	<0.001
Anti-HER2 therapy			
No (ref)			
Yes	143.69	118.63-174.05	<0.001

1148644 - Health care utilization of patients with atypical hyperplasia of the breast

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Background/Objective: Atypical ductal and lobular hyperplasia (collectively, atypical hyperplasia, AH) are considered high risk lesions for the subsequent development of breast cancer. In addition, surgical excision of the area with AH is commonly performed to rule out concomitant cancer. This review evaluates utilization of medical resources (specialist visits, chemoprophylaxis use, genetic testing, and receipt of high-risk screening with MRI/mammogram) by patients with AH. The use of medical resources in the context of cancer risk management is compared between patients who underwent surgical excision and those who did not.

Methods: We conducted a retrospective review of all women diagnosed with atypical ductal or lobular hyperplasia at a single health system between 1/1/2010 and 12/31/2018. Patient and management characteristics such as age, race, menopause status, insurance status, symptoms prompting diagnosis, specialist visits (medical oncology, surgery, high risk clinic, genetic counseling and plastic surgery), chemoprophylaxis use, genetic testing, high-risk screening use, and diagnosis of cancer were compared between those who underwent surgical excision and those who did not using Fisher's exact test.

Results: We identified 94 patients with AH. Of these, 12 were diagnosed with concomitant ductal carcinoma in situ (DCIS) after initial surgical excision. These 12 patients were excluded from further analysis. Of the remaining 82 patients with AH, the majority were non-Hispanic white (78%), younger than 65 (77%) and had private insurance (92%). Most women were post-menopausal (60%) and

asymptomatic prior to diagnosis (67%). The most common imaging abnormality leading to AH diagnosis was microcalcifications (66%). For additional work up, 9% underwent genetic testing. For management, 31 patients (38%) began a high-risk breast screening protocol that included breast MRI, 32 (40%) were recommended chemoprophylaxis with 18 (22%) receiving it, and 60 (73%) underwent initial surgical excision. In total, nearly half of the patients with AH subsequently had ≥5 number of specialist visits. There was no difference in the rate of subsequent invasive breast cancer development between those who underwent initial surgery and those who did not (p=0.22). Of the 60 patients who underwent initial excision, 2 (3%) were subsequently diagnosed later with invasive cancer. Of the 22 patients who did not initially undergo excision, 2 (9%) were subsequently diagnosed later with invasive cancer. Patients who underwent surgical excision were more likely to undergo subsequent breast screening with breast MRI (p=0.006) and mammograms (p=0.002). They were also more likely to have more visits with specialists (p=0.0002). They seemed to be more likely to be recommended chemoprophylaxis as well, though this was not statistically significant (p=0.11).

Conclusions: About half of patients with atypical hyperplasia of the breast use medical resources frequently. Those who underwent surgical excision were more likely to continue intensive breast cancer screening, including the use of breast MRI, however, no differences in subsequent rates of breast cancer were found. Additional studies are needed to determine how to efficiently manage the risk of breast cancer in patients with AH.

Table. Patient characteristics of women with atypical hyperplasia of the breast who underwent surgical excision vs no surgical excision, single institution, 01/01/2010-12/31/2018, n=94

	All (n=82)		Surgical Excision n=60		No Surgical Excision n=22	
	N	%	N	%	N	%
Age at Diagnosis (years)						
18-50	28	34.1	21	35.0	7	31.8
51-64	35	42.7	25	41.7	10	45.5
65+	19	23.2	14	60.1	5	22.7
Race						
White	64	78	50	83.3	14	63.6
Black	0	0	4	6.7	0	0
Asian	4	18.2	2	3.3	4	18.2
American Indian/Alaskan native	0	0	0	0	0	0
Native Hawaiian/other pacific islander	0	0	0	0	0	0
Other	1	4.6	1	1.7	1	4.6
Chose not to answer	3	13.6	3	5.0	3	13.6
Year of Diagnosis						
2010-2013	28	34.1	20	33.3	8	36.4
2014-2018	54	65.9	40	66.7	14	63.6
Insurance Status						
Private	75	91.5	55	91.7	20	90.9
Other	7	8.5	5	8.3	2	9.1
Menopause status						
Pre-menopausal	25	30.5	18	30.0	7	31.8
Peri-menopausal	3	3.7	2	3.3	1	4.5
Post-menopausal	49	59.8	36	60.0	13	59.1
Unknown	5	6.1	4	6.7	1	4.5
High risk screening with breast MRI and mammogram						
Yes	31	37.8	26	43.3	5	22.7
No	51	51.6	34	56.7	17	77.3
Chemoprophylaxis Recommended						
Yes	32	39.0	26	43.3	6	27.3
No	50	61.0	34	56.7	16	72.7
Chemoprophylaxis Used						
Yes	18	22.0	17	28.3	1	4.5
No	64	78.0	43	71.7	21	95.5
Number of Specialist Visits[1]						
<4	65	79.3	45	75.0	20	90.9
≥5	17	20.7	15	25.0	2	9.1
Invasive Malignancy Diagnosis						
Yes	4	4.9	2	3.3	2	9.1
No	78	95.1	58	96.7	20	90.9

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1148427 - Occurrence of PDL-1 positivity in hormone receptor-positive breast cancer patients under age 40

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Background/Objective: Breast cancer, when diagnosed in young adults, is often biologically more aggressive. Despite optimal chemotherapy and advances in HER-2 directed therapy, the adjuvant pivotal trials showed that 15-31% of patients recur. The KEYNOTE trials aimed at targeting PDL-1 positive cancers. KEYNOTE-522 showed that pembrolizumab in addition to chemotherapy decreased disease progression in triple-negative breast cancer. KEYNOTE-028 showed that pembrolizumab was well tolerated and had an overall 12% response rate in previously treated ER+/HER2- breast cancer, though analysis of outcome is ongoing, and had a small cohort of patients. In young patients with aggressive ER+ cancer, more strategies are needed to further improve survival.

Methods: This is an IRB approved retrospective study, analyzing hormone receptor-positive breast cancer patients 40 years and younger from January 2015 to January 2020 for PDL1 positivity. Core biopsy blocks were sent for PDL-1 staining. 1% or more PDL-1 positive cells were considered positive for PDL-1. Variables including genetic status, Her-2 status, T and N stage, oncotype RS testing, and disease recurrence were correlated with PDL-1 positivity.

Results: A total of 48 patients had blocks sent for testing. Median age was 38.5 (34.5-40). A total of 28 patients (58.3%) were positive for PDL1. Genetic mutations included BRCA (n=4), CHEK2 (n=1), MUTYH (n=1), NTHL1 (n=1), and several VUS genes (n=4). There was no statistically significant correlation between genetic mutation and PDL1 positivity. Only 22 of the 48 patients (45.8%) had tumors sent for oncotype score. The other 26 patients had either node positive disease or HER-2 positive disease and were not tested. Using Fisher's exact test, only HER-2 status was statistically associated with PDL-1 positivity (0.014). Patients with HER-2 positive disease were more likely to have PDL-1 positive tumors (85.7% vs. 47.1%, OR=8.93, p=0.012). Of the 14 patients with HER-2 positive disease, 5 patients underwent neoadjuvant chemotherapy (TCHP). Two of the 5 patients had complete pathologic response. Median follow-up was 38.5 months (1 month to 74 months). A total of 4 patients had recurrent disease (8.3%), with 3 patients having distant metastases and 1 patient with axillary recurrence. Three of the 4 recurrences were HER-2 negative.

Conclusions: PDL1 testing should be considered in all young patients, especially with HER2 positive breast cancer, to provide additional pathways for treatment with immunotherapy.

Table. Comparing variables with PDL-1 positivity using Fisher's Exact Test

	PDL1 Negative (n=20)	PDL1 Positive (n=28)	P value
Age, n (%)			0.257
20-29	3 (15.0)	3(10.7)	
30-39	9 (45.0)	19 (67.9)	
40	8 (40.0)	6 (21.4)	
Genetics, n (%)			0.311
Neg/VUS	15 (80.0)	25 (89.3)	
Pos	4 (20.0)	3 (10.7)	
HER2, n (%)			**0.014**
Neg	18 (90.0)	16 (57.1)	
Pos	2 (10.0)	12 (42.9)	
T stage, n (%)			0.311
1	17 (85.0)	19 (67.9)	
2	3 (15.0)	9 (32.1)	
N stage, n (%)			0.244
0	10 (50.0)	16 (57.1)	
1	9 (45.0)	7 (25.0)	
3	1 (5.0)	5 (17.9)	
RS, n (%)			1.000
</=25	9 (81.8)	9 (81.8)	
>25	2 (18.2)	2 (18.2)	
Recurrence, n (%)			0.631
No	19 (95.0)	25 (89.3)	
Yes	1 (5.0)	3 (10.7)	

VUS=variant of uncertain significance

1148597 - Breast cancer clinical trial accrual rates unaffected by 2020 COVID-19 quarantine

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Background/Objective: The COVID-19 pandemic changed almost every facet of the health care system, from the supply-chain to staffing to patients' access to medical facilities. In breast surgery, many groups have discussed decreased rate of screening mammography during and immediately after the national quarantine as well as delaying surgical treatment. Given these findings, we hypothesize that breast cancer trial accrual has also been attenuated during and after national quarantine. We aim to describe the effect of the COVID-19 pandemic on a cancer center's breast cancer clinical trial accrual before, during, and after the March 2020 quarantine.

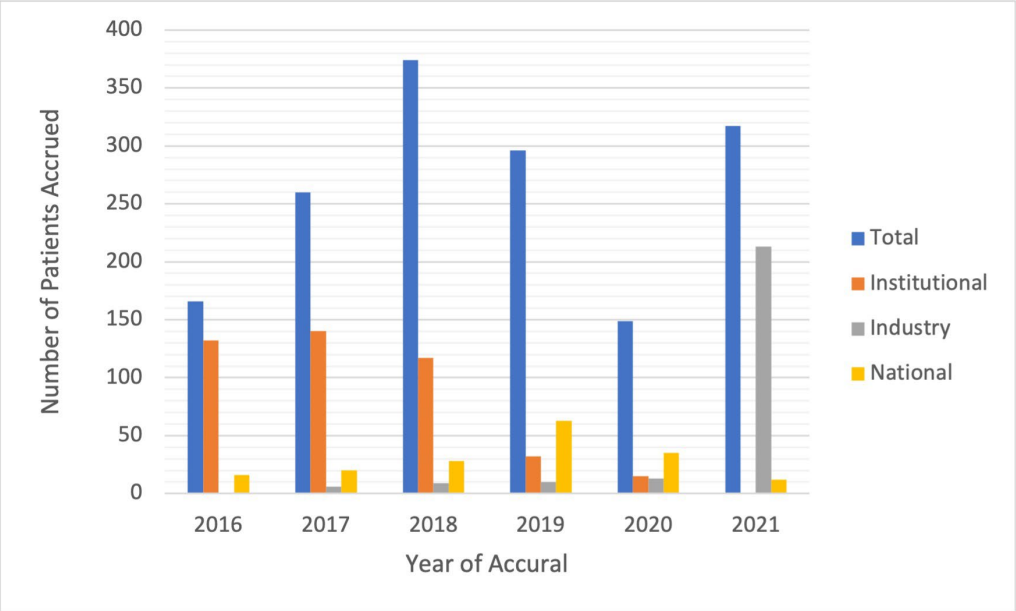
Methods: An NCI designated cancer center's breast clinical trial accrual data was reviewed in the years 2016-2021. Study period was divided between pre-COVID (2018-2019) and post-COVID (2020-2021).

Results: A total of 1562 patients were recruited to breast cancer clinical trials between 2018 and 2021. The total of patients recruited in 2018-2019 versus 2020-2021 was not statistically different (p=0.56). When looking at groups responsible for recruitment (industry, institutional, and national), there were no significant differences in accrual rate pre-COVID and post-COVID. Categories of clinical trials were interventional and non-treatment. Non-treatment trials had the higher annual local target (36336) versus interventional (423) for a combined annual local target for accrual of 36,759. In all categories, 3447 patients were recruited representing 9.4% of the target. In the last year, 1607 patients were

recruited (4.4% of target). Interventional trials did see the highest rate of target accrued in the last year (10.4%), compared to non-treatment trials (4.3%).

Conclusions: Despite barriers to accessing the cancer center's resources, including clinical trial navigation, we did not see a significant difference in clinical trial accrual. Interventional trials had a higher percent of target accrued versus non-treatment trials. This may be due to the expansion of telehealth during quarantine which has persisted since "reopening." It is also possible that due to fewer breast surgery cases performed during quarantine, medical oncologists pursued more neoadjuvant therapies as a bridge to surgery later. More work should be done analyzing patient driven factors affecting breast clinical trial accrual during this period.

Figure. Breast cancer clinical trial accrual



1148356 - Cost effectiveness comparison of implementing intraoperative margin assessment using radiofrequency spectroscopy or full cavity shave margins to reduce re-excision in breast-conserving surgery: A pro-forma

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Background/Objective: In an effort to reduce positive margins and subsequent re-excision after breast-conserving surgery, many providers and facilities seek to mitigate positive margins at the time of initial surgery by implementing either a Full Cavity Shave (FCS) approach or adding the MarginProbe Radiofrequency Spectroscopy System to their surgical protocol. Although both FCS and MarginProbe

have been shown to provide clinical value by reducing positive margins by 50% or more, little has been reported about the health care economic impacts of adopting either of the 2 interventions, and no direct comparison has been evaluated. We sought to create a functioning Pro-Forma for use by facilities and payers to evaluate and compare the cost-effectiveness of implementing FCS or MarginProbe based on personalized variable inputs.

Methods: A decision tree demonstrating 3 possible surgical pathways, BCS, BCS+FCS, and BCS+MarginProbe with clinical inputs for re-excision rate, mastectomy as 2nd surgery, rate of reconstruction, and rate of 3rd surgery derived by a literature review. A surgical pathway cost formula was created using the decision tree and financial inputs derived by fairhealth.org. Using the surgical pathway formula and financial inputs, a customizable Pro-Forma was created for immediate cost-effectiveness analysis using variable inputs.

Results: Utilizing MarginProbe to reduce re-excisions for positive margins is more cost-effective than FCS due to the increased pathology processing costs by using an FCS approach. The reduction in re-excision provided by both FCS and MarginProbe offset their increased spend to various degrees with cost-effectiveness improving as baseline re-excisions rates increase, until ultimately each may become cost-neutral or cost-saving to BCS alone. In the privately insured population, MarginProbe provides a cost-savings over BCS alone when baseline re-excision rates are over 20%. FCS becomes cost-saving when baseline re-excision rates are over 29%. For Medicare patients, MarginProbe provides a cost-savings when baseline re-excision rates exceed 34%, and FCS becomes cost-saving for re-excision rates over 52%. The Pro-Forma demonstrates utility to input personalized evaluation of the cost-effectiveness of FCS and MarginProbe as the standard of care as well as in specific sub-groups of the identified patient population.

Conclusions: The clinical importance of reducing positive margins and subsequent re-excisions after BCS is well known. MarginProbe Radiofrequency Spectroscopy is a more cost-effective solution to FCS to reduce positive margins and re-excisions by 50% or more. The degree of cost-effectiveness or cost-savings to health care payers can be evaluated for both interventions by utilizing the Pro-Forma with customized variable inputs.

Table. Figure: Pro-forma cost-effectiveness in sample population

Variables		Commercial		Medicare		Uninsured	
BCS per Year: Insured Commercial	26						
BCS per Year: Insured Medicare	19	Procedure Costs		Procedure Costs		Procedure Costs	
BCS per Year: Uninsured		BCS	$ 12,986	BCS	$ 7,436	BCS	$ 12,019
Rate of Reoperation BCS	19.6%	BCS+FCS	$ 16,094	BCS+FCS	$ 10,825	BCS+FCS	$ 19,327
Rate of Re-Ex BCS	62%	BCS+MP	$ 15,017	BCS+MP	$ 9,561	BCS+MP	$ 15,450
Rate of TM post BCS	38%						
Rate of TM post BCS as bilateral	33%	TM	$ 13,231	TM	$ 6,242	TM	$ 17,130
Rate of Reconstruction	47%	IR	$ 7,957	IR	$ 6,269	IR	$ 16,818
Rate of IR	75%	DR	$ 9,626	DR	$ 9,102	DR	$ 22,742
Rate of DR	25%						
Rate of 2nd Reoperation	15%	Path Shave	$ 518	Path Shave	$ 565	Path Shave	$ 1,218
Rate of 2nd Re-ex BCS	37%						
Rate of TM post 2nd Reop	63%	Pathway Cost		Pathway Cost		Pathway Cost	
Rate of Reoperation BCS+FCS	9.8%	BCS	$ 16,977	BCS	$ 9,901	BCS	$ 17,366
Rate of Re-Excision BCS+FCS	62%	BCS+FCS	$ 17,967	BCS+FCS	$ 12,000	BCS+FCS	$ 21,842
Rate of TM post BCS+FCS	38%	BCS+MP	$ 17,012	BCS+MP	$ 10,793	BCS+MP	$ 18,123
Rate of Reoperation BCS+MP	9.8%						
Rate of Re-excision BCS+MP	62%	Impact per Patient		Impact per Patient		Impact per Patient	
Rate of TM post BCS+MP	38%	FCS vs BCS	$ 990	FCS vs BCS	$ 2,099	FCS vs BCS	$ 4,476
MP Disposable Cost	$ 995	MP vs BCS	$ 36	MP vs BCS	$ 892	MP vs BCS	$ 758
MP Capital Cost	$ 50,000	MP vs FCS	$ (954)	MP vs FCS	$ (1,207)	MP vs FCS	$ (3,718)
		NET COST per patient		ANNUAL IMPACT		COST-EFFECTIVENESS	
Adding FULL CAVITY SHAVE to BCS:		$ 1,458	INCREASE	$ 65,627	SPENT	$ 14,881	/ re-ex prevented
Adding MARGINPROBE to BCS: one-time console cost +		$ 397	INCREASE	$ 17,881	SPENT	$ 4,055	/ re-ex prevented
Implementing MARGINPROBE instead of FCS		$ (1,061)	DECREASE	$ (47,746)	SAVED	after case #	47

1148585 - The decrease in bilateral mastectomy rates at accredited cancer centers across the United States

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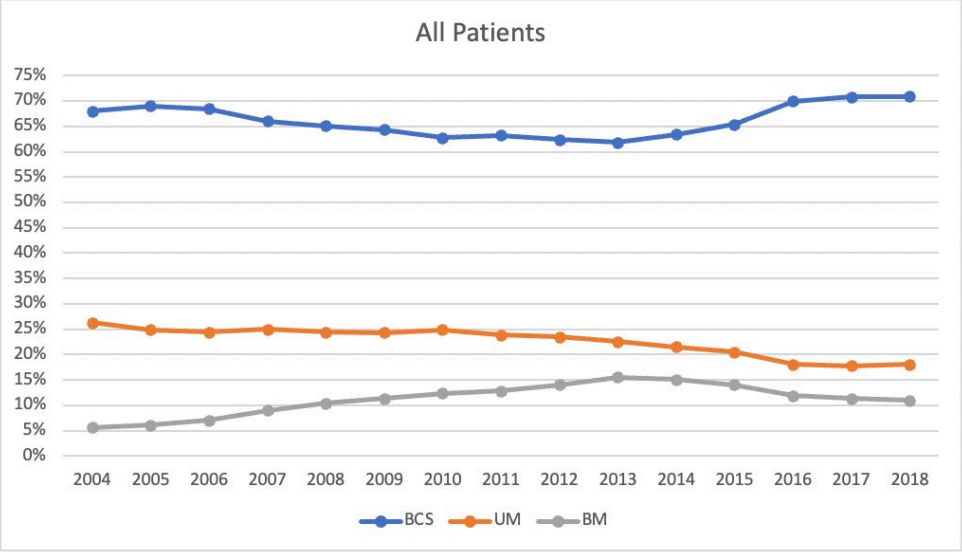
Background/Objective: Bilateral mastectomy (BM) rates have been increasing for greater than a decade, but more recent trends in BM have not been examined. The objective of this study was to examine trends in BM rates over the past fifteen years and whether BM rates have changed for any specific patient group within this time period.

Methods: Using the National Cancer Database (NCDB) we examined BM, unilateral mastectomy (UM) and breast-conserving surgery (BCS) rates for patients with AJCC Stage 0-II breast cancer from 2004-2018. Multivariable logistic regression was used to identify patient and facility factors associated with BM from 2004-2006 and 2016-2018.

Results: Of 1,053,366 patients, 697,290 (66.2%) had BCS, 232,543 (22.1%) had a UM and 123,533 (11.7%) had BM. UM rates have been on a consistent downward trend from 26.3% in 2004 to 18.1% in 2018. BCS rates have increased from a low of 61.9% in 2013 to 70.0% in 2018. Overall BM rates have decreased from a peak of 15.6% in 2013 to 11.0% in 2018; for women under 50 years old BM rates went from a peak of 33% in 2013 to 25% in 2018 (Figure). The decreased trend in BM rates from 2013 to 2018 has been consistent for all patients age groups, race/ethnic groups and all tumor stages. However, despite the downward trend, BM rates in 2018 are still higher than in 2004. For the entire cohort the BM rate was 11.9% in 2018 compared to 5.7% in 2004; for women <50 years old the BM rate was 25.0% in 2018 compared to 10.5% in 2004. To identify which patient groups were more likely to undergo BM in 2018 compared to 2004 we performed logistic regression including age, race, income, insurance status and facility factors of case volume, rural/urban location and type. Compared to 2004-2006, the odds of undergoing BM in 2018 increased for nonwhite races (African Americans, Hispanics, Asians). Compared to whites, the adjusted odds ratio of undergoing BM increased in African Americans from OR 0.40 (95% CI 0.36-0.44) to OR 0.61 (95% CI 0.58-0.64), in Hispanics from OR 0.57 (95% CI 0.50-0.65) to OR 0.69 (95% CI 0.66-0.73), and in Asians from OR 0.43 (95% CI 0.37-0.51) to OR 0.56 (95% CI 0.53-0.60). The likelihood of undergoing BM in 2018 also increased compared to 2004 for patients with Medicaid or no insurance, for patients from low income and rural areas, for centers with annual case volumes under 250 cases, and for community-based centers. In 2018, comprehensive community centers were 14% more likely (OR 1.14 [95% CI 1.10-1.17]) to perform BM than academic/research centers.

Conclusions: BM rates are decreasing across the United States, but disparities in BM by certain social determinants of health have been minimized over the past fifteen years.

Figure. Comparison of rates of patients undergoing BCS vs UM vs BM



1148620 - COVID pandemic leads to delays in mammograms, leading to larger breast cancers

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[1]Mount Sinai West, Harlem, NY, [2]Mount Sinai, New York, NY, [3]Mount Sinai Medical Center, New York, NY, [4]Mount Sinai West, New York, NY

Background/Objective: The objective of this study was to evaluate if apparent delays in mammographic screening during the COVID pandemic resulted in larger breast cancers. Patients undergoing breast cancer surgery pre-COVID pandemic were compared with those post-vaccine-availability. Delays in mammographic screening and tumor size were recorded.

Methods: A retrospective analysis of breast cancer patients who underwent surgery at Mount Sinai East and Mount Sinai West in NYC from March to August 2019 (pre-pandemic) were compared with patients who underwent an operation from March to August 2021 (when vaccine became readily available). Therapeutic interventions (type of index operation, nodal dissections) and clinico-pathologic features were collected, including type of breast cancer, pathologic tumor size, nodal status, and hormone subtype. The difference between the date of the patient's imaging that revealed the index cancer diagnosis (BIRAD 0, 4, 5) and the date of their prior screening mammogram was compared for both cohorts. Patients who had previously underwent bilateral mastectomies were excluded from analysis.

Results: Of the total 991 breast cancer cases included (n = 413 for 2019, n = 578 for 2021), there was a significant increase in the average time between patient's imaging from a mean of 1.9 years pre-pandemic to 2.35 post-vaccine (p=0.0008). This finding was associated with an increase in tumor size. The mean T size in 2019 was 13.8mm while the mean T size in 2021 increased to 16.4mm (p = 0.009). Furthermore, the ratio of T staging significantly shifted towards a higher T stage in the 2021 cases. T1 tumors were found in 73% of patient in the pre-pandemic group vs 61% in the post-vaccine group. T2

tumors were noted in 21% of pre-pandemic patients vs 28% in patients that presented after a vaccine for covid was available (p = .0030).

Conclusions: The COVID pandemic changed patient's utilization of breast screening as evidenced by the significantly increased gap between the time of patient's tumor diagnosis and their prior imaging. This delay in screening is likely multifactorial, possibly revealing both decreased access to physicians and screening centers and patient's hesitancy to engage with medical care given perceived risk. Patients also presented with larger cancers that upgraded to a worsened T stage on final pathology.

1143548 - Effect of latency time and primary tumor type on secondary breast cancer survival by age

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Background/Objective: Secondary cancers account for 16% of cancer diagnoses, with breast cancer (BC) being the most common secondary cancer. Compared to primary BC, secondary BC has unique characteristics and decreased survival, especially in premenopausal women. However, the impact of time between diagnosis of primary and secondary tumor (latency) or primary tumor type on breast cancer-specific survival (BCSS) among women with secondary BC is unknown.

Methods: Females diagnosed with secondary BC, with a prior primary tumor of any type, during 1991-2015 (n=37,625) were obtained from the California Cancer Registry. We assessed the impact of latency since primary tumor (2 years or less, <2 years-5 years, <5 years-10 years, greater than 10 years) and primary tumor type on BCSS by age group (≤50 years, younger (n=5,112); >50, older (n=32,513)) using multivariable Cox proportional hazards regression. Models were adjusted for race/ethnicity, age, socioeconomic status, year of diagnosis, stage, lymph node involvement, and histology type. The results are presented as adjusted hazard ratios (HR) and 95% confidence intervals (CI).

Results: Most older women developed secondary BC greater than 5 years after primary cancer (61.1%), whereas most younger women developed secondary BC within 5 years (53.9%), with significantly fewer after 10 years (16.5% vs 30.2% in older women). Older women with secondary BC tended to have lower stage tumors (Stage 1a: 55.3% vs 44.1% for women ≤50years old), be less likely to get chemotherapy or mastectomies (Chemotherapy: 23.1% vs 50.4%; Mastectomy: 45.2% vs 57.8% for women ≤50years old), be non-Hispanic White (73.9% vs 54.5% for women ≤50years old), have lymph node-negative disease (72.6% vs. 61.6% for women ≤50years old), and have hormone receptor-positive disease (74.3% vs 61.4% for women ≤50years old) than younger women. BCSS was decreased for younger (HR=1.42, CI: 1.27-1.59) and older (HR=1.94, CI: 1.49-2.54) women with a latency <2 years (vs >10). Women with secondary BC after carcinomas of the respiratory system, genitourinary system, myeloma, lymphomas, leukemias, and prior BC consistently had worse survival than women with other primary tumors.

Conclusions: Women who rapidly developed secondary BC, especially women whose primary cancers were breast, respiratory, genitourinary, or hematologic malignancies, had worse survival from their BC compared to those with a longer interval between their 2 cancers. Therefore, we may need to tailor our treatment of secondary BCs based on latency and prior tumor diagnosis.

1138884 - Dermal lymphatic invasion and tissue lymphovascular invasion in breast cancer have synergistic effect on poor prognosis

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Background/Objective: Breast tissue lymphovascular invasion (LVI) is a well-established negative prognostic factor and is associated with more aggressive clinical behavior such as high tumor grade, increased risk for axillary nodal and distant metastases. Dermal lymphatic invasion (DLI) is another variant of lymphatic involvement also associated with poor prognosis. Although DLI and LVI have a similar nature, DLI seems to carry a worse prognosis. The interrelations of tissue DLI and LVI and the possible magnification of the negative prognosis have not been evaluated.

Methods: This study is a retrospective review of records from October 2014 to August 2020 at our institution. We queried and included all women over the age of 18 (median age 54.5±13) with biopsy proven invasive breast cancer who underwent mastectomy and had DLI or LVI reported on final pathology. A cohort of female mastectomy patients without LVI or DLI during the same time frame was compiled for comparison. Rates of locoregional recurrence, distant recurrence, lymph node positivity and overall survival were assessed for each of the DLI and LVI groups and compared to patients without LVI or DLI. Median follow-up time was 29±20 months. The effects of adjuvant radiation and skin frozen sections (F/S) were studied as well.

Results: 176 patients with DLI, LVI or both (DLI/LVI) were included in this study. 328 patients with neither DLI nor LVI were compiled for comparison. Tissue only LVI was encountered in 151 (86%) patients, DLI in 5 (2.8%) and DLI/LVI in 20 patients (11.2%). All patients with DLI or DLI/LVI had positive lymph nodes on final surgical pathology, 78% with LVI and 38% without LVI or DLI (P<0.001). Patients with DLI or DLI/LVI had lowest overall survival (60% and 72% respectively). Locoregional recurrence was the highest in the DLI/LVI group (72%) in comparison to the groups with DLI or LVI alone or the group without LVI or DLI (25%, 20% and 5% respectively, P<0.001). Distant recurrence was higher in DLI/LVI (56%) in comparison to other groups (DLI: 40%, LVI 19% and none 8%, P<0.001). Adjuvant radiation didn't improve survival or recurrence in any of the studied groups. Also, axillary nodal involvement wasn't associated with worse outcomes in same groups of patients. Intra-operative F/S margins had a high negative predictive value (NPV) of 83-100% in all groups.

Conclusions: In our study, we report that combination of DLI and tissue LVI had significantly worse outcomes in studied outcome metrics in comparison to both variants alone or breast cancer without

lymphatic involvement. It means, that the combination of DLI and tissue LVI has a synergistic worse prognosis. Interestingly, our study showed that adjuvant radiation didn't seem to impact treatment outcome in patients with any type of lymphatic involvement. This result is opposite to common opinion that radiation improves treatment outcomes in such patient population. In addition, outcome does not seem to be related to axillary nodal involvement in such patients either. Intra-operative skin F/S margins accurately predict final surgical margins and has high NPV.

1138747 - Mucocele-like lesions of the breast: A systematic review and corresponding upgrade rate to carcinoma

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Background/Objective: Mucocele-like lesions of the breast diagnosed on core biopsy while rare, have historically been excised due to the risk of upgrade to carcinoma. The goal of this study was to provide and compile existing data in order to guide clinical management of this high risk lesion.

Methods: A literature search was performed of PubMed and Google Scholar and each source was cross-referenced. We then performed a review of our institution's pathology database of the most recent 5 years, dating from 1 January 2015 to 5 May 2020. We combined our data with the published data to determine the most accurate upgrade rate. Thirty studies were included with a total of 682 mucocele-like lesions identified on core biopsy and subsequently excised. The pathology was then reviewed and analyzed.

Results: Of the 682 lesions, 231 had features of atypia on core needle biopsy. Of the 231 cases with atypia, 67 were upgraded to carcinoma (including carcinoma in situ and invasive carcinoma) at an upgrade rate of 29%. The overall upgrade rate was 18%. For lesions without atypia, the upgrade rate was 2.5%

Conclusions: While mucocele-like lesions with signs of atypia on core biopsy are at high risk for underlying carcinoma and should subsequently be excised, those without signs of atypia on core biopsy can be considered for close clinical observation with radiological surveillance.

1143612 - Primary breast neuroendocrine tumors: A National Cancer Database analysis

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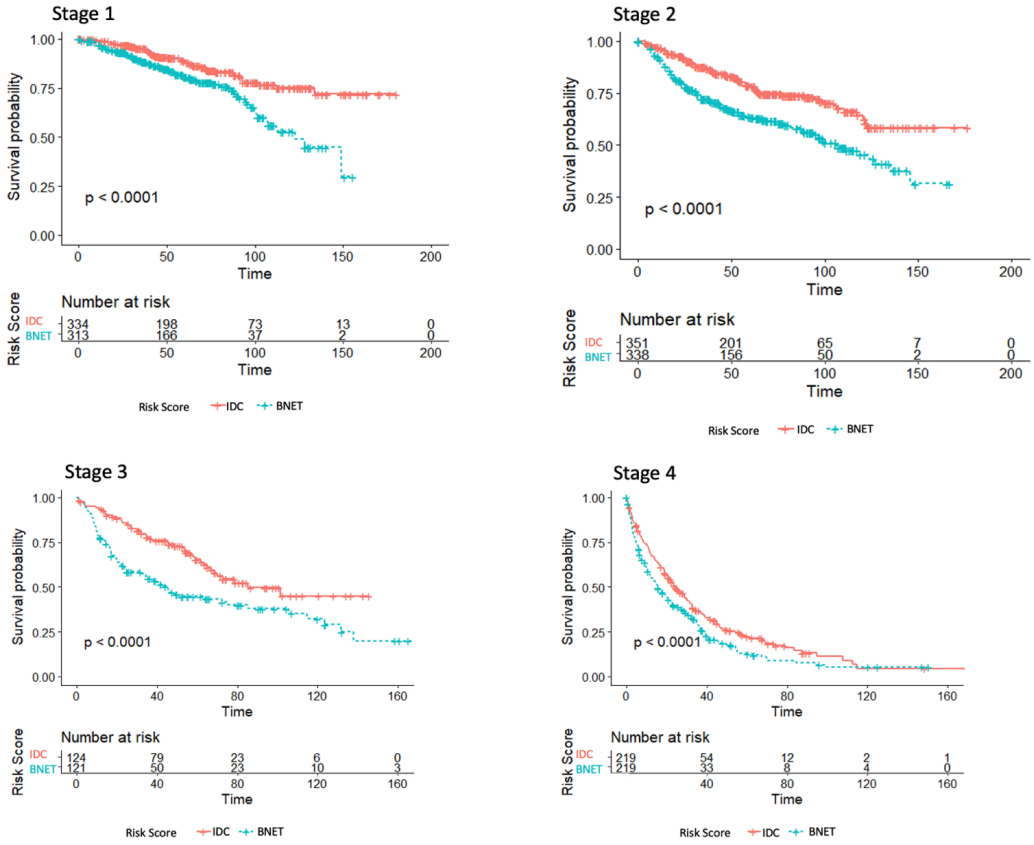
Background/Objective: Neuroendocrine Tumors account for only 2% of solid organ malignancies diagnosed in the United States. Primary breast neuroendocrine tumors (BNETs) represent <1% of all breast cancers subtypes. While BNETs clinically present similarly to other breast cancers, unique biomarkers such as chromogranin and synaptophysin distinguish BNETs from more common breast tumors. We aimed to describe primary BNET tumor characteristics, treatment modalities, and analyze survival outcomes in comparison to invasive ductal cancers (IDC).

Methods: A retrospective cohort analysis was performed using the National Cancer Database from 2004 – 2017. Cases of BNETs were identified by breast histology codes for small cell carcinoma, carcinoma with neuroendocrine differentiation, and neuroendocrine carcinoma. A comparative matched IDC cohort was then created by matching patients by race, age, and disease stage. Kaplan Meier analysis was performed by disease stage and hazard ratios (HR) were calculated with 95% confidence intervals (CI) through the bootstrap sampling method.
Results: A total of 1,389 BNET and 1,967,401 IDC cases were identified. When compared to IDC patients, BNET patients were older ($p<0.01$), had more comorbidities ($p<0.01$), and were more often male (2.1% BNET vs 1.0% IDC, $p<0.01$). There were no significant differences in patient race between the 2 cohorts. BNETs were overall larger in size, higher grade, and more likely to be hormone-receptor and Her2-negative ($p<0.01$ for all). BNET patients presented with more advanced disease stage, defined as Stage ≥2 (65.6% BNET vs 39.5% IDC, $p<0.01$). While patients were treated with surgery ($p<0.01$) and radiotherapy ($p<0.01$) less often compared to IDC patients, they did receive systemic chemotherapy more frequently (53.5% BNET vs 40% IDC, $p<0.01$). Five-year overall survival rates for BNETs were 80% for Stage 1, 63% for Stage 2, 45% for Stage 3, and 13% for Stage 4. When compared to a matched IDC cohort by patient race, age, and disease stage, BNETs demonstrated a lower overall survival by disease stage. Compared to IDC, mortality risk was higher for Stage 1 disease (HR 1.8, 95% CI 1.5 - 2.3, $p<0.01$), Stage 2 (HR 2.0, 95% CI 1.6 - 2.5, $p<0.01$), Stage 3 (HR 1.8, 95% CI 1.3 - 2.3, $p<0.01$), and Stage 4 (HR 1.5, 95% CI 1.3 - 1.8, $p<0.01$).

Conclusions: Patients with BNETs tend to present at a more advanced disease stage and have lower overall survival rates by stage compared to IDC patients. Given the rarity of BNETs, no prospective clinical trial data exists on optimal treatment management. Clinicians and patients should be mindful when developing multidisciplinary oncological treatment plans, as BNETs demonstrate a more aggressive breast tumor phenotype compared to patients with conventional IDC.

Figure. Kaplan-Meier curves comparing overall survival by disease stage for BNETs (blue) and matched IDC cohort (orange)



1140045 - Breast-conserving therapy for T4 non-inflammatory breast cancer: An analysis from the National Cancer Database

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Background/Objective: Breast-conserving therapy (BCT) plus radiation (RT) is equivalent to mastectomy (TM) for smaller, invasive breast cancers (BC). However, for clinical T4a-c BC (skin/chest wall involvement), neoadjuvant chemotherapy (NAC) to downstage or mastectomy is often recommended with BCT only offered to select patients. We aim to evaluate practice patterns and influences on surgical type for cT4a-c BC as well as survival outcomes of those undergoing BCT vs. TM.

Methods: The National Cancer Database was retrospectively reviewed for clinical T4a-c BC treated with BCT or TM between 2004-2015. Age, Charlson Comorbidity Index (CCI), socioeconomics, neoadjuvant/adjuvant therapies, margins, clinical and pathologic stages were assessed. Overall survival (OS) was analyzed using multivariate Cox regression models with subgroup analysis on patients receiving NAC.

Results: 19,456 patients were identified: 2,708 (13.9%) underwent BCT and 16,748 (86.1%) received TM. Median age was 65 for BCT vs. 61 with TM (p<0.0001). NAC was administered to 39.3% of those undergoing BCT vs. 61.5% receiving TM (p<0.0001). Of those with BCT, 2.8% received neoadjuvant RT vs. 4.2% of those with TM (p=0.002). No significant differences were seen in surgery type performed between academic and community centers (p=0.7484), race (p=0.1556), or CCI (p=0.1701). Factors associated with BCT included age (p=0.0059), income (p=0.0318), location (p=0.0012), HER2 status (p=0.0184), clinical stage (p<0.0001), NAC (p<0.001), and adjuvant therapies (p<0.0001). OS was similar between BCT and TM (p=0.332). Positive margins occurred more often in BCT compared to TM (26.6% vs. 13.9%, p<0.0001), but there was no difference in margin status when NAC was applied (p=0.991). OS was increased in patients undergoing BCT vs. TM (p<0.0001) when NAC was given.

Conclusions: For patients with cT4a-c BC, BCT appears to be a reasonable option in carefully selected patients. While BCT remains the less common approach, OS is similar when compared to TM and may even be increased if performed after NAC. Increasing consideration should be given to BCT as a safe alternative, especially in those receiving NAC.

1144454 - Lessons learned from the pandemic: Using telemedicine for preoperative surgical evaluation

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Background/Objective: The COVID-19 pandemic motivated telemedicine care to decrease potential exposures for both patients and staff. For some patients, surgical planning consultation occurred via telemedicine, with physical examination on the day of surgery. We hypothesize that select breast surgical patients can be successfully evaluated preoperatively with telemedicine consultation.
Methods: With IRB approval, patients with initial telemedicine surgical consults between 3/1/2020 and 8/31/2020 were identified from our prospective breast surgical registry. All patients at our institution are seen by breast internal medicine physicians and have imaging and pathology reviewed prior to surgical consultation. Via chart review, we evaluated dates of subsequent in-person preoperative visits and physical exam (day of surgery or prior). Frequency of successful preoperative evaluation using telemedicine alone was assessed, defined as cases in which surgery was completed on the planned day without changes to surgical plan after physical examination in the pre-operative area. Differences in disease presentation and patient characteristics were evaluated by whether first in-person visit occurred on day of surgery versus prior using chi-square tests for nominal variables and Wilcoxon rank-sum tests for ordinal and continuous variables. Complications evaluated included bleeding, infection, seroma, urinary tract infection, dehiscence, flap ischemia, and return to the operating room.

Results: 374 patients underwent breast surgery between 3/1/2020 and 8/31/2020. Among 96 telemedicine patients , 78 were initial consults, and 18 were post-neoadjuvant chemotherapy (NAC) visits of patient previously seen in-person at diagnosis. After the telemedicine visit, 38 patients (39.6%) had additional in-person visit with the breast surgeon prior to their operative date, and 58 patients (60.4%) did not. 53 patients underwent breast-conserving therapy, 41 underwent mastectomy (30 with reconstruction), and 2 underwent axillary dissection. All surgeries were completed on the planned operative day, with no changes in surgical plans for any patients. Overall, 55 patients (57.3%) received neoadjuvant therapy, 23 chemotherapy and 32 endocrine therapy. Compared to patients with in-person visits after telemedicine, patients with telemedicine only prior to surgery were more likely to have NAC

(31.0% vs 13.2%, p=0.04), speak English (100% vs 92.1%, p=0.02), have lower BMI (median 24.9 vs 29.2, p=0.01), and were less likely to undergo reconstruction (22.4% vs 44.7%, p=0.02). Frequency of in-person preoperative visits also varied significantly by surgeon (p<0.001). Among 30 reconstruction patients, 23 had additional in-person visits prior to surgery (6 plastic surgery only, 3 breast surgery only, and 14 with both). Age, ASA score, distance from facility, clinical T or N category, surgery type, unilateral vs. bilateral, and complications did not differ between groups.

Conclusions: Telemedicine was successfully utilized in selected patients at our institution during the COVID-19 pandemic. For patients with language barriers or plans for reconstruction, in-person preoperative visits were preferred. Our findings suggest that for some patients who can complete pre-operative imaging with subsequent surgical telemedicine evaluation, it is feasible to schedule breast surgery prior to physical examination. Telemedicine has potential to address disparities by maximizing access to specialty surgical care while minimizing travel and work/life disturbances for patients from both rural and other underserved communities.

Table. Factors associated with in-person follow-up visit prior to surgical date

Variable	No In-person follow-up visit (n=58)	In-person follow-up visit (n=38)	p-value
Age, years, median (range)	55 (21-86)	58 (29-85)	0.96
Non-English speaker	**0 (0%)**	**3 (7.9%)**	**0.02**
Distance traveled, miles, median (range)	50 (2-800)	54 (2-971)	0.72
BMI, median (range)	**24.9 (18.0-59.1)**	**29.2 (16.5-54.0)**	**0.01**
Palpable lesion, n (%)	26 (44.8%)	14 (36.8%)	0.44
Screen detected, n (%)	36 (62.1%)	20 (52.6%)	0.36
Prior Hx of Breast CA, n (%)	7 (12.1%)	5 (13.2%)	0.87
Malignant diagnosis, n (%)	50 (86.2%)	31 (81.6%)	0.54
cN category, n (%)			0.37
cN0	50 (86.2%)	35 (92.1%)	
cN1	5 (8.6%)	2 (5.3%)	
cN2/cN3	3 (5.2%)	1 (2.6%)	
cT category, n (%)			0.07
cT0	11 (19.0%)	11 (28.9%)	
cTis	6 (10.3%)	9 (23.7%)	
cT1	25 (43.1%)	10 (26.3%)	
cT2	11 (19.0%)	7 (18.4%)	
cT3/cT4	5 (8.6%)	1 (2.6%)	
Received NAT, n (%)	35 (60.3%)	20 (52.6%)	0.46
Bilateral surgery, n (%)	13 (22.4%)	12 (31.6%)	0.32
Mastectomy, n (%)	21 (36.2%)	20 (52.6%)	0.11
Reconstruction, n (%)	**13 (22.4%)**	**17 (44.7%)**	**0.02**
Post Op complication, n (%)	7 (12.1%)	3 (7.9%)	0.51

Patient Education

1147271 - A proposal for an objective classification of decision-making based on disease, treatment, and patient factors

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Background/Objective: Compliance and adherence to recommended oncology treatment can be low. Shared decision making (SDM), which should account for disease, treatment, and patient factors, has been linked to higher patient satisfaction, as well as an improved treatment adherence. The quality of SDM can be improved with decision aids and clinician skills training, but there is no clear objective way to adjust SDM based on types of decisions, which are cancer category specific. This study aims to propose an objective classification of decision-making in the treatment of the 4 most common cancers: breast, lung, prostate, and colon and demonstrate the differences in the content of SDM.

Methods: Using National Comprehensive Cancer Network guidelines, decision trees were created for the treatment of stages (I, II, III) of breast (BC), lung (LC), prostate (PC) and colon cancers (CC) (Table). Each decision was evaluated for the content and a label name was chosen with the input of the study authors. The decisions were divided based on disease-based (DB), treatment-based (TB), and patient factors-based (PB) subcategories, depending on which was deemed most influential on the decision.

Results: Altogether, there were a total of 14 decision types to consider: 3 DB, 6 TB and 5 PB decisions. A breakdown of the decision types is as follows: - DB decisions: subtype (type of cancer: triple-negative or ER positive or Her2 positive breast cancer) BC:1, LC:1, PC: 1, CC:1; location (central or peripheral for lung) LC:1; and stage/node evaluation (sentinel node biopsy vs axillary dissection for positive nodes) BC:2, LC:1. - TB decisions: equivalent (choosing between similar options: 2 medications) BC:3, PC:2; complexity (increasing complexity of similar treatments: whole breast vs. partial breast radiation) BC:4, LC:2, PC:1, CC:2; modality (surgery vs. medication vs. radiation) BC:1, PC:3; combination (radiation after partial mastectomy) BC:1, LC:1; sequence (adjuvant or neoadjuvant therapy) BC:1, LC:1, PC:1, CC:1; and duration (endocrine therapy: 5 or 10 years) BC:1, PC:1. - PB decisions: debilitating (fear of significant morbidity from advancing disease e.g. colonic obstruction) LC:1, CC:1; genetic (prophylactic mastectomy) BC:1; desire (contra-lateral mastectomy) BC:1; comorbidity (smoking or diabetes influencing reconstruction options/delayed reconstruction) BC:1; and sexual (effects on sexual health) BC:1, PC:1. Total number of decisions identified to accept or decline were BC:18, LC:8, PC:9, and CC:7. Within these total decisions, ones that were heavily influenced by patient preference were designated as patient driven (PD). Total PD were BC:5, PC:2, LC:0 and CC:0.

Conclusions: Health care shared decision-making is multilayered and varied among different solid tumor types, often with several medically appropriate treatment options. Here, we present an objective way to categorize these decisions and demonstrate their application within 4 common cancer types. Further research can evaluate if we can adjust patient education, physician training, time allotted for discussion and reimbursement to cancer complexity SDM.

Table. Decision trees: Breast, lung, prostate and colon cancers

Decision Tree: Breast Cancer	
Surgery	1. Surgery with or without radiation (**combination: TB**) 2. Mastectomy or lumpectomy (**complexity: TB**) 3. Mastectomy with or without reconstruction (**complexity: TB**) 4. Mastectomy reconstruction with implant or with autologous tissue (**equivalent: TB**) 5. Lumpectomy with or without onco-plastics, reduction, or mastopexy (**complexity: TB**) 6. Advanced or aggressive: neoadjuvant or adjuvant (**sequence: TB**) 7. Sentinel node biopsy vs. targeted axillary dissection vs. axillary dissection (**stage: DB**) 8. Axillary dissection or axillary radiation (**modality: TB**)
Systemic Therapy	9. Chemotherapy or endocrine therapy (**subtype: DB**) 10. Type of chemotherapy (**equivalent: TB**) 11. Type of adjuvant therapy (**equivalent: TB**) 12. Adjuvant therapy long term duration 5 or 10 years (**duration: TB**)
Radiation	13. Whole breast or partial (**complexity: TB**) 14. Mastectomy: Additional due to advanced disease like nodes, margins, size (**stage: DB**)
Patient Factors	15. Risk Reduction: bilateral mastectomy (**genetic: PB**) 16. Contralateral mastectomy (**desire: PB**) 17. Smoking/uncontrolled diabetes: delayed reconstruction (**comorbidity: PB**) 18. Fertility preservation or ovarian ablation considerations (**sexual: PB**)
Patient Driven	1. Choice of hormone therapy 2. Choice to reconstruct or not with lumpectomy 3. Choice to reconstruct or not with mastectomy 4. Choice of type of reconstruction 5. Choice for contralateral mastectomy
Decision Tree: Lung cancer	
Surgery	1. Peripheral or central (**complexity: TB**) 2. Mediastinal node: positive or negative (**stage: DB**) 3. Minimally invasive or open (**equivalent: TB**)
Systemic Therapy	4. Non-small cell or small cell (**subtype: DB**) 5. Type of chemotherapy (**equivalent: TB**) 6. Concurrent radiation or not (**combination: TB**)
Radiation	7. Stereotactic body radiotherapy (SBRT) or whole lung (**complexity: TB**)
Patient Factors	8. Patient fear of morbidity from inability to breathe (**debilitating: PB**)
Patient Driven	none
Decision Tree: Prostate Cancer	
Surgery	1. Treatment: surgery vs. radiation (**modality: TB**) 2. Treatment surgery: minimally invasive or open prostatectomy (**equivalent: TB**) 3. Aggressive: Neoadjuvant or adjuvant (**sequence: TB**)
Systemic Therapy	4. Androgen deprivation therapy (ADT) or chemotherapy (**modality: TB**) 5. ADT: Short term or long term (**duration: TB**) 6. Gleason score can affect treatment recommendation (**subtype: DB**)
Radiation	7. External or brachytherapy (**complexity: TB**)
Patient Factors	8. Effect on libido (**sexual: PB**) 9. Comorbidities or expected survival: treatment vs. no treatment (**comorbidities: PB**)
Patient Driven	1. Surgery or radiation 2. Type of radiation
Decision Tree: Colon Cancer	
Surgery	1. Resectable: obstructing or unobstructing: diversion, primary repair, or ostomy (**complexity: TB**) 2. Location: which part of colon removed (**complexity: DB**) 3. Type: minimally invasive or open (**equivalent: TB**)
Systemic Therapy	4. Unresectable vs. Resectable: neoadjuvant or adjuvant (**sequence: TB**) 5. Type of chemo (**equivalent: TB**) 6. MSI high can be treated with immunotherapy (**subtype: DB**)
Patient Factors	7. Patient fear of morbidity from colonic obstruction (**debilitating: PB**)
Patient Driven	none

1145993 - Adverse effects of breast cancer treatment on sexual health: Not if, but when and how

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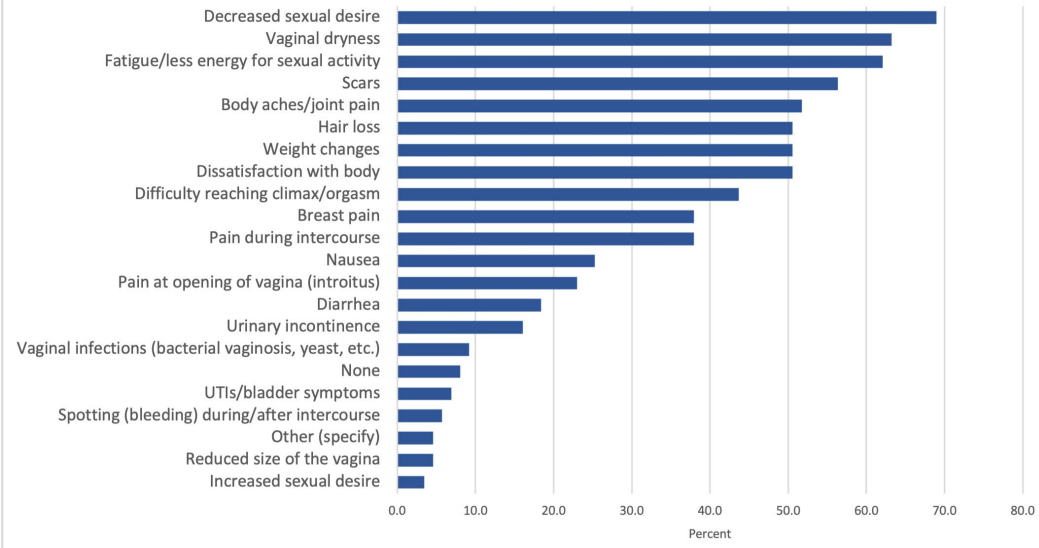
Background/Objective: With improved breast cancer survivorship, patients are living with the temporary and permanent physical and psychosocial consequences of treatment, many of which impact sexual health. More than half of breast cancer survivors report diminished sexual function and satisfaction during and after treatment, and many experience high distress with these changes. However, sexual health is often not addressed during treatment. This study aims to (1) characterize the sexual health-related symptoms experienced by breast cancer patients, (2) evaluate the education received from the oncology team, and (3) determine the preferred content, format, and timing of sexual health education.

Methods: Adult female patients diagnosed with Stage 0-IV breast cancer seen at an academic breast center during December 2020 received questionnaires assessing sexual health-related symptoms experienced during and after treatment. Patients indicating interest in further study involvement were invited to participate in focus groups. Semi-structured interviews explored sexual health education provided by the oncology team, educational content patients found useful, and the optimal format and timing for delivery of this information. All questions were developed with multidisciplinary input from breast surgeons, medical oncologists, and sexual health consultants who routinely work with breast cancer patients. Questionnaire results were summarized using descriptive statistics. Interviews were analyzed by 2 independent researchers to identify key thematic elements.

Results: Eighty-seven patients completed the questionnaire. A majority of patients reported decreased sexual desire (69%), vaginal dryness (63%), and less energy for sexual activity (62%) during/after treatment (Figure). Sixteen patients participated in interviews. Few reported receiving any information about potential sexual health-related effects of breast cancer treatment; those who did reported a focus on menopausal symptoms or fertility rather than sexual function. With regard to preferred format, patients favored multiple options to be offered rather than a “one-size-fits-all” approach, with particular emphasis on in-person communication and support groups. Patients desired education early and often throughout breast cancer treatment, not only about sexual side effects, but importantly on mitigation strategies, sexual function, dating and partner intimacy, and body image changes.

Conclusions: Few patients received information about the sexual health-related effects of breast cancer treatment, even though many experienced symptoms. Potential adverse effects should be addressed early, and counseling should be provided throughout treatment, with attention to strategies to alleviate symptoms and improve sexual health. Greater emphasis on measures beyond traditional cancer outcomes, such as sexual health, will continue to be a priority to patients and critical in ensuring high quality, patient-centered care.

Figure. Frequency of symptoms affecting sexual health in breast cancer patients



1144946 - Preparing to survive: Improving outcomes for young women with breast cancer from diagnosis, throughout treatment and into survivorship

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Background/Objective: Young women with breast cancer (YWBC) have unique survivorship needs due to life stage at point of diagnosis, and interventions to address these are limited. We aimed to understand the unmet needs of YWBC in order to develop a tailored online self-management program to improve breast cancer experience and psychosocial-sexual outcomes for YWBC, long-term.

Methods: Using qualitative inquiry, we conducted semi-structured interviews with YWBC survivors and clinicians using purposive sampling. Inclusion criteria: women aged 40 years or younger at point of diagnosis, Stage 0-IV disease. Survivors were minimum of 1-year post-diagnosis and active treatment complete. Clinicians were actively part of the breast cancer multi-disciplinary team. Interviews were recorded and transcribed verbatim and data analyzed using Thorne's Interpretive Description. Themes were reviewed with study team throughout data analysis.

Results: Thirty-five participants interviewed from ten centers across 7 Canadian provinces. Mean age was 36 years. Participant reported demographics: 18% 'visible minority', 9% 'born outside Canada', 7% 'Indigenous' and 54% of patient's household income at or below Canadian average. Thirty-six percent

received neo-adjuvant chemotherapy, 47% underwent mastectomy with reconstruction and 41% contralateral prophylactic mastectomy. Emerging themes from YWBC interviewed focused on coping, educating and supporting. The majority of women reported coping needs focused on psychological, emotional, fertility challenges, negative impact of treatment on self-identity and sexual health morbidity. Coping needs were greatest at point of diagnosis and on discharge from the acute cancer care team. Significant coping challenges were described for close family members, including children and partners. Partners needs were often neglected with no offer of professional support, which in turn, negatively impacted on relationships and survivor experience. Age-specific educational resources or supports during survivorship were described as sparse or non-existent for the majority, despite this being reported as the most challenging time for YWBC. Coping mechanisms described by YWBC centered on social medial support, online forums and peer support. The latter, whilst often challenging to find, offered unparalleled shared experience support to prevent social isolation for this young cohort of women. YWBC identified that self-management should include age- and cancer-stage specific one-on-one peer support, education to manage their own psychology and emotions, age-specific sexual health and fertility education, as well as post-treatment survivorship support. They also requested specific support tools for partners and professional psychological relationship support. Professionals identified similar needs for their YWBC patients as those described and often similar challenges in lack of age-specific support. They also reported a reluctance from health professionals to explore or ask about these issues with patients due to avoidance to discuss side-effects of treatment not initiated by themselves; lack of knowledge or expertise on psychosocial-sexual issues; focus on objective survival over quality of life issues during clinical encounters.

Conclusions: We completed the largest and most detailed qualitative survivorship research to date and identified unique biopsychosocial and educational needs for YWBC. We will target these through a novel and patient informed self-management tool, to be used across Canada, aiming to improve YWBC's experience and reduce long-term physical and psychosocial morbidity.

Phyllodes

1144866 - Foci of invasive ductal carcinoma in phyllodes tumors: Should we be worried?

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Background/Objective: Phyllodes tumors are rare, fast growing fibroepithelial tumors of the breast that account for <1% of all breast tumors globally. These tumors are thought to be largely unrelated to invasive cancer pathology, though sporadic cases have been reported of collision between invasive ductal carcinoma (IDC) and phyllodes tumors. We sought to better characterize this rarely reported pathology and understand its contribution to the global burden of disease.

Methods: A systematic literature review identified articles in PubMed, CINAHL, and Embase using the combination of keywords “invasive ductal carcinoma” and “phyllodes tumor.” Using the PRISMA guidelines, articles were screened for relevance to foci of IDC in phyllodes tumors and further categorized based on case description.

Results: A total of 432 studies were initially identified and reviewed. 31 articles from 19 countries published between 1986 and 2020 met the inclusion criteria. 28 articles were case reports while 3 articles were case series with collision of phyllodes and IDC comprising a small percentage of cases. There was no association noted between the grade of phyllodes tumor (benign, borderline, or malignant) and the development of IDC.

Conclusions: This systematic review highlights the importance of close pathologic examination of all phyllodes samples for foci of invasive cancer. While incidence of IDC within phyllodes tumors remains exceedingly low, clinical concern for secondary pathology within phyllodes tumors is warranted. In particular, clinicians should have heightened suspicion in patients with other factors predisposing them to development of IDC.

1140839 - Upgrade of fibroepithelial lesions to phyllodes tumors: Benign, borderline, and malignant

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Background/Objective: When a breast lesion is determined to be a fibroepithelial lesion and one cannot rule out a phyllodes tumor, the current standard of care is to perform a surgical excisional biopsy for further characterization. This is conducted because the treatment for a benign fibroadenoma versus a borderline or malignant phyllodes tumor of the breast is quite different, as well as the estimated recurrence rate. We conducted this study to describe the upgrade rate of benign fibroepithelial lesion to benign, borderline, or malignant phyllodes in order to determine whether select patients can be chosen to forgo the recommended excisional biopsy in favor of surveillance.

Methods: This study was a retrospective chart review. The histopathological results of core needle biopsy revealing a fibroepithelial lesion followed by surgical excisional biopsy were compared in 122 patients during the time period of 2015-2021, using a single institution database. This study included the following diagnoses based on core needle biopsy: fibroepithelial lesion and fibroadenoma. The following surgical excisional biopsy diagnoses were included: fibroadenoma, benign phyllodes, borderline phyllodes, and malignant phyllodes. Any patient who had a breast biopsy result consistent with a fibroepithelial lesion who did not undergo a surgical excisional biopsy and any patient who carried a diagnosis of invasive or non-invasive breast cancer at time of excisional biopsy were excluded.

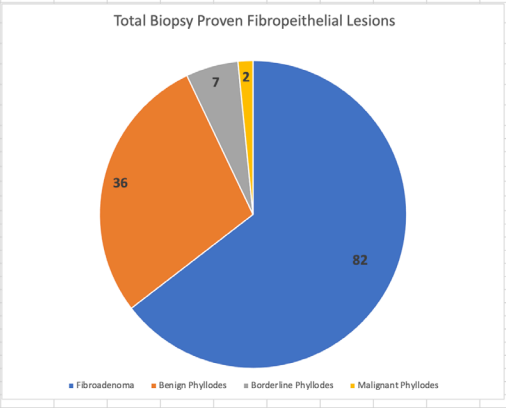
Results: Of the 122 patients, 66.39% (n=81) had benign fibroepithelial lesions that were classified as benign fibroadenoma on surgical excisional biopsy. The overall upgrade rate noted from fibroepithelial lesion to phyllodes tumor was calculated at 33%. Of the 41 patients upgraded to a phyllodes tumor 26.23 % (n= 32) were upgraded to benign phyllodes tumor, 5.74% (n=7) were upgraded to borderline phyllodes tumor, and 0.82% (n=1) were upgraded to malignant phyllodes tumor.

Conclusions: In our study with a relatively large sample size of 122 patients, 33% of the patients underwent an upgrade from fibroepithelial lesion to phyllodes tumor. Though data suggests that a benign phyllodes tumor does not need to be treated aggressively with excision to negative margins, it is noted that these patients have a higher recurrence rate associated with that pathology. At this point, it appears that standard of care which includes performing a surgical excisional biopsy for fibroepithelial lesions for which a phyllodes tumor cannot be ruled out is appropriate with future studies looking at the histology associated with the fibroepithelial lesions that did get upgraded so that specific factors associated with upgrade can be delineated with only those meeting certain criteria undergoing surgical intervention.

Figure.

	Number	Percentage
Total number of patients	118	
Total number of fibroepithelial lesions on core biop	128	
Total number of excised biopsies	126	
Total number of fibroadenoma on excisional biopsie	82	65.08%
Total number of lesions upgraded to phyllodes	44	34.92%
Number of lesions upgraded to benign phyllodes	36	28.57%
Number of lesions upgraded to borderline phyllodes	7	5.56%
Number of lesions upgraded to malignant phyllodes	2	1.59%

Fibroadenoma	65.08%
Benign Phyllodes	28.57%
Borderline Phyllodes	5.56%
Malignant Phyllodes	1.59%



Quality Measures

1147198 - To excise or not to excise? The papilloma predicament: High upgrade rates of intraductal papilloma with and without atypia suggest excision is necessary

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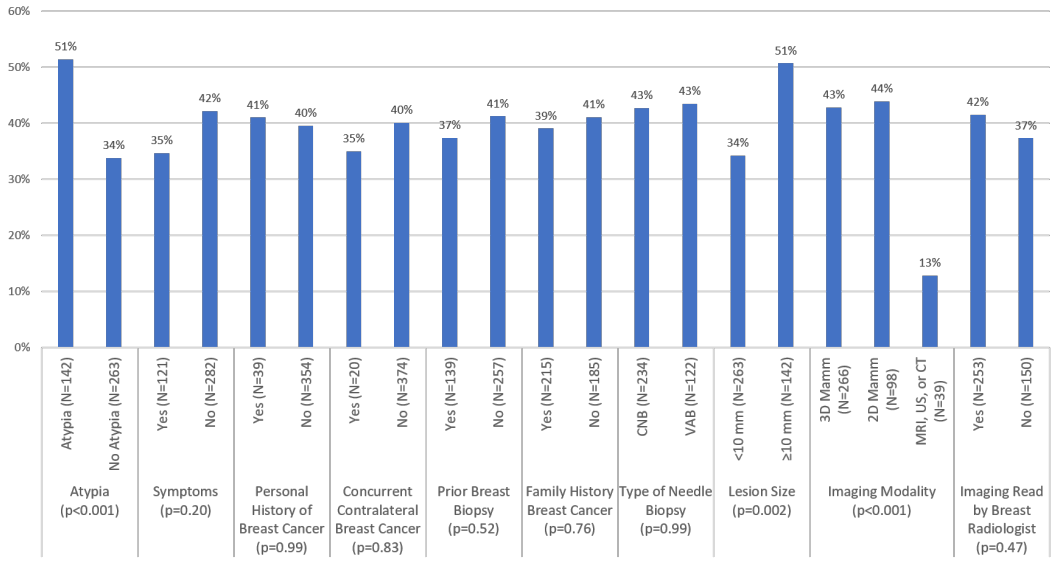
Background/Objective: Surgical management of intraductal papillomas (IDPs) varies across the United States, with some practices excising all IDPs and others reserving excision only for IDPs with atypia. Individual institutional upgrade rates play a significant role in management and practice. In the present study, we aimed to (1) quantify the upgrade rates of IDP in our community, (2) determine if upgrade rates differ for IDPs with vs without atypia, and (3) explore upgrade rates across patient characteristics.

Methods: This study is a retrospective cohort study of patients undergoing biopsy at a regional medical center in Oregon between 2013-2021. The pathology database was queried to identify all breast biopsies revealing IDP, with or without atypia. This data was cross-referenced with radiology imaging database and electronic medical record data to extract study variables. We analyzed clinical, radiologic, and pathologic features of IDP that were upgraded to either ductal carcinoma in situ (DCIS) or invasive carcinoma (IC). Outcomes of patients who underwent surveillance initially instead of surgical excision were also followed.

Results: We reviewed 445 cases of IDP from 441 unique patients. 405 lesions underwent surgical excision, of which 162 (40%) were upgraded to DCIS or IC. 142 cases (35%) demonstrated atypia, and 73 of those were upgraded (51%). 263 cases (65%) showed no atypia, and 89 of those were upgraded (34%). Surveillance was chosen in 72 cases (7 with atypia, 65 without) and surgical excision was eventually performed in 8 of those cases (11%). None of the 8 cases were upgraded. Only 2 cases with atypia had undergone surgical excision by the time of data collection. Figure shows upgrade rates across patient and imaging characteristics, to explore potential risk factors for upgrading. There was no significant difference in upgrade rates between patients with vs without symptoms, personal history of breast cancer, concurrent contralateral breast cancer, prior breast biopsy, family history of breast cancer, across type of needle biopsy, or when having imaging read by a breast radiologist. Cases with atypia and with lesions ≥10mm had significantly higher upgrade rates. Cases with imaging done by 3D or 2D mammogram had higher upgrade rates than those with imaging done by MRI, US, or CT.

Conclusions: We observed a 40% upgrade rate of any IDP in our community. For cases with atypia, the upgrade rate was 54%, which is congruent with the national average. However, the upgrade rate of cases without atypia in our community was 34%, which far exceeds historically reported ranges of 5-20%. We also found higher upgrade rates in cases with lesions ≥10mm, and in lesions identified via mammography rather than MRI, US, or CT. Current American Society of Breast Surgeons guidelines recommend surgical excision for papillary lesions, especially when palpable, when imaging is discordant, or when atypia is present on biopsy. Our study supports this recommendation and further encourages excision of all IDPs, given the high upgrade rate observed in cases without atypia.

Figure. Upgrade rates across patient and imaging characteristics



1146772 - A Quality Project that Significantly Improves Re-excision rates for Breast Conservation: True Progress or Hawthorne Effect?

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Background/Objective: Negative margins after segmental mastectomy are associated with lower tumor recurrence. Additional surgical procedures to obtain negative margins after primary surgical intervention result in worse outcomes for patients and the health care system. We conducted a prospective quality improvement project to examine re-excision rates at our institution.

Methods: We performed a single institution retrospective chart review of patients undergoing segmental mastectomy (CPT code 19301) from 2016-2018 ("Pre-intervention") by 6 surgeons. Surgeons were informed of their re-excision rates ("intervention"), and individual and group re-excision rates were observed prospectively in 2020 and 2021 ("Post-intervention"). Each time a surgeon had a re-excision case, they were asked why the re-excision occurred.

Results: A total of 238 re-excisions were performed pre-intervention and 37 post-intervention. The average baseline re-excision rate pre-intervention was 15.8%. After being informed of individual re-excision rates, the average re-excision rate of the group post-intervention decreased to 6.4% in 2020 and 6.6% for the first 6 months in 2021 (both p<0.001). Surgeons reported taking 6-sided shave margins in most procedures that ultimately required re-excision post-intervention (96.3%). Of patients requiring re-excision post-intervention (n=37), re-excision was performed more commonly for ductal carcinoma in situ (DCIS) than pre-intervention (31.2% v 55.6%, p=0.012), with no significant change in re-excision for

invasive ductal carcinoma (IDC) (47.8% v 44.4%, p=0.74) or invasive lobular carcinoma (ILC) (14.1% v 7.4%, p=0.33). Surgeons reported that DCIS was not seen on preoperative imaging or core biopsy 40.7% of the time. Surgeons at our institution use a variety of localization techniques. We observed a non-significant increase in seed utilization (64.9% v 81.5%, p=0.08) and a non-significant decrease in wire localization post-intervention (21.9% v 7.4%, p=0.08). There was also a significant increase in ultrasound localization (1.5% v 7.4%, p=0.046) post-intervention. Surgeons felt that the size of the tumor was larger than seen on preoperative imaging in the majority of cases requiring re-excision (62.9%). Post-intervention, surgeons reported not taking enough tissue due to concerns about cosmesis 14.4% of the time and were surprised 66.6% of the time that a re-excision was necessary.

Conclusions: Re-excision rates are a controversial breast surgery quality metric. We observed a decrease in re-excision rates without formal intervention, possibly due to the Hawthorne effect.

1147570 - A multi-site exploration of first start operative delays in breast surgery

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Background/Objective: Operating room (OR) delays occur frequently and affect resource utilization, efficiency, cost, and clinician and patient satisfaction. Therefore, improving on-time OR starts represents a potential target to improve the value of surgical care by improving quality and reducing costs. This study aimed to describe the current state of OR delays in the breast surgical oncology population and evaluate the impact of multiple surgical teams on frequency and severity of OR delays.

Methods: We retrospectively reviewed all oncologic breast procedures with or without reconstruction performed between January 2018 and July 2021 at 4 distinct surgical centers across a single large health care system. We restricted our analysis to first start cases as they should not be impacted by a prior case and are therefore optimized for an on-time start. Scheduled operative start times and actual patient arrival times to the OR were extracted from the electronic medical record. An OR delay was defined as a patient arrival to the OR after the scheduled start time. Descriptive statistics summarized these data. Univariate analysis compared the frequency and severity of operative delays between cases with more than 1 surgical team and cases with a single operative team.

Results: A total of 1686 procedures were performed during the study time period, 620 of which were first case starts. Of these, 238 (38.4%) patients arrived in the OR early or on time, and 382 (61.6%) patients arrived late (median: 8 minutes; range: 1-204 minutes). Table demonstrates operative delay by procedure type. Mastectomies with reconstruction (alloplastic or autologous) were more frequently delayed than mastectomies without reconstruction ($p<0.01$, $p<0.01$, respectively). Additionally, first start cases involving multiple surgical teams were more frequently delayed compared to cases with a single operative team (79.6% vs. 47.2%; $p<0.01$). However, there was no difference in the severity of the delay when comparing cases with multiple surgical teams to cases with 1 team ($p=0.29$).

Conclusions: Despite being primed for an on-time start, first start cases are frequently delayed. Examination of breast surgical oncology cases demonstrated that cases involving multiple surgical teams

were more frequently delayed than cases involving a single operative team. This suggests that quality improvement interventions should target improving the efficiency of the pre-operative process for cases involving multiple surgical teams. Preventing first start case OR delays is a relatively low effort strategy that could improve efficiency, prevent subsequent case delays, reduce costs and increase clinician and patient satisfaction.

Table. Operative delay by breast oncology surgery type

	N (%)	Median (IQR)*	Range*
Excisional Biopsy or Lumpectomy	139 (48.8%)	6 [7]	1-141
Mastectomy (No Reconstruction)	30 (54.5%)	11 [20]	1-69
Alloplastic Reconstruction	147 (78.6%)	10 [12]	2-204
Autologous Reconstruction	55 (78.6%)	10 [7.5]	1-50
Axillary Surgery	11 (47.8%)	6 [4.5]	1-16

N = Number of delayed cases, %= percent delayed cases.
Abbreviations: IQR, interquartile range.
*Values are minutes from scheduled operative start time.

1148300 - Serratus anterior nerve block at time of mastectomy: A prospective randomized control trial in opioid-sparing breast surgery

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Background/Objective: The use of narcotics as a primary mode of pain control post-operatively poses the risk of significant complications and adverse effects. The primary objective of this study is to determine if an ultrasound guided Serratus Anterior nerve block in patients undergoing mastectomy, with or without secondary procedures, will require fewer narcotics and have greater pain control post-operatively than those on a standard multi-modal pain management regiment. The secondary objective of this study is to assess the impact on hospital stay and number of emergency department visits for post-operative pain related complications.

Methods: This is a prospective randomized control trial of women who had undergone unilateral or bilateral mastectomies for any cause, with or without reconstruction, between 11/5/2019 to 10/31/2021. 59 patients (N=59) are enrolled in the study. The patients were randomized into 2 groups: 1 receiving a nerve block (0.25% Bupivacaine or 0.375% Ropivacaine), and the other group the standard pain regiment. The standard pain regiment utilized was Acetaminophen 650mg PO q8hr and Ibuprofen 800mg PO q6-8hr, without any routine narcotics. The patients were observed throughout their hospitalization, with their pain assessed using the standard 10-point scale. The primary outcome noted was frequency of narcotics required in the immediate post-operative period, upon discharge, and at their post-operative follow-up. The secondary outcomes reported were duration of hospital stay and post-operative visits to the Emergency Department.

Results: 31 patients received an ultrasound guided Serratus Anterior block and 28 the standard therapy. A total of 17 patients underwent subsequent reconstruction. Five out of the 31 patients (16%) who received the nerve block required narcotics for breakthrough pain during their hospital stay. Four out of

the 28 patients (14%) who did not receive the nerve block required narcotics while admitted into the hospital. Seven patients in the nerve block group required a hospital stay longer than 24 hours, whereas 5 patients in the control group required the same. Three patients in the no block group (11%) and 4 patients (13%) in the nerve block group received a prescription for narcotics upon discharge. Two patients in the nerve block group presented to the Emergency Department due to post-operative pain related complications. Whereas 4 patients in the no block group presented to the ED postoperatively. However, these 4 patients presented primarily due to causes unrelated to post-operative pain.

Conclusions: The Serratus Anterior nerve block provides no greater control of post-operative pain or reduce the number of narcotics required to manage pain post-operatively when compared to standard multimodal pain management. Overall, there were no differences found between the 2 groups when assessing duration of hospital stay due to uncontrolled pain, likelihood of being discharged with a prescription for narcotics, or returning to the Emergency Department due to uncontrolled post-operative pain. Though the results of this study might appear discouraging, it should be noted that during this study no routine narcotic prescriptions were provided, which can be inferred to deem them unnecessary routinely in the care of these patients.

1147482 - Multidisciplinary provider time burden for intraoperative radiation therapy (IORT) versus external beam radiation therapy (EBRT)

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Background/Objective: We aimed to evaluate provider time burden for breast surgical oncologists, radiation oncologists, and medical physicists for IORT versus EBRT for breast cancer. We hypothesized that surgeon and physicist time would be higher with IORT whereas radiation oncology time significantly lower with IORT, resulting in overall less provider time burden for IORT.

Methods: A prospective, time tracking study was performed at our institution with breast surgical oncologists, radiation oncologists, and medical physicists participating. Each provider self-identified patients undergoing IORT or EBRT with lumpectomy and sentinel lymph node biopsy as the first step in management of cT1-2 N0 breast cancers. Providers recorded patient care time in minutes. The tasks that providers tracked were grouped into consult, treatment, and follow-up categories for the purposes of analysis (Table). These times were compared IORT and EBRT patients by provider specialty, as well as overall, using student's t-test with p-value <0.05 statistically significant.

Results: Four surgeons, 3 radiation oncologists, and 3 physicists collected data representing 31 IORT cases and 24 EBRT cases. Surgeon overall time did not differ for IORT versus EBRT (189±35 vs 147±145 minutes, p=0.39). While operative time was longer for IORT cases (112±27 vs 72±15 minutes, p<0.01), consult (p=0.55) and follow-up (p=0.05) times were similar, resulting in the overall non-significant time difference. Radiation oncologists spent significantly less overall time for IORT versus EBRT cases (146±31

vs 253±89 minutes, p<0.01). Specifically, time burden for follow-up tasks was significantly shorter (p<0.01) with IORT; this trend was also true for consult and treatment tasks (p=0.76 and p=0.42 respectively) although these did not reach statistical significance. In contrast to surgeons and radiation oncologists, physicists spent significantly more time overall for IORT than for EBRT (112±13 vs 47±12 minutes, p<0.01). The physicist time burden for IORT was significantly more for each category (consult p<0.01; treatment p=0.04; follow-up p<0.01). When total time for all 3 specialties was evaluated, IORT and EBRT had similar time burden (p=0.99). However, when considering only radiation oncologists and surgeons, IORT had significantly lower time burden (p=0.02).

Conclusions: IORT demonstrated significant time savings compared to EBRT, particularly for radiation oncologists, with no difference in overall time for surgeons. Although prior studies have assessed operative time and OR learning curve for intraoperative radiation therapy (IORT), data evaluating total multidisciplinary provider time for IORT versus external beam radiation therapy (EBRT) is lacking. Provider time is a finite and expensive resource. Treatment approaches that offer comparable oncologic outcomes while lowering provider time burden are essential to protect this resource. In appropriately selected patients, IORT provides an opportunity to implement an efficient treatment strategy while preserving provider time.

Table. Tasks recorded for each specialty, classified into consult, treatment, and follow-up for the purposes of analysis

	Radiation Oncology	*Surgeon*	*Medical Physicist*
Consult	Initial Consult Discussion of case with other specialties Follow-up to consult or re-evaluation	Initial Consult Discussion of case with other specialties Additional Communication with Patient	QA and Machine Set-up (day prior) Consulting with other specialties Initial Plan Check
Treatment	Prescription Entry Treatment Document Preparation Simulation and Plant Design Treatment Delivery including Documentation On-Treatment Clinic Visits Treatment Completion Documentation	Time in OR (incision start to incision close)	AM Machine Readiness Confirmation Treatment time in OR Patient-specific QA on Machine Clean-up and Store Machine after OR
Follow-Up	Follow-up Visit(s) after Treatment	Time in Postop Visits (30 days)	Post-Treatment Paperwork

1147599 - Comparison of treatment initiation and long-term outcomes of breast cancer patients among the various Commission-on-Cancer facilities

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Background/Objective: Breast cancer represents 11.7% of new cancers worldwide among women, and surgery remains a mainstay of treatment. Although surgical management has evolved, there were historical disparities between metropolitan academic and community centers in areas such as breast-conserving techniques and radiation treatment, although these have improved. Today, some community patients opt to receive treatment at academic centers due to prestige and reputation, often necessitating significant travel and expense which may lead to lack of compliance in receiving treatment.

The purpose of this study is to compare time-to-treatment initiation after breast cancer diagnosis, long-term outcome after initiating treatment, and patient factors involved in treatment initiation among the various types of Commission-on-Cancer (CoC) programs including Community and Academic centers.

Methods: This was a retrospective analysis; Middle Atlantic Region patient data from the National Cancer Database (NCDB) from 2004 to 2016 were analyzed. Reports included AJCC clinical stage, initiation of surgery, radiation, or systemic treatment from the time of diagnosis, death from time of diagnosis, surgical margins, and various patient-related factors. In-situ disease was excluded. Data were compared among CoC facilities including Community Cancer (COM), Comprehensive Community Cancer (CompCom), Academic/Research (A/R), and Integrated Network Cancer (INC) programs. SPSS Statistics was used for data analysis.

Results: N-values included 239,303 for COM, 1,180,552 for CompCom, 796,644 for A/R, and 389,284 for INC programs. For days from diagnosis until first surgical procedure, there was no statistical significance among the CoC programs for Stage 1A-4 disease (p value > 0.05). However, mean number of days for initiating treatment after diagnosis for Stage 1A and 1B for COM (33.68, 33.11) and CompCom (35.89, 36.35) was less than A/R (41.62, 41.65) and INC programs (39.78, 40.13). For days from diagnosis until initiation of radiation, there was no significant difference among the CoC programs for Stage 1A-4 disease, although patients did receive treatment slightly earlier in COM and CompCom programs for patients with Stage 2A through Stage 3C disease. For days from diagnosis until initiation of systemic therapy, there was no significant difference among the CoC programs for Stage 1A-4 disease. Long-term outcome was measured with number of months from day of diagnosis until either death of the patient or last date of contact. There was no statistical difference among the various CoC facilities from Stage 1A-4 disease. There was also no significant difference in achieving adequate surgical margins at time of operation.

Conclusions: Patients receive equal quality of care regarding initiating appropriate surgical, radiation, or systemic treatment regardless of whether they receive it at Community, Comprehensive Community, Academic/Research, or Integrated Network Cancer Programs. This includes long-term survival, and achieving adequate surgical margins. Community centers are more convenient with non-inferior outcomes. Prior studies have also shown surgery at community centers to be less expensive than NCI centers. The patient's idea that quality care is obtained only at well-known tertiary care centers is inaccurate, and most may be well served with quality local care.

1148480 - SiriusLink - process mining and surgical oncology process improvement: An application to Breast Cancer Surgery in The Netherlands

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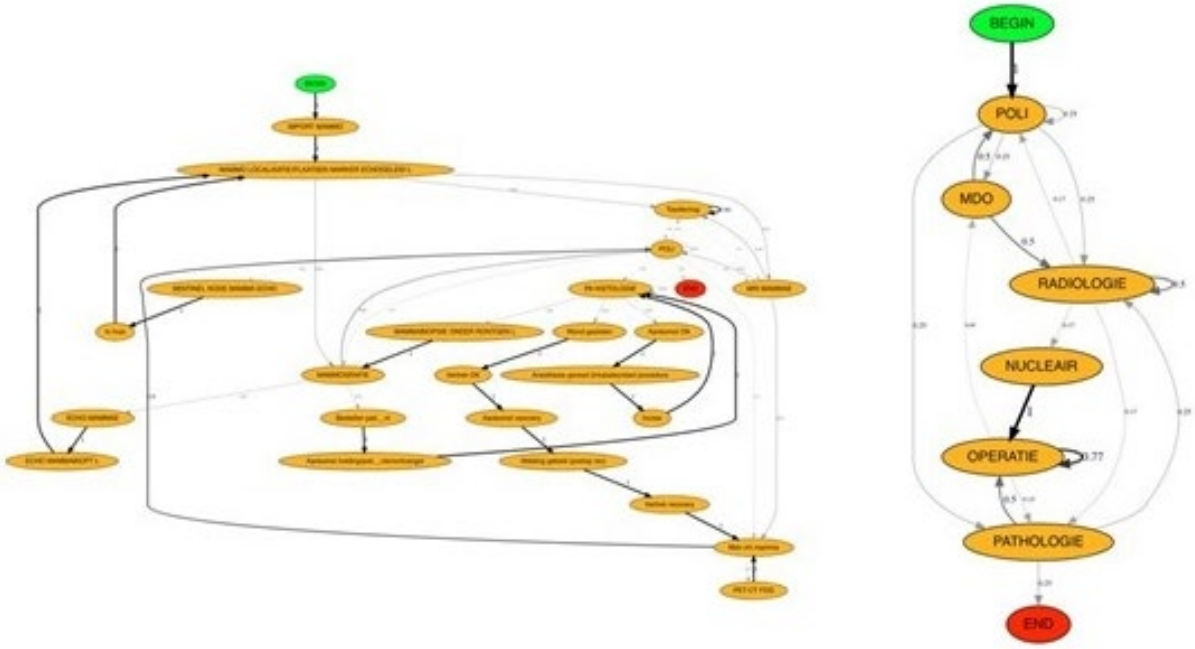
Background/Objective: Process mining using data science (data mining, machine learning, statistics, and interactive visualization) is an excellent method to optimize processes using business process management (designing, modeling, executing, monitoring, optimizing, and re-engineering business processes). It provides detailed insight into real process flows (see Fig 1), performance and resources and thus offers the possibility to continuously improve and manage these processes. In breast cancer surgery, there is continuous improvement of the diagnostic and therapeutic work processes around the patient. To get detailed insights into these processes on the individual patient's level is very time-consuming, expensive, and complex. To test a new approach, we piloted the application of process mining and business process improvement called SiriusLink. SiriusLink is an application that gives these insights based on administrative data. In our study, it was tested in a project for improvement of the localization of non-palpable breast cancer lesions. We studied how process mining methods could help in studying breast cancer diagnostic and surgical work processes by (i) identifying the full real world work processes per individual breast cancer patient from diagnosis till end of surgical therapy, by (ii) gaining insights from these processes (the mined pathways), and by (iii) making recommendations for improved work processes (the hypothetical work processes).

Methods: In the initiation phase, data agreement and data abstraction were organized. Patients' event data were obtained from the hospital administrative databases (EPIC) from 2018 to 2020. Data were mined from event data recorded for administrative purposes. All included surgical patients had primary breast cancer and had their complete diagnostic and surgical procedures at our hospital. The data covered all event data variables a patient could undergo during these procedures with corresponding time stamps. In the second phase, analysis iterations took place in a combination of data processing and data mining with Python. In the third phase, the Celonis academic suite was used to give process mining insights.

Results: Data were collected for 360 patients over the 3-year period. Per patient, 60 event variables were collected with time stamps. Patients were grouped based on the administrative data (for analysis) in 2 groups. Patient with no nodal involvement (N0) and no neo-adjuvant systemic therapy and patients with nodal involvement (N1-3) plus neo-adjuvant therapy. Insights showed the specific time and activity pathways of the 2 groups enabling the team to construct process improvement proposals. In a next phase we intent to apply this approach to get insights in the value of the improved work processes and compare these processes to the baseline.

Conclusions: The SiriusLink approach shows the potential of process mining techniques. With the analysis we show that we can derive real world work process insights from administrative hospital data with process mining thereby facilitating business process improvement (creating hypothetical work processes).

Figure. Data process flows showing breast surgery patient pathways based on real-world administrative data



1148511 - Enhanced recovery after surgery (ERAS) pathway for mastectomies with and without reconstruction decreases total cost and improves resource utilization

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Background/Objective: Enhanced recovery after surgery (ERAS) pathways were developed in 2001 as a tool to improve patient outcomes while decreasing length of stay and cost. In 2017 the breast cancer consensus focused on preoperative, intraoperative, and postoperative optimization of patients undergoing breast cancer surgery. Criteria includes preadmission smoking cessation, weight loss, and alcohol cessation as well as intraoperative fluid management, and postoperative pain control; all ERAS recommendations for postoperative care in breast reconstruction were designed to improve patient outcomes. The aim of this study is to compare improvements in cost and resource utilization for patient's undergoing mastectomy with or without reconstruction since implementation of the ERAS protocol and subsequent transfer from inpatient to the outpatient ambulatory surgery setting.

Methods: A retrospective review of all mastectomies with and without reconstruction at a single hospital between 2018 and 2021 was performed. Our institutional breast ERAS protocol was initiated in January of 2019. Shortly after, these mastectomies were moved from the inpatient surgical center to the outpatient ambulatory center. The cost variables we examined included direct cost, indirect cost, and total cost. Direct costs include everything consumed in performing the procedure, such as labor, supplies, equipment, etc. Indirect costs include expenses incurred by non-revenue producing

departments within the organization. These include administration, plant operations, environmental services, materials management, patient financial services, payroll, accounts payable, etc. Total cost was the sum of direct and indirect costs. Statistical analysis was completed using RStudio Statistical Software. The Shaprio-Wilk Test was used to determine that the cost variables were non-normal. Non parametric Mann Whitney Wilcoxon tests were used on all numerical variables to determine if the 2 samples were significantly different.

Results: The average direct cost for the pre-ERAS group was significantly higher than the post-ERAS group ($20,251 vs 13,944, p=<0.001). The indirect cost was higher in the pre-ERAS group when compared to the post-ERAS group ($2,739 vs $2,535, p= 0.005). The total cost was significantly higher on average for the pre-ERAS group vs the post-ERAS group. ($22,427 vs $16,659, p< 0.001).

Conclusions: The use of an ERAS protocol for breast surgery patients is financially beneficial for hospitals and allows for growth and increasing capacity for inpatient surgeries. Through this study, we have shown that mastectomies with and without reconstruction can be moved to the outpatient setting, eliminating the need for inpatient beds and resources. The implementation of the breast ERAS protocol at our institution significantly decreased cost and use of resources while maintaining surgical volume.

1148125 - Is there more HER2 FISH in the sea? An institution's experience in identifying HER2 positivity using fluorescent in-situ hybridization in patients with HER2-negative immunohistochemistry

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Background/Objective: In the U.S., 20% of breast cancers express HER2/neu positive (+) receptors. This signifies more aggressive disease, higher recurrence, and increased mortality. HER2 receptor immunohistochemistry (IHC) staining with equivocal (2+) results commonly undergoes fluorescent in-situ hybridization (FISH) for further classification. Current guidelines do not recommend routine FISH testing in IHC negative (0 or 1+) cases. The aim of this study is to investigate an institution that performs both IHC and FISH testing on all breast cancer specimens to identify incidence of HER2+ on FISH that was HER2- on IHC.

Methods: A retrospective chart review from 2015 to 2021 (October) was conducted at a single institution where both HER2 IHC staining and FISH were performed at the time of diagnosis for all invasive breast cancers. Patients with HER2-(0 or 1+) on IHC with subsequent HER2+ results on reflex FISH testing were included. Patients with HER2 equivocal (2+) or HER2 positive (3+) on initial IHC were excluded.

Results: A total of 1,835 invasive breast cancer cases were primarily treated at this institution. A total of 287 HER2 + cases (2+ or 3+) IHC with FISH confirmation (15.6%). An additional 40 cases were classified as HER2 - (0 or 1+) on IHC, but reclassified as HER2+ on reflex FISH testing. This increased the total rate of HER2+ cases from 287 (15.6%) to 327 cases (17.8%). For 2021 alone, out of 132 total breast cancer

cases, 44 were HER2+(33.3%). Eight cases were HER2-(IHC), but HER2+ by FISH establishing a HER2+ rate of 27.3% to 33.3%.

Conclusions: The use of routine FISH testing in addition to standard IHC staining for determining HER2 status for breast cancer may identify a subset of patients who would be incorrectly classified as HER2-. FISH testing is inexpensive and outweighs the financial and ethical costs if a HER2+ patient is inappropriately treated. The data supports FISH testing should not be omitted due to IHC negative (0 or 1+) results in order to avoid missing imperative diagnostic information that would significantly impact patient's overall prognosis and long-term survival.

1148675 - Dose delays, dose reductions, and relative total dose intensity in patients with advanced cancer who exercised during neoadjuvant chemotherapy treatment

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Background/Objective: When it comes to chemotherapy, maintaining the dose and schedule of treatment are of vital importance, as clinical evidence suggests that this is associated with optimal treatment outcomes. Yet, dose delays and reductions are common methods of mitigating the chemotherapy-induced side effects of treatment. Despite the fact that maintaining RDI is important to achieve improved outcome, a substantial proportion of patients are given less than 85% of the suggest dose. Exercise has been successfully shown to attenuate chemotherapy-related symptoms that frequently cluster together. Therefore, in light of importance of maintaining dose intensity, we conducted a retrospective analysis in patients with advanced disease treated with adjuvant or neoadjuvant chemotherapy regimens and who completed exercise training during treatment.

Methods: After obtaining IRB approval, data were collected retrospectively in a chart review of 184 patients, aged 18 years or older and treated for Stage IIIA-IV cancer. Data collection included baseline patient demographics and clinical characteristics, including age at diagnosis, cancer stage at initial diagnosis, chemotherapy regimen, and planned dose and schedule. Specific variables that were collected include: cardiovascular changes, treatment-related side effects, treatment compliance, and medications. All patients completed at least 12 weeks of prescribed, individualized exercise. Each program included cardiovascular, resistance training, and flexibility components, and were completed under the supervision of a certified exercise oncology trainer once a week. RDI was measured for each myelosuppressive agent in a regimen over the entire chemotherapy course and then averaged across the myelosuppressive agents in a regimen. An RDI of less than 85% was designated as the clinically meaningful threshold for reduction in RDI based on previously published studies.

Results: A considerable proportion of patients across regimens had dose delays (18.3%-74.3%) and dose reductions (18.1%-84.6%). Further between 12% and 83.9% of patients missed at least 1 dose of a myelosuppressive agent that was part of their standard regimen. Overall, 50.8% of patients received less than 85% of the RDI.

Conclusions: Patients with advanced cancer who adhered to their exercise regimen, chemotherapy dose delays and dose reductions were relatively common among tumor types and treatment regimens. However, these delays and reductions occurred significantly less frequently than previously published data.

1141464 - The impact of same-day discharge and enhanced recovery on patient quality of life after mastectomy with implant reconstruction

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Background/Objective: Enhanced recovery protocols facilitate safe and effective same-day discharge after mastectomy with implant-based reconstruction. We sought to evaluate how this change in practice impacted patients' postoperative quality of life (QoL).

Methods: Patients undergoing mastectomy with implant-based breast reconstruction from 2008-2020 were identified in a prospective database and were mailed BREAST-Q which included a ranking scale for each statement from 1 (none of the time) to 5 (all of the time) which was converted from a raw summed score to an equivalent rasch transformed score from 0 (worst) to 100 (best), and Was it Worth it? (WIWI) questionnaire. Enhanced recovery protocols after mastectomy were instituted in our practice in 2017. Questionnaire responses were compared between patients who underwent surgery before versus after enhanced recovery protocol implementation. Subgroup analysis within the enhanced recovery cohort compared responses from patients admitted to the hospital versus those discharged same day. Responses were compared using one-way analysis of variance (ANOVA) and chi-square tests.

Results: A total of 568 patients met inclusion criteria, and 247 patients responded (43% response rate). Due to survey response inconsistencies, 217 were included for analysis. 62 patients underwent enhanced recovery and 155 patients were historical controls. Among patients undergoing enhanced recovery, 30 patients were discharged same day and 32 admitted to the hospital. Mean time from surgery to survey completion was 6 years (range 8 months to 12 years) among all respondents, and 2 years (range 8 months to 3 years) for enhanced recovery respondents. There were no significant differences in patient characteristics (age, ethnicity, BMI) or type of mastectomy performed (bilateral/unilateral, skin or nipple-sparing) between compared cohorts. The reconstruction techniques (stage, implant placement) did not differ between enhanced recovery patients who were admitted vs those discharged same day. QoL outcomes are outlined in Table. Chest physical well-being was lower for the enhanced recovery cohort (numbers, p-value). Psychosocial, sexual well-being, and satisfaction with information given, did not significantly differ between patients who experienced enhanced recovery protocols and those who did not. They were also between patients admitted to the hospital compared to those discharged same day. WIWI QoL measures (QoL change, post-operative experience) also did not significantly differ between each of the compared groups. Among same-day discharge patients, 91% reported it was worth it, 88% would choose reconstruction again, and 91% would recommend

reconstruction to others. 91% of same-day discharge patients reported improved or unchanged QoL, and 84% reported their post-operative experience met (37%) or exceeded (47%) their expectations.

Conclusions: Enhanced recovery with same-day discharge after mastectomy with implant-based reconstruction does not adversely impact patient postoperative QoL. For most patients, the perioperative experience met or exceeded their expectations.

Table.

	Enhanced Recovery			Same Day Discharge		
	Yes (62)	No (155)		Yes (30)	No (32)	
BREAST-Q	Mean, SD	Mean, SD	p-value	Mean, SD	Mean, SD	p-value
Chest-physical well being	74 (22)	80 (21)	**0.046** [1]	77 (19)	70 (25)	0.216 [1]
Psychosocial well being	76 (20)	78 (19)	0.543 [1]	81 (16)	72 (23)	0.068 [1]
Sexual well being	59 (23)	55 (23)	0.256 [1]	59 (17)	58 (29)	0.834 [1]
Post-op breast satisfaction	67 (21)	60 (19)	**0.03** [1]	68 (19)	66 (23)	0.688 [1]
Satisfaction with information	74 (20)	73 (19)	0.749 [1]	77 (21)	70 (18)	0.118 [1]
WIWI	Yes N (%)	Yes N (%)		Yes N (%)	Yes N (%)	
Worth it	54 (87)	135 (89)	0.933 [2]	29 (91)	25 (83)	0.682 [2]
Would choose reconstruction again	54 (87)	129 (85)	0.261 [2]	28 (88)	26 (87)	0.262 [2]
Would recommend reconstruction	54 (87)	122 (81)	0.239 [2]	29 (91)	25 (83)	0.54 [2]
QoL change			0.69 [2]			0.625 [2]
Improved	19 (31)	38 (25)		11 (35)	8 (27)	
Unchanged	35 (56)	94 (62)		18 (56)	17 (56)	
Worse	8 (13)	19 (13)		3 (9)	5 (17)	
Experience			0.357 [2]			0.394 [2]
Better than expected	24 (39)	59 (39)		15 (47)	9 (30)	
Met expectations	27 (43)	53 (35)		12 (37)	15 (50)	
Worse than expected	11 (18)	39 (26)		5 (16)	6 (20)	

Table 1. [1]ANOVA F-test p-value; [2]Chi-Squared p-value.

1142283 - Learning from COVID experience: Outpatient mastectomies with and without axillary surgery

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Background/Objective: Traditional pre-COVID post-operative management of patients undergoing mastectomy with or without axillary dissection included 23-hour admission. Indications for observation included education of drain management, pain control and assessment for possible immediate surgical complications. The purpose of this study was to determine safety of same-day discharge by comparing the outcomes of mastectomies in the pre-COVID and during-COVID era.

Methods: A retrospective analysis at a single institution was performed for patients undergoing mastectomies with or without axillary surgery and/or immediate reconstruction. The patients were followed up for surgical complications for 3 months after surgery.

Results: There were 195 patients analyzed in the study. In the pre-COVID period (from September 1, 2019 to March 16, 2020) n=113, 57.9 % of patients were analyzed. The post-COVID cohort (from March 17, 2020 to August 31, 2020) included n=82, 42.1 % of patients. The majority of patients underwent unilateral mastectomy (n = 116, 59.5%). A large number of patients (n=117, 60 %) underwent reconstruction, ranging from tissue expanders and direct implants (n=107, 54.9 %) to autologous flaps (n=10, 5.1%). During COVID, 51.2% of patients were treated as outpatients versus 16.9% of patients pre-COVID ($p< 0.001$). Complication rate, including surgical site infections, hematomas, seromas, readmissions, and additional plastic surgery in patients undergoing reconstruction was overall low, 5%. There was no difference in complications in patients admitted for 23-hour observation versus outpatient surgery.

Conclusions: We learned from the COVID pandemic that outpatient mastectomies with or without axillary surgery and reconstruction are safe without significant changes in complication and readmission rates. The patients are able to receive sufficient drain management education and experience adequate pain control in the outpatient setting after the surgeries that previously required observation.

1136389 - Improving breast cancer-related lymphedema detection: Creating a standard practice for preoperative arm measurements

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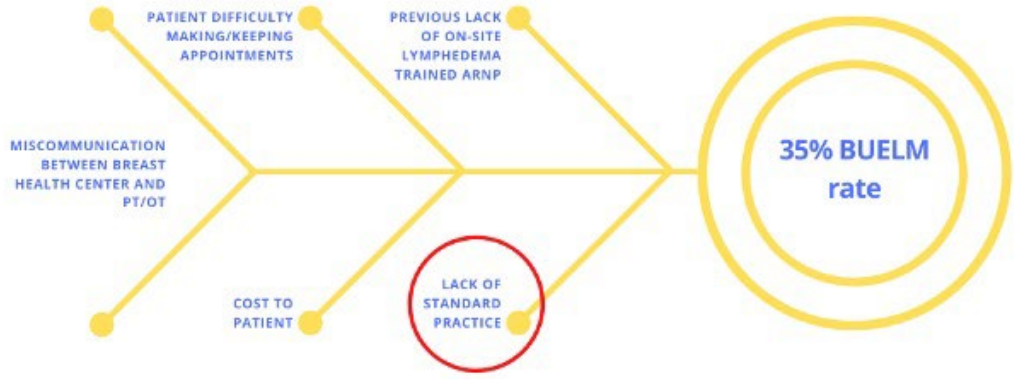
Background/Objective: Approximately 20% of female breast cancer surgery patients develop lymphedema from lymph node surgery and radiation.1 Early diagnosis and treatment can markedly improve outcomes.2 40-50% of patients without baseline upper extremity lymphedema measurements (BUELM) who develop lymphedema are misdiagnosed thus, BUELM are essential. 3 Current recommendations state every lymph node surgery patient should have BUELM.4 In 2019 at the primary safety-net hospital (SNH) in the Kansas City Missouri metro area, 38% of axillary lymph node dissection (ALND) patients and 30% sentinel lymph node biopsy (SLNB) patients received BUELM (35% combined). The aim of this quality improvement project is to double the BUELM rate for ALND/SLNB patients to >70% over a 1-year period.

Methods: The Breast Program Leadership Committee performed a root-cause analysis (Fig. 1) for the low rate of BUELM at our SNH. Analysis revealed lack of standard practice as the primary cause. We designed a standard practice which includes (a) identification of eligible patients by breast nurse navigator and (b) arm measurements taken by an advanced practice nurse at initial appointment with breast surgeon. A list of ALND/SLNB breast cancer patients in 2019 was obtained from the cancer registrar and included 58 patients (13 ALND, 45 SLNB). Detailed chart review of all 13 ALND patients and 10 randomly selected SLNB patients determined the 2019 rate of BUELM. 2020 data were excluded due to disruptions from the pandemic. Similar methods were used to determine rate of BUELM post-implementation of standard practice using interim data from February 2021-September 2021. All consecutive breast cancer patients who saw a breast surgeon and underwent ALND or SNLB between February 2021-September 2021 were included in this analysis. A chi-squared test compared differences in rate of BUELM in 2019 vs post-implementation, two-tailed, $p<0.05$.

Results: 28 patients underwent ALND/SLNB and 24 received BUELM since implementation. A chi-squared test comparing rate of BUELM in 2019 (8/23, 35%) to post-implementation data thus far (24/28, 86%) showed a chi-squared of 14, $p=0.0002$. A chart review of the 4 breast cancer patients who did not receive BUELM revealed that these patients were not seen at our primary breast clinic location.

Conclusions: Analysis of interim 7-month data suggests adoption of standard practice significantly increased BUELM for patients undergoing ALND/SLND in a safety-net hospital setting, surpassing the goal of >70% set by the BPLC. This interim analysis also uncovered a need for additional implementation strategies for obtaining BUELM when patients' first point of contact with the breast team is the satellite clinic. Future plans include identifying challenges, unintended consequences, and implementing an improved standard of care at the off-site location.

Figure. Fishbone diagram showing root-cause analysis of the low rates of BUELM



1116131 - A comparison of opioid use and post-operative satisfaction between perioperative paravertebral vs. pectoral block for partial mastectomies: A randomized clinical trial

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Background/Objective: Persistent postoperative pain after breast cancer surgery is associated with significant morbidity. Up to 30% of patients experiencing this pain will develop chronic opioid dependence. Current literature review reveals that both pectoral (PEC) and paravertebral (PVB) block have shown to decrease postoperative opioid use; however, the PVB block is considered the gold standard regional anesthetic for breast surgery. We suspect that the PEC block may have advantages in efficacy, safety during placement and patient satisfaction for partial mastectomies with or without sentinel lymph node biopsies.

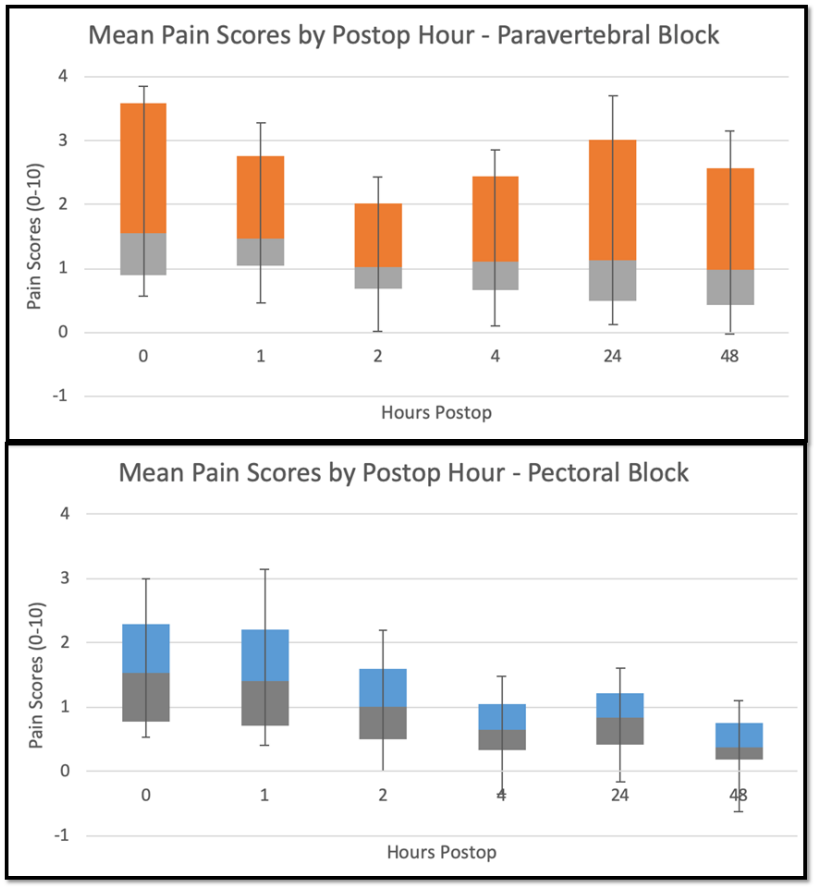
Methods: This study was a nonblinded randomized control trial of 2 different nerve blocks prior to a partial mastectomy: a paravertebral block, the current gold standard, versus a pectoral nerve block. This protocol had enrolled 36 women (18 in each treatment group). Inclusion criteria were women over the age of 18, diagnosed with breast cancer, ASA Class I-III. Exclusion criteria included patients with chronic opioid use with greater than 60 morphine milliequivalents (MME)/30 days and those with severe COPD as measured with GOLD stage classification. Statistical analysis of MME was performed with a paired t-test. Our primary outcomes included: 1) daily postoperative opioid use up to 1 week following surgery; 2) subjective pain scores up to 48 hours following surgery (0-10 scale); and 3) patient satisfaction (0-10 scale).

Results: Results included 3 comparisons with regards to PEC vs PVB block, respectively: 1) overall mean opioid use of 4.58 vs 14.58 MME per subject; 2) in total, 4 vs 6 subjects using opioids; and 3) mean of 2.00 vs 2.67 postoperative days using opioids. Figure summarizes mean pain scores (0-10) at 0, 1, 2, 4, 24 and 48 hours following partial mastectomy. At all time points, subjects receiving the pectoral block reported lower mean pain scores than did subjects receiving the paravertebral block. Furthermore, the

patient satisfaction among the 2 groups includes 9.70/10 (PVB) 9.66/10 (PEC) block. The two-sided p value= 0.85 for an independent samples t-test.

Conclusions: In conclusion, patients that underwent a pectoral block used less opioids postoperatively and reported lower pain scores postoperatively than patients that underwent a paravertebral nerve block. These findings are remarkable as it is a randomized control trial for our community hospital and with these results, the anesthesiologists have been trained in performing pectoral nerve blocks and are regularly offering pectoral nerve blocks for all eligible patients undergoing a partial mastectomy. This study is also important and clinically significant in the support of the efficacy of pectoral nerve blocks for partial mastectomies, which is still under debate from current literature. Limitations to our study include a relatively small sample size when considering our power calculation. The most frequent listed reason for patients that decided to not enroll was a vocalized request for the pectoral block whereby the block would be done while under the effects of anesthesia, as opposed to performing a paravertebral while awake. Although this study was structured as a randomized clinical trial for superiority, future studies can certainly consider restructuring as a noninferiority trial.

Figure. Mean pain scores by postop hour, paravertebral block on the superior table, pectoral block displayed on the inferior table



1133871 - Cost analysis of surgery versus clinical follow-up for patients with high-risk pathology on core needle biopsy

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Background/Objective: The aim of our study was to compare the number of clinical visits and treatment cost for patients who have surgery versus close clinical follow-up (FU) for high-risk lesions (HR) on core needle biopsy (CNB), including atypical ductal and lobular hyperplasia, lobular carcinoma in situ, papilloma, and radial scar. We hypothesized that surgery is associated with fewer clinical visits but higher treatment cost.

Methods: Following IRB approval, a single center retrospective review of patients with HR CNB results was conducted from 2014-2019. In accordance with institution protocol, patients with HR CNB were reviewed in a multidisciplinary conference with recommendations for surgery versus FU. Breast-specific clinic and imaging visits, along with clinicopathologic data, were collected for 3 years after conference recommendations. Surgery and FU cohorts were compared using negative binomial regression and generalized linear models, with primary outcomes of interest including number of breast surgery clinic visits, total breast program visits (surgeons, high-risk providers, breast-specific APPs, genetic councilors), and treatment cost. Treatment cost included surgery, clinic visits, and imaging. Cost was defined by CPT codes and Medicare fee schedules. Statistical significance for all analyses was defined as $p<0.05$. Analyses were performed using R, version 4.1.1.

Results: In the entire cohort of 277 patients, 123 underwent surgery and 152 underwent FU. Surgery and FU cohorts were similar with respect to baseline clinicopathologic factors, with the majority of patients (79.6%) having an abnormal screening mammogram leading to their HR CNB (Table). As expected, the FU group had more imaging within the first year of HR diagnosis compared to patients proceeding to surgery ($p<0.001$, ratio 2.63). However, the 2 cohorts were similar with respect to total breast imaging performed during the study timeframe ($p=0.22$, ratio 1.11). The surgery cohort had significantly more breast surgery clinic visits ($p<0.01$, ratio 2.96) and combined breast program visits ($p<0.01$, ratio 3.56) versus the FU cohort. The surgery cohort also had significantly higher cost versus FU cohort ($p<0.01$, ratio 2.28) taking into account all surgery, clinic, and imaging charges.

Conclusions: Patients undergoing surgery for HR CNB findings had 3x more breast surgery clinic visits, 3.5x more post-conference visits, and 2x cost in 3 years after their diagnosis compared to those undergoing close clinical FU. Prior publications have demonstrated that many patients with HR findings on CNB can be safely managed with close clinical follow-up (FU) instead of surgery. However, the time-savings and cost repercussions of these divergent treatment recommendations has not been robustly studied. Our data demonstrates close clinical FU also provides time- and cost-savings benefits. Going forward, consultation for patients with HR CNB results should include both clinical outcomes and time- and cost-considers for the purposes of shared decision making and finalizing treatment recommendations.

Table. Clinicopathologic factors

Table 1: Clinicopathologic Factors	Overall (N=277)	Surgery	
		No (N=152)	Yes (N=123)
Age (At Time of Conference)			
Mean (SD)	54.7 (12.4)	55.1 (11.3)	54.0 (13.6)
Missing	3	3	0
Race			
Black or African American	43 (15.5%)	26 (17.1%)	17 (13.8%)
White	215 (77.6%)	10 (6.6%)	9 (7.3%)
Other	19 (6.9%)	116 (76.3%)	97 (78.9%)
Ethnicity			
Hispanic or Latino	6 (2.2%)	3 (2.0%)	3 (2.4%)
NOT Hispanic or Latino	270 (97.5%)	149 (98.0%)	119 (96.7%)
Unknown / Not Reported	1 (0.4%)	0	1 (0.8%)
Rurality			
Urban	236 (85.8%)	124 (82.7%)	110 (89.4%)
Rural	39 (14.2%)	26 (17.3%)	13 (10.6%)
Missing	2	2	0
Insurance			
Medicare/Medicaid	79 (28.9%)	40 (27.0%)	37 (30.1%)
Private	194 (71.1%)	108 (73.0%)	86 (69.9%)
Missing	4	4	0
Family History of Breast/Ovarian Cancer			
No	140 (53.4%)	78 (54.2%)	62 (52.5%)
Yes	122 (46.6%)	66 (45.8%)	56 (47.5%)
Missing	15	8	53
Way Lesion Was Identified			
Mammogram	215 (79.6%)	116 (77.9%)	98 (81.7%)
MRI	17 (6.30%)	13 (8.7%)	4 (3.3%)
Ultrasound	38 (14.1%)	20 (13.4%)	18 (15.0%)
Missing	7	3	3

1143892 - Breast cancer screening among women Veterans: What are we doing right?

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Background/Objective: Women make up an increasing proportion of the Veteran population and as such, continued efforts will be needed to ensure access to high quality breast cancer care. The Veterans Affairs (VA) health care system consists of a network of tertiary care centers linked with subsidiary community based outreach centers (CBOC). Prior studies assessing both civilian populations and Veterans have shown that rural location, race, and a mental health diagnosis have a negative impact on breast cancer mammographic screening rates. We aimed to assess the impact of these risk factors on screening adherence rates amongst Veterans at our institution.

Methods: A retrospective, cross-sectional, quality improvement study was completed analyzing women Veterans at a single metropolitan tertiary care center and its associated CBOCs who were eligible for breast cancer screening per the United States Preventative Services Taskforce guidelines as of October 2021. Adherence rates, defined as obtaining a mammogram within the past 2 years (10/19/19-10/19/21), were compared between various categories including urban/rural/highly rural designation, race, age, and mental health disorders including post-traumatic stress disorder (PTSD), depression and anxiety that were diagnosed within the last 2 years. Patients with a history of breast cancer or bilateral mastectomies were excluded.

Results: We identified a total of 2321 eligible women Veterans. Our cohort had a median age of 61 years, was 57% urban, and had a racial distribution of 89% White, 8% Black, 1% Asian, 2% American Indian/Alaska Native, and 1% Native Hawaiian or other Pacific Islander. Additionally, we found baseline PTSD rates of 18%, anxiety 31%, and depression 41%. Overall adherence was 78.2%. Urban women had similar rates of adherence to rural and highly rural women (77%, 79%, 80%, p=0.54). White, Black, Asian, American Indian/Alaska Native and Native Hawaiian/Pacific Islander all had similar adherence rates (p = 0.22). All eligible age ranges were similarly adherent (p = 0.11). Diagnoses of PTSD or anxiety were not associated with worse adherence rates versus non-diagnosed patients (PTSD 77%, non-PTSD 79%, p = 0.37; anxiety 79%, non-anxiety 78%, p = 0.51). Women Veterans with a diagnosis of depression were interestingly more likely to adhere to screening guidelines with adherence rates of 81% vs 76% (p =0.01) (Table).

Conclusions: Our Veteran population's adherence rate to mammographic screening guidelines is higher than the national average. Additionally, rural location, race, age, and certain mental health disorders did not negatively affect adherence to screening mammography. Our institution utilizes a women's health coordinator with designated liaisons at each CBOC, who send monthly reminders of provider-specific patient lists with mammogram due dates. This may be a contributing factor to our high adherence rate, however further studies throughout the VA system are needed.

Table. Screening rates of women Veterans based on rurality, race, age, and mental health disorder

Population Characteristics	n	Adherent (%)
Rurality	2320	
Urban	1312	77
Rural	953	79
Highly Rural	55	80
Unknown	1	n/a
Race	2132	
White	1893	78
Black	159	82
Asian	14	57
American Indian or Alaska Native	51	75
Native Hawaiian or Other Pacific Islander	15	80
Unknown	189	n/a
Age	2321	
50-59 yrs	1039	77
60-69 yrs	1041	80
≥70 yrs	241	74
Mental Health Disorder	2321	
PTSD	427	77
Non-PTSD	1894	79
Anxiety	711	79
Non-Anxiety	1610	78
Depression	958	81
Non-Depression	1363	76

Radiation

1146878 - Intraoperative radiation therapy (IORT) versus whole-breast radiation therapy in comparable patients

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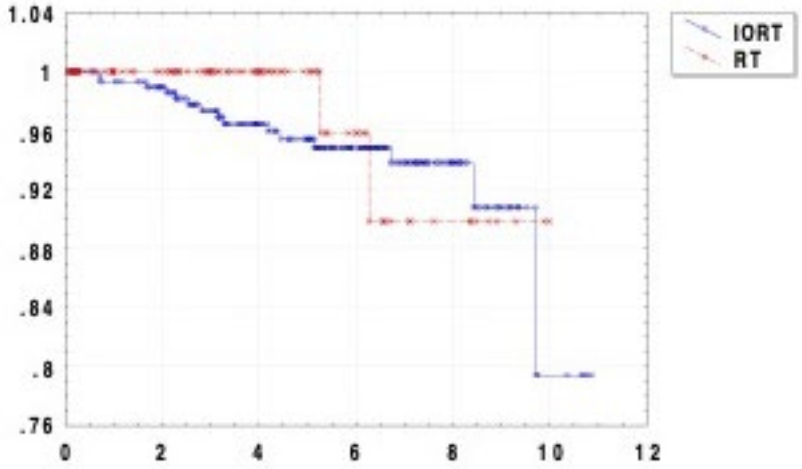
Background/Objective: In 2010, we began a registry trial of intraoperative radiation therapy (IORT). To be eligible for excision plus IORT as the only local treatment, final pathology had to confirm tumor size ≤ 30 mm, tumor margins ≥ 2 mm, negative lymph nodes, and no extensive lymphovascular invasion. This study compares patients eligible for IORT who received IORT alone verses those who received standard whole breast radiation therapy (WBRT), despite being eligible for IORT.

Methods: A prospective database was queried for all patients treated by a single surgeon who met all IORT criteria stated above and received breast conservation surgery between 2010-2021. 392 patients met all criteria and were offered excision plus IORT. 103 declined IORT, and received WBRT, for a range of reasons, including, but not limited to, insurance denial, lack of long-term IORT data, and novelty of the procedure. Local recurrences were analyzed using the Kaplan-Meier estimate and compared with the log-rank test.

Results: 392 patients met all IORT criteria. 289 patients received excision plus IORT as their only form of local treatment and experienced 15 local recurrences. 103 patients received excision plus WBRT and experienced 2 local recurrences. The Kaplan-Meier 5-year probabilities of local recurrence were 4.6% and 0%, respectively ($p = 0.56$). Median follow-up was 62 months. The 2 groups were similar regarding several factors, including ER/PR positivity, tumor size, grade, stage, tumor histology, and age.

Conclusions: Patients who receive IORT during breast conservation surgery as their only form of local treatment recur at a higher rate than those who receive excision plus WBRT. Due to our small sample size, the difference was not statistically significant. Other larger randomized trials with longer term follow-up have shown adjuvant WBRT confers a significant decreased risk of local recurrence. However, with IORT, single-session local treatment is advantageous in that it is more precise, immediate, and less costly overall with less damage to surrounding tissue, affording patients convenience at the price of a higher probability of local recurrence. When choosing IORT as an alternative to WBRT, it is important to discuss the benefits of this approach while weighing the risks of local recurrence.

Figure. Kaplan-Meier estimate and curve for local recurrence-free survival for IORT versus WBRT using hazard ratio (95% confidence interval) and log rank test P value. IORT=intraoperative radiation therapy; RT=Radiotherapy



1147831 - Is radiation boost feasible in oncoplastic breast-conserving surgery?

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Background/Objective: Oncoplastic surgery is becoming a prevalent option for women undergoing breast conservation. When significant tissue rearrangement is involved, there is concern about accuracy in delivering the boost. Radiation boost decreases risk of local recurrence and is recommended for patients with positive margins, younger age, or high-grade breast cancer. We analyzed our experience with oncoplastic breast-conserving surgery (OBCS) and the feasibility to deliver the radiation boost.

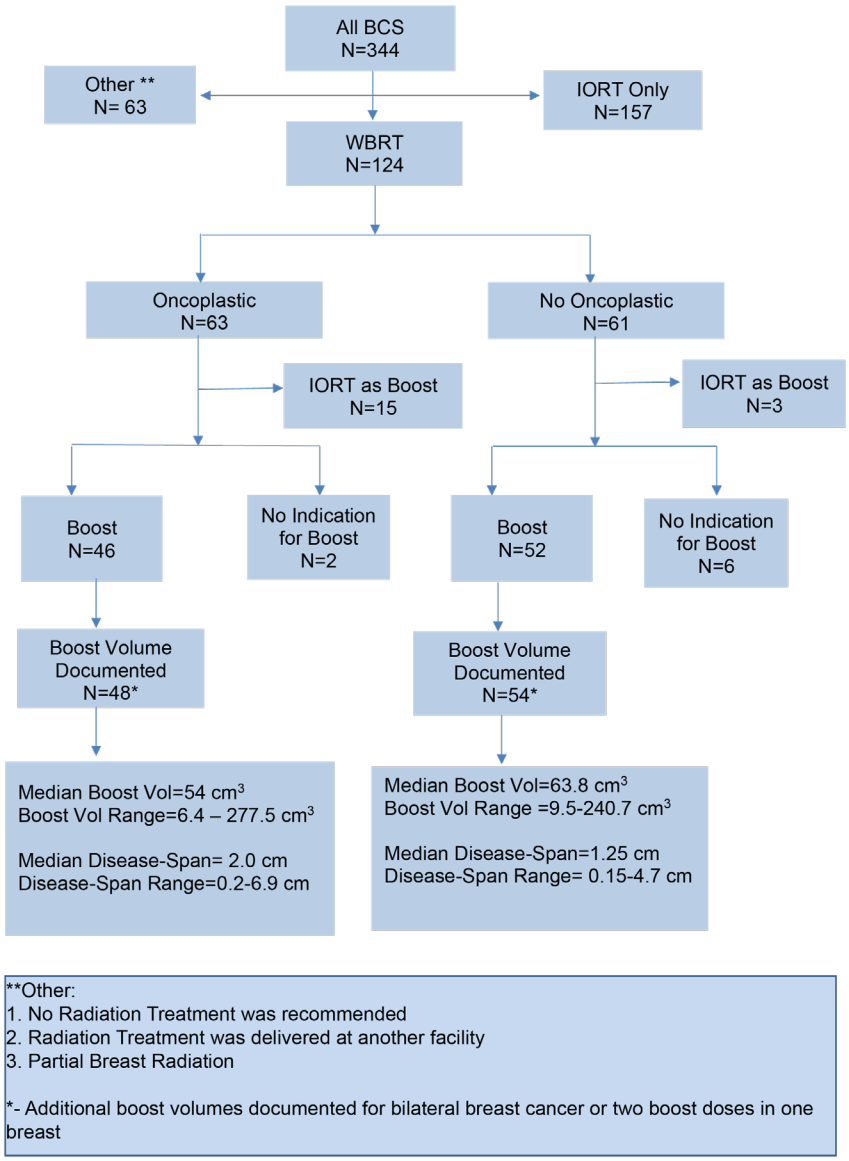
Methods: All patients undergoing breast-conserving surgery with whole breast radiation (WBRT) treated at a single institution from January 2018 to June 2021 were evaluated. Patients were divided according to type of breast-conserving surgery: oncoplastic versus non-oncoplastic breast-conserving surgery (non-OBCS). Surgical clips were placed intraoperatively in all patients and served to mark the site of disease. Those who underwent intraoperative radiation therapy (IORT) were excluded since most patient do not require WBRT and if needed, IORT served as the boost dose. Remaining patients were evaluated for disease span, boost volume, and boost dose administered. Descriptive statistics of these variables were compared. A p-value <0.05 was considered statistically significant.

Results: 124 patients were treated with breast conservation and WBRT. Sixty-three patients underwent OBCS and 61 non-OBCS. Eighteen patients with prior IORT were excluded (OBCS n = 15, non-OBCS n = 3). Eight patients lacked indication for boost administration (OBCS n = 2, non-OBCS n = 6) due to low-risk features. In the OBCS cohort, 46 patients received 48 boost doses since 2 patients had bilateral breast cancer. The median disease span was 2.0 cm (IQR = 2.4), the median boost volume was 54cm3 (IQR = 60.5), and the median boost dose delivered was 1000 cGy (IQR = 0). 52 patients in the non-OBCS cohort,

received 54 boost doses since 1 patient had bilateral breast cancer and 1 had multi-centric disease requiring 2 boost doses in the same breast. The median disease span was 1.25 cm (IQR = 1.3), the median boost volume was 63.8cm3 (IQR = 54.78) and the median boost dose delivered was 1000 cGy (IQR = 212.5). There was 1 patient in the non-OBCS group who discontinued her treatment early due to patient choice. Despite patients in the OBCS cohort presenting with significantly larger disease span (absolute median difference = 0.75 cm, p = 0.011) and use of tissue rearrangement, there were no statistically significant differences in boost volume (p = 0.234) or boost dose delivered (p = 0.869) between the 2 groups.

Conclusions: All patients who met criteria for a radiation boost received the appropriate boost dose. Those who did not receive a boost had pathologic indications to omit the boost. The mean boost volume for both groups was similar despite the larger disease span in the oncoplastic group. Radiation boost is feasible in OBCS and does not lead to larger boost volumes.

Figure. Patient flow diagram



1148635 - Efficacy of preoperative radiotherapy for non-responder breast cancer patients following to neoadjuvant chemotherapy

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Background/Objective: In breast cancer treatment, radiotherapy (RT) is usually performed after surgery in patients who receiving neoadjuvant chemotherapy(NAC), we investigated neoadjuvant radiotherapy(NART) in partial responded patients to the NAC in order to check if radiotherapy increases complete response rate and complication profile.

Methods: Between 2017-2019, 37 patients diagnosed with locally advanced breast cancer who had a clinical partial response (MRI ± Pet-CT) after NAC (4AC / EC +12 Paclitaxel ± Trastuzumab) ± hormonotherapy, had received standard dose RT on the breast and peripheral lymphatics (axilla + supraclavicular and mammaria interna) before the surgery. Surgical treatment was performed in minimum 6 weeks waiting period later. Response was evaluated according to the postoperative pathologic report.

Results: The median age of the patients was 50 (28-63), 62% (n = 26) of patients had 25 and above body mass index (BMI). Clinically, 49% (n = 18)of patients were Stage 2B, 51% (n = 19) of them were Stage 3a + T4a(only skin edema). After NAC + NART, 7 cases (18.9%) had pathological complete response in breast, 14 cases (37.8%) had pathological complete response in axilla. Breast and axillary treatment responses were analysed according to molecular subtypes. Luminal-A (n = 7) 29%, luminal-B (n = 19) 5% and Her2 / Triple-negative breast cancer(TNBC) (n = 11) 36% had pathological complete response in breast. Luminal-A (n=7) had not pathological complete response in axilla, luminal-B %37 and Her2 / TNBC subgroup 64% had pathological complete response in axilla. Following to the surgical treatment 11 patients (30%) infectious complications developed, 8 (22%) developed severe infection required hospitalisation, 3 (8%) had mild infection required outpatient treatment. All patient with infection have greater than 25 BMI (p = 0.036). Those patients who developed infection, 11 had mastectomy (27%), 12 had nipple-sparing mastectomy + implant(33%), 14 had breast-conserving surgery(29%). 2 out of 12 patients who had skin necrosis, implant extraction required (p = 0.996). During the 3-year follow-up period, 1 patient (2.7%) with mastectomy had skin recurrence (at 12 months), and 4 patients (10.8%) had systemic recurrence.

Conclusions: In this study, complete response rates increase but infectious complications also increase after neoadjuvant RT following to neoadjuvant chemotherapy in breast and axilla. Especially neoadjuvant RT can be considered in Her2(+) and TNBC pts with partial response to NAC. In order to reduce infectious complications surgical procedure can be postponed longer than 6 weeks period.

1148596 - Is adjuvant radiation omission feasible based on low 21-gene recurrence score in women <70?: An analysis of the National Cancer Database

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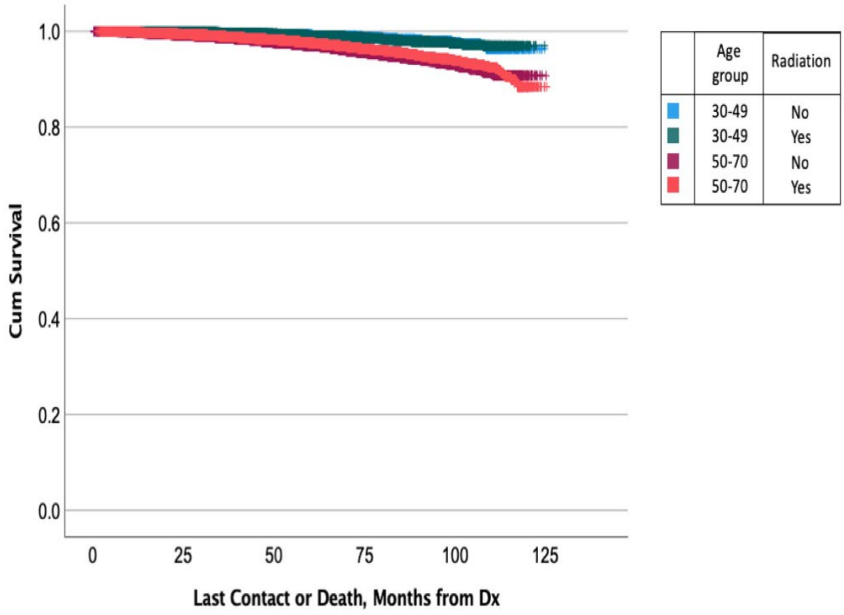
Background/Objective: The integration of the 21-gene recurrence score (oDx) into clinical practice has allowed the identification of patients with low-risk tumors and has prevented the morbidity of adjuvant chemotherapy in those who are unlikely to benefit. Whether the selective omission of adjuvant radiation (RT) in patients with low recurrence scores (RS) impacts outcomes and whether there is an interaction with age is unknown.

Methods: From the National Cancer Database (2010-2018), we identified women 30-70 years old with pT1 hormone-receptor-positive, HER2 negative invasive breast cancer who underwent breast-conserving surgery (BCS) and had an oDX RS <18. Patients were stratified by age (30-49, 50-70) and by receipt of adjuvant radiation. Univariate and multivariable analyses were performed to analyze the clinicopathologic features associated with the receipt of RT and overall survival (OS).

Results: Of 119,862 patients, 27,109 (23%) were 30-49 years old. Omission of RT was more common among patients 30-49 than those 50-70 (42.4 v. 27.9%, p<0.001). Adjuvant chemotherapy use was more common among the younger group (7.2 v. 3.1%, p<0.001), while the use adjuvant endocrine therapy was high in both groups but less common among younger women (92.5 v. 93.1%, p=0.002). On multivariable analysis, the strongest predictor of receipt of RT was positive axillary lymph nodes (pN1 OR 1.24; pN2 OR 3.7, p<0.001). Unadjusted OS was no different between those who received RT and those who did not in each age group (p=0.54 and 0.77, respectively), but differed between age groups (p<0.001, Figure). Multivariable survival analyses adjusting for clinicopathologic features demonstrated that the receipt of chemotherapy had no impact on OS (HR 0.82, p=0.11), and the likelihood of death was higher in the 50-70 years old group (HR 2.1, p<0.001) and lower in those who underwent RT (HR 0.87, p=0.006)

Conclusions: Omission of adjuvant radiation in patients with favorable small tumors and low RS is fairly common in current practice, especially among young women. While there may be a small survival benefit associated with RT, more investigation is needed into other factors that may help identify non-elderly patients who can safely forego RT after BCS, and results from the currently-enrolling DEBRA study may clarify these findings.

Figure. Overall survival among women with pT1 breast cancer stratified by age group and receipt of adjuvant radiation



Reconstruction

1146399 - Does innervated autologous breast reconstruction restore protective sensation? A systematic review and meta-analysis

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Background/Objective: Recovery of breast sensation following autologous breast reconstruction represents the next frontier in breast reconstruction and a growing topic of interest in the literature. This systematic review and meta-analysis explores the results of innervated autologous breast reconstruction studies to assess the results of return of sensation.

Methods: A comprehensive literature search was conducted using publications extracted from PubMed, Scopus, and Cochrane Library. Eligible studies were published on or after 2000 and had results measuring breast sensation following innervated and non-innervated autologous breast reconstruction.

Results: The initial search yielded 336 articles. After 3 stages of screening, 23 studies were included. Of those articles, all 23 reported data on tactile sensation, 8 on temperature sensation and 4 on pain sensation. Eight of the articles that reported data on tactile sensation used the Semmes-Weinstein Monofilament Test (SWMT). Previous literature has shown that scores above 4.56g/mm² indicate loss of protective sensation. All 8 studies had SWMT values below 4.56g/mm² (mean 4.04 g/mm²) following innervated autologous reconstruction and above 4.56g/mm² (mean 4.97 g/mm²) following non-innervated surgeries. Articles on thermal and pain sensation also discussed greater sensitivity in innervated breasts in comparison to non-innervated breasts.

Conclusions: Existing findings suggest autologous breast reconstruction with innervation restores protective tactile, thermal, and pain sensation better than techniques without innervation. The aggregated data supports greater incorporation of innervated flaps for breast reconstruction. Future studies with clear SWMT values and standardized thermal and pain scores are needed to further clarify sensory outcomes of innervation in autologous breast reconstruction.

Table. Semmes-Weinstein monofilament test scores

Study	S.W. Monofilament Innervated Mean Score g/mm²	S.W. Monofilament Non-innervated Score g/mm²
Bijkerk et al, 2020	4.05	4.62
Mori et al, 2011	4.17	5.07
Beugels et al, 2020	3.99	5.20
Beugels, Bijkerk, et al, 2021	4.32	4.89
Tevlin et al, 2021	4.60	4.90
Cornelissen et al, 2018	4.35	5.30
Yap et al, 2005	3.04	5.09
Beugels, van Kuijk, et al, 2021	3.77	4.71
Average	4.04	4.97

1148204 - Analysis of breast reconstruction at a safety net facility: Evidence that access is modifiable

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Background/Objective: Numerous studies have documented disparities in breast cancer care. Lower likelihood of breast reconstruction has been associated with biologic factors such as higher stage at diagnosis, but there has been increasing recognition of structural barriers in access to breast reconstruction. We sought to evaluate patterns and outcomes of breast reconstruction at a safety net facility.

Methods: We performed a retrospective study of female patients with breast cancer clinical Stage IIIB or lower who underwent partial or total mastectomy at a safety-net hospital from 2016-2021. Demographics, type of primary surgery, plastic surgery referral, receipt of reconstruction, reconstruction type, receipt of contralateral prophylactic mastectomy, 30-day postoperative readmission, and 60-day postoperative complications were evaluated. The year of diagnosis was categorized from 2016-2018 and 2019-2021 corresponding to time periods before and after implementation of a dedicated breast clinic with specialized breast surgical services at the safety net hospital. Chi-squared test was used for analysis.

Results: Of 166 patients, 36 (21.7%) underwent partial or total mastectomy with reconstruction and 130 (78.3%) did not (p=0.5). There were 85 (51.2%) English-speaking and 77 (46.4%) Spanish-speaking patients (p=0.5). Ethnicity was Hispanic in 105 (63.6%) and non-Hispanic in 60 (36.1%) (p=0.6). Racial background was 131 (78.9%) White, 20 (12.0%) Black, and 13 (7.8%) Asian (p=0.8). There were 79 (47.6%) obese (BMI≥30) patients and 87 (52.4%) non-obese (p=0.1). Type of primary breast surgery included partial mastectomy 95 (57.6%) or total mastectomy 62 (37.5%). Plastic surgery referral was placed for 71 (42.8%) patients, of which 36 (21.7%) received reconstruction. Comparing the time periods before and after implementation of a dedicated breast clinic, there was a higher proportion of plastic surgery referrals with incorporation of specialized breast surgical services (36.4% before vs 53.4% after implementation of a dedicated breast clinic, p=0.03), although no differences in the proportion of patients undergoing breast reconstruction were noted in these 2 time periods (p=0.8). Overall, 27 (16.3%) underwent contralateral prophylactic mastectomy of which 21 (58.3%) had reconstruction (p= <0.001). Immediate breast reconstruction was performed in 30 (18.0%) and delayed reconstruction in 6 (3.6%). Reconstruction types consisted of 31 (86.2%) implant-based, 3 (8.3%) autologous, and 2 (5.6%) oncoplastic. The median BMI was 27.4 (IQR 31.3, 24.9) for reconstructed and 30.1 (IQR 35.4, 26.6) for non-reconstructed patients. The median age of diagnosis was 47 years for reconstructed and 57 years for non-reconstructed patients. No significant differences in reconstruction vs non-reconstruction were present with regard to age, race, ethnicity, language, or obesity. Overall complication rates were comparable in both groups, though more infectious complications were reported with reconstruction and more seroma complications were reported without reconstruction (p=0.13). No significant differences in LOS or 30-day readmission in reconstruction vs non-reconstruction groups were present.

Conclusions: Although un- and underinsured breast cancer patients have opportunities for care at a safety net hospital, structural barriers remain in place limiting breast reconstruction. Fortunately, referral patterns are a modifiable risk factor for access to reconstruction. These patterns may be improved by educational efforts and streamlining of interdisciplinary breast oncology care.

1148349 - Extending breast conservation indications for moderate defects in small breasts: The intercostal artery perforator flap

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Background/Objective: Breast-conserving therapy (BCS) has at least equal oncologic outcome as mastectomy and better quality of life for patients; although this modality historically may not be pursued when the oncologic deformity is too significant. For women with small breast size even small or moderate tumors can cause significant cosmetic deformity which many times results in mastectomy for treatment. A newer technique involves recruitment of upper abdominal wall tissue based on the intercostal artery perforating vessels (ICAP). This effectively expands the indications for BCT, and we aimed to report our early experience with this novel flap compared to standard alloplastic reconstruction after mastectomy.

Methods: Retrospective review was performed for all patients who underwent ICAP flaps for reconstruction of partial mastectomy defects at our institution were included in this study. Flaps are based on either anterior or lateral intercostal artery perforating vessels and either rotated in a turnover fashion or advanced into the defect. These cases were compared to unilateral tissue expander (TE) reconstruction of mastectomy defects over a single year. All cases were performed at a single institution and flaps performed by a single microsurgeon. Demographic data was collected in addition to intraoperative data and postoperative outcomes. Patients were not matched for demographic data or oncologic status. Significance was determined by performing unpaired t-tests between statistic groups.

Results: Fourteen patients underwent 15 ICAP flaps (1 bilateral) compared to 17 unilateral tissue expanders placed for alloplastic reconstruction. There was a significant difference in operative time (106 minutes ICAP versus 74 minutes for TE; p=<0.001). Two TE patients required washout and tissue expander removal for infection, 1 patient developed a hematoma requiring washout, and 1 patient had a seroma requiring TE exchange. The patients requiring infection and hematoma washouts had a mean additional hospital stay of 1.76 days. There were also significant differences with longer hospital stays (1.59 days versus 0.14, p=<0.01) and time to ambulation (0.53 days versus 0.14; p=0.02) in TE patients versus ICAP patients. Five TE patients required opiate refills (29.4%) compared to no ICAP patients. No ICAP patients required additional surgeries, there were no complications, and patients reported being happy with their aesthetic outcome.

Conclusions: Early experience with this novel technique of ICAP flaps for reconstruction of moderate defects in small breasts is promising with less morbidity than traditional mastectomy with implant-based reconstruction. This technique expands the indications for BCT allowing for improved patient quality of life. Additionally, patients with ICAP reconstruction required less pain medication, were treated as outpatients, did not require additional surgery to complete reconstruction, without any significant complications.

1148313 - Reducing length of stay following autologous breast reconstruction via combined nerve block-ERAS protocol? A systematic review and meta-analysis

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Background/Objective: Reducing length of hospital stay (LOS) and narcotic usage following autologous breast reconstruction has been shown to reduce postoperative complications, drug-dependencies, and lead to an increased rate of recovery. Previous studies support the use of Enhanced Recovery After Surgery (ERAS) protocols as well as nerve blocks to reduce LOS and lower narcotic usage. However, the additive effectiveness of both methods is not well understood. This systematic review and meta-analysis explores current pain management methods following autologous breast reconstruction to assess best methods of practice.

Methods: A comprehensive literature search was conducted in October 2021 using publications extracted from PubMed, Scopus, and Cochrane Library. Eligible studies were published on or after 2000 and had data reporting LOS, postoperative medications, narcotic usage measured in morphine milligram equivalents (MME). The criteria used were those described in the PRISMA Declaration for performing systematic reviews.

Results: The initial search yielded 301 results. After 3 stages of screening, 20 studies were included. Of those 20, 9 implemented ERAS protocols and 11 used nerve blocking techniques. Implementation of ERAS protocols lead to a shorter LOS (4.5:5.85, p=0.0047) than non-ERAS postoperative methods. Implementation of nerve blocks, most commonly a Transverse Abdominis Plane block (TAP block), was also shown to reduce LOS (3.36:4.475, p=0.0254) and narcotic usage than the lack thereof.

Conclusions: Existing findings suggest the use of ERAS protocols and nerve blocks to reduce LOS following autologous breast augmentation. Furthermore, a combined intervention using both ERAS protocols and TAP block may have an additive effect in reducing LOS. Further studies analyzing the effects of a combined nerve block-ERAS protocol are needed to reliable assess the potential synergistic effects of the 2 components.

1149069 - All gain less pain: How an acute pain service can make opioid consumption equivalent between tissue expander and free flap breast reconstruction

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Background/Objective: Despite free flap breast reconstruction being accepted as superior long-term reconstruction option, one limiting factor in its adoption is the perceived additional pain from the donor site. However, with the potential advantages of having pain control be addressed before, during and after surgery, by experts in pain control, differences in pain may be abrogated by this multi-disciplinary approach to pain. The aim of the study was to compare postoperative opioid consumption and early recovery between tissue expanders and free flaps, both managed via a comprehensive Acute Pain Service protocol.

Methods: We performed a retrospective cohort study in which we identified patients that underwent either tissue expander or free flap breast reconstruction. The primary outcomes were total opioid consumption on postoperative day (POD) 0 - 3 (measured in intravenous morphine equivalents) and hospital length of stay. A Wilcoxon rank sum test was performed to compare primary outcomes in both cohorts. To compare patient characteristics in both cohorts, a Chi-square test and Student's t-test was used to compare categorical and continuous variables, respectively.

Results: There were 85 patients included in the analysis, in which 42 (49.41%) were in the free flap cohort. Among both cohorts, there were no differences in age, presence of preoperative chronic pain, or use of preoperative peripheral nerve block. The free flap cohort had higher average body mass index than the tissue expander cohort (28.9 kg/m2 versus 25.1 kg/m2, respectively, p = 0.0003). The median [quartiles] opioid consumption during POD 0 - 3 in the microsurgery and tissue expander cohorts were 18.0mg [6.4, 33.0mg] versus 10.0mg [4.0, 28.8mg], respectively (p=0.45) (Table). The median [quartiles] hospital length of stay in the microsurgery and tissue expander cohorts were 3.0 days [2.0, 4.0 days] versus 2.0 [1.0, 2.0 days], respectively (p<0.0001).

Conclusions: We found that patients who elected to have tissue expanders had similar opioid requirement as patients who had free flaps. Free flap patients however had a longer hospital length of stay by 1 day. Although this is a relatively small series it demonstrates flap reconstruction can be performed with low opioid requirements. Such data could be useful for patient counseling regarding reconstruction options as well as highlight the value of a multidisciplinary team-based approach to perioperative pain management.

Table.

	Tissue Expanders		Free Flaps	
	n	%	n	%
Total	43	50.59	42	49.41
Total MEQ (POD0-3), median [quartile]	10.0 [4.0, 28.8]		18.0 [6.4, 33.0]	
Hospital LOS, median [quartile]	2.0 [1.0, 2.0]		3.0 [2.0, 4.0]	
Age in years, mean [standard deviation]	46.3 [9.5]		49.1 [7.7]	
BMI, mean [standard deviation]	25.1 [5.4]		28.9 [4.3]	
Preoperative chronic pain	1	2%	3	7%
Regional anesthesia used	35	81%	42	100%

1148145 - The Breast Cancer Reconstruction Outcome Survey Study (ROSE Study): Quality of life in patients with and without breast reconstruction - A Canadian perspective

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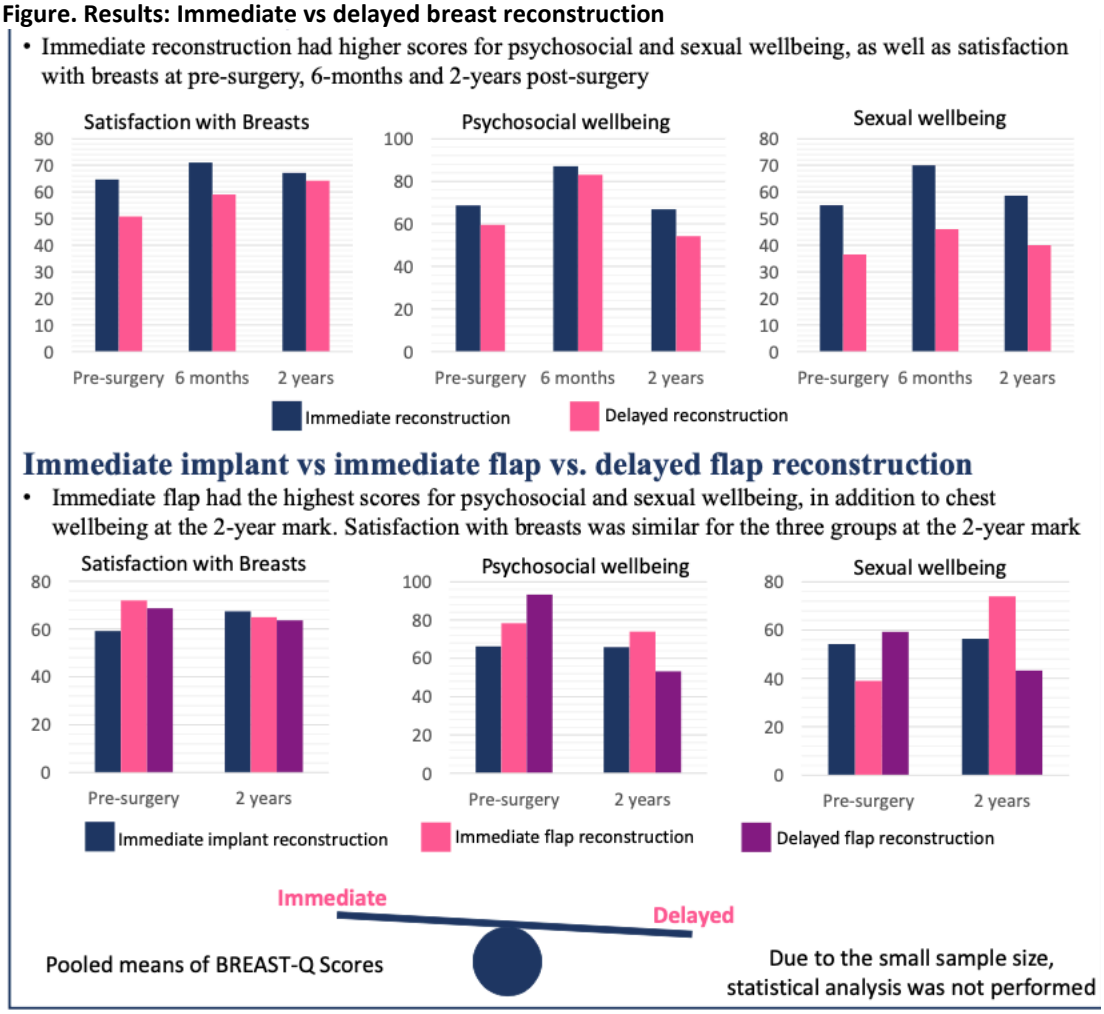
Background/Objective: Oncologic safety and pleasing aesthetic outcome have become the cornerstone of breast cancer surgery. Reconstruction has been shown to improve patients' quality of life (QoL) and reduce the psychological distress from ablative breast surgery. At the time of breast cancer diagnosis, women are asked to make complex surgical decisions regarding oncologic and reconstructive options. Information derived from Patient Reported Outcome Measures (PROM) tools has become integral in framing the shared clinical decision-making model that consultations should be based on. This study aims to establish the first Canadian database of QoL Data of breast cancer patients to assist in the navigation of their breast cancer journey.

Methods: Research Ethics Board approval was obtained for the ROSE study and the BREAST-Q module, a rigorously validated patient-reported outcome measurement tool was used. The BREAST-Q modules were imported into RED-Cap, a secure web application through which they were sent as on-line surveys to be completed anonymously by the patients. Prospective and retrospective patient cohorts are recruited in this study. Since the launch, 103 reconstruction and 30 no reconstruction patients have been recruited. Patient demographics and treatment related data are also extracted from RED-Cap. The 6 QoL domains are measured pre-operatively, 6 months, 1 year, 2 years and 5 years post-operatively. Here, we report the preliminary data to date.

Results: Immediate reconstruction patients scored higher for psychosocial and sexual well-being and had higher satisfaction scores for chest and abdominal wellbeing at pre-surgery and 2-years post-surgery. However, at 6 months post-surgery, the delayed reconstruction patients had higher scores for chest and abdominal physical wellbeing. Overall, in the comparison of pooled means of BREAST-Q scores, immediate breast reconstruction patients had higher satisfaction and QOL scores than delayed reconstruction patients. When comparing immediate implant, immediate flap and delayed flap reconstruction at the 2-year mark, all had similar BREAST-Q scores for the breast satisfaction. Immediate flap reconstruction had the highest scores for psychosocial and sexual wellbeing, in addition to chest wellbeing at the 2-year mark. Immediate implant reconstruction had the second highest scores (psychosocial, sexual, chest wellbeing) at 2-years. Preoperative non-reconstruction patients exhibited significantly lower physical wellbeing mean scores (p-value=0.0016), highlighting the potential burden of breast cancer diagnosis. Furthermore, prior to surgery roughly half of the patients reported being accepting of their appearance after surgery or believing reconstruction was not essential for their wellbeing.

Conclusions: The ROSE study is the first Canadian study that aims to construct an electronic database of breast cancer patients and the QoL outcomes with and without reconstruction. Preliminary data of the reconstruction cohorts attest to the positive impact reconstruction in the immediate setting has as well as the potential superiority of the autologous options. Data from the no reconstruction cohort indicates that access to reconstruction remains an issue and that more patients maybe accepting of their appearance without restoring their breast. Patients are being recruited and data is collected over time and will help extrapolate treatment-specific QoL insights and remove barriers to QoL-improving treatments.

Figure. Results: Immediate vs delayed breast reconstruction



1148231 - Pre-pectoral implant reconstruction using synthetic mesh: An Irish perspective

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Background/Objective: In recent years there has been a resurgence in the use of the pre-pectoral implant based technique, with many institutions favouring this form of implant reconstruction . Literature has reported positive outcomes with overall reductions in complications when compared to other reconstruction techniques. Recent studies however have largely reported outcomes using forms of biological mesh. Aim is to establish the outcome of an Irish cohort of patients who underwent pre-pectoral immediate implant reconstruction using TIGR mesh, a form of synthetic mesh.

Methods: We performed a review of a prospectively maintained database of all patients that proceeded with pre-pectoral implant reconstruction from January-December 2020 at The Mater Misericordiae

University Hospital. We included all patients who underwent immediate pre-pectoral implant based breast reconstruction using TIGR mesh. Patient and tumour characteristics, oncological management, surgical data and complications were collated and analysed.

Results: 62 immediate pre-pectoral implant reconstructions were performed on 49 patients. Majority were unilateral,73%, with 27% bilateral. The mean age at time of surgery was 46.77 years(range29-63). The mean length of stay was 2.5 days(range1-4). The average BMI was 24.15, only 2 patients had a BMI >30. Majority of patients were non-smokers 78% with 18% of patient reporting an ex-smoker status. In terms of adjuvant therapy, 51% of patients proceeded with radiation therapy and 49% underwent chemotherapy. Majority of patients had skin-sparing mastectomies (77%), with only 23% nipple-sparing. There was a 6% return to theatre rate at 3 months post op and a 2% rate of implant loss. Other complications included surgical site infection requiring antibiotics 2% and haematoma 2%.

Conclusions: Pre-pectoral breast reconstruction is a novel method of breast reconstruction, with acceptable early outcomes.

1148466 - Effects of vitamin E and pentoxifylline on surgical complications and aesthetic outcome after postmastectomy radiation (PMRT) and reconstruction

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Background/Objective: PMRT is known to affect surgical outcomes in reconstructed breast cancer patients. Oral vitamin E and pentoxifylline has shown to decrease fibrosis after radiation therapy. The purpose of this study was to evaluate whether a course of vitamin E and pentoxifylline would improve aesthetic outcomes in PMRT patients undergoing implant-based reconstruction and lead to less surgical interventions.

Methods: Women who had PMRT after implant-based reconstruction were eligible. Beginning 1 week after finishing radiation, patients were given oral vitamin E and pentoxifylline for 6 months. The dose was 400 IU of vitamin E daily and 400mg of pentoxifylline twice daily. If tolerated, after 1 week pentoxifylline was increased to 400mg thrice daily. Patients were seen in follow-up at 1, 6 and 18 months following radiation completion. Standardized photographs were taken and later independently graded on aesthetic outcome by a panel of physicians using the Lowery Aesthetic Scale. This is a 5 four-point subscale evaluating the reconstruction on volume of breast mound, contour of breast mound, placement of breast mound, inframammary fold and breast scars. The panel of physicians consisted of a radiation oncologist, plastic surgeon and breast surgeons. Other data was collected including patient demographics, comorbidities, and surgical complications. Surgical complication was defined as any unplanned plastic surgery intervention including implant failure. Data was compared to a cohort of women who underwent PMRT after implant-based reconstruction in the 2 years prior to initiation of this trial.

Results: A total of 27 patients were enrolled from February 2018 to January 2020. Eight women were excluded from analysis for various reasons. There were 19 patients available for analysis. All received conventional fractionated radiation therapy. 15 patients completed the 6 months of oral therapy. There were 22 women who were enrolled in the control cohort. Of these, 3 were lost to follow-up and 19 women were available for analysis. Both cohorts were well balanced in comorbidities. In the trial cohort, 6 women had surgical complications, including 3 implant failures. In the control cohort, 12 women had surgical complications, including 4 implant failures. The average Lowery score was 7 at 18 months for the trial group compared to 6.34 at 24 months, for the control group. This was not statistically significant ($t = 0.03$, $p = 0.97$).

Conclusions: Vitamin E and Pentoxifylline resulted in half the number of total complications in the trial cohort compared to a historical control group. There was no difference in physician assessed aesthetic outcomes between the 2 groups. Limitations to this study are a small patient population and non-randomized design. Funding for this project was provided by The Alliance for Clinical Trials in Oncology Foundation.

1142759 - National trends in "Going Flat" after mastectomy

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Background/Objective: The "Going Flat" movement provides awareness, information, and support to women who are considering or choose to forego reconstruction following mastectomy. Despite growing recognition of the "Going Flat" movement, it is unclear whether this movement has had an impact on rates of post-mastectomy breast reconstruction. In 2016 the New York Times published an article entitled "'Going Flat' After Breast Cancer" which catapulted this issue into the national spotlight. Since then, both women and breast cancer advocacy groups have promoted the option to go flat. The objectives of this study were to evaluate whether the number of women going flat after mastectomy has increased since the start of this movement and which patient, disease, and treatment factors are associated with an increased likelihood of going flat.

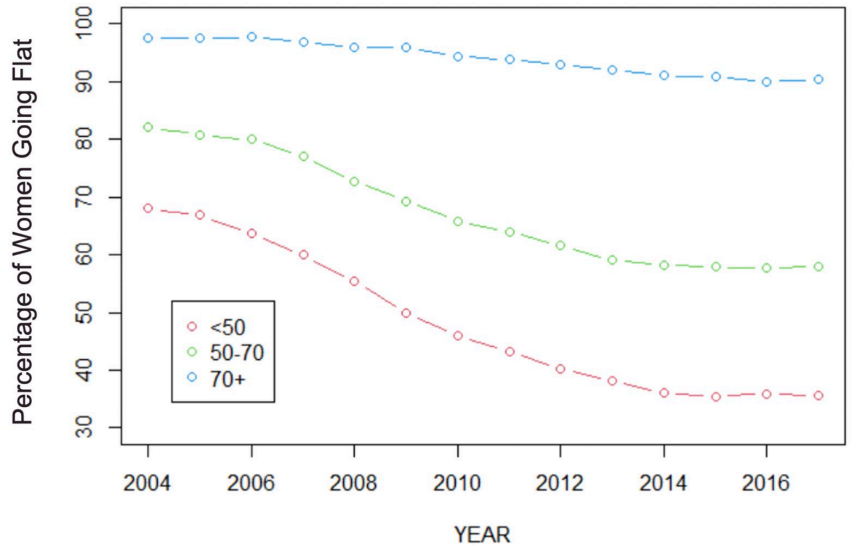
Methods: A retrospective cohort analysis was performed using the National Cancer Database. Women diagnosed with non-metastatic breast cancer and who underwent a unilateral or bilateral mastectomy between 2004 and 2017 were included. Trends in opting to go flat after mastectomy were calculated and stratified by years of age (<50, 50-70, >70). A multivariate logistic regression model was then used to identify patient, disease, and treatment variables associated with going flat after mastectomy.

Results: A total of 595,624 patients met inclusion criteria. Of these, 201,509 (33.8%) underwent reconstruction and 394,115 (66.2%) chose to go flat. Among women ages <50 and 50-70, rates of going flat decreased steadily from 2004 to 2015 and then stabilized in 2016 which coincides with the rise in popularity of the "Going Flat" movement. Rates of going flat remained stable for women >70 from 2010-2017. In multivariate analysis, non-white race, older age, a higher Charlson-Deyo comorbidity score, government provided insurance, advanced disease stage, treatment at a community cancer center,

receipt of adjuvant radiotherapy and neoadjuvant chemotherapy were all factors associated with a higher likelihood of going flat ($p<0.001$).

Conclusions: In the first 2 years since the start of the "Going Flat" movement, the number of women opting to go flat after mastectomy has stabilized for the first time in over a decade. These trends temporally align with the "Going Flat" movement and suggest that the social impact of this movement has at least stabilized rates of post-mastectomy breast reconstruction. While it is anticipated that tumor and treatment factors would impact the decision for post-mastectomy reconstruction, additional data is needed to better understand the psychosocial and cultural complexities of why women who are non-white, have Medicare and Medicaid insurance, and treated at a community cancer center tend to go flat after mastectomy more often than their counterparts.

Figure. Trends of Going Flat by age



1122797 - Optimizing tissue expander breast reconstruction in smokers

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Background/Objective: Smoking is a significant risk factor for post-operative complications following breast reconstruction. Abruptly refraining from all nicotine products may be difficult for patients with a new cancer diagnosis. Surgeons may elect to not to offer reconstruction to smokers because of the elevated complications. However, others may perform reconstruction for informed patients who choose to accept a higher risk. The goal of this study is to assess complications following a new approach to tissue expander reconstruction aimed at optimizing outcomes in nicotine users

Methods: Patients in a single hospital system who underwent tissue expander reconstruction after mastectomy between 2017-2021 were retrospectively reviewed. The approach to optimize outcomes in

smokers was to delay reconstruction at least 7 days after the mastectomy and place the expander submuscularly (Group I). The other patients underwent standard immediate reconstruction on the day of mastectomy and were divided into Group II (active smokers) and Group III (non-smokers)

Results: There was a total of 195 patients (323 breast reconstructions): Group I (10 patients, 19 expanders); Group II (11 patients, 19 expanders) and Group III (174 patients, 285 expanders). In Group I, 5.3% of patients (n=1/19) had wound dehiscence requiring surgical debridement and/or device removal, compared to 5.6% (n=18/285) in the non-smoker Group III (p=1.0). Group II exhibited significantly more wound dehiscence necessitating operative intervention, 31.6% (n=6/19), compared to Group III (p=0.002). In Group I, all tissue expanders were placed submuscular. In Group II, 72.7% (8/11) were placed submuscular, compared to Group III, in which 29.9% (n=52/174) were placed submuscular. There was no significant difference when comparing wound dehiscence in prepectoral expander placement (n=14/181) versus submuscular placement (n=4/104) in Group III (p=0.218). Skin necrosis in those that had nipple-sparing mastectomy was 0% (n=0/3) in Group I, 50 % (n=2/4) in Group II, and 12.4% (n=13/105) in Group III (p=1.0). There were no differences in infection rates, seroma, or hematoma between the groups

Conclusions: If patients who use nicotine are offered tissue expander breast reconstruction, performing the operation 1) at least 7 days after the mastectomy (to allow for vascular delay and demarcation) and 2) in the submuscular plane can normalize the risk of skin necrosis to that of non-smokers who have standard (prepectoral or submuscular) reconstruction on the day of mastectomy.

SLN

1146189 - How often do sentinel lymph node biopsy results impact adjuvant therapy decisions among postmenopausal women with early stage, HR+/HER2= breast cancer in the post-RxPonder era?

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Background/Objective: Sentinel lymph node biopsy (SLNB) results dictate the need for axillary lymph node dissection (ALND) and impact eligibility for partial breast irradiation (PBI), nodal irradiation, and use of adjuvant chemotherapy in early-stage breast cancer patients. The RxPonder trial reported no benefit to chemotherapy among post-menopausal patients with HR+/HER2- tumors and low recurrence scores, raising questions about the role of axillary staging in this population. Here we evaluate the impact of SLNB results on adjuvant therapy decisions in postmenopausal women with HR+/HER2- breast cancer.

Methods: Postmenopausal women with cT1-2N0, HR+/HER2- breast cancer treated with lumpectomy and SLNB from 2012-2018 with complete clinicopathologic data available were identified from an institutional database. Receipt of nodal irradiation and indication for ALND, PBI, and chemotherapy were reviewed both pre- and post- SLNB results. Factors associated with use of ALND and change in PBI eligibility were assessed using Wilcoxon rank sum test for continuous variables and Fisher's exact test or chi-squared test for categorical variables. P values adjusted for multiple comparison were obtained where appropriate.

Results: 1786 women were identified with a median age at diagnosis of 62 years (range 50-85), 84% with pT1 tumors and 16% pT2-3. Among this cohort of cN0 patients, 85% (n=1525) remained pN0, 14% (n=244) were pN1, and 1% (n=17) were pN2-3. 20 (1%) patients had >2 positive SLNs, necessitating ALND. Larger tumor size was associated with need for ALND with only 1 patient with a tumor <10mm having >2 +SLNs. Pre-SLNB, 1478 women were considered eligible for PBI; with the addition of SLNB results, 227 (13%) of these women converted to PBI ineligible. Younger age, larger tumor size, tumor grade, and pN stage were all associated with a change from PBI eligible to ineligible. 58 node positive patients received nodal irradiation representing 3% of the entire cohort and 22% of node positive patients. Overall, 1401 patients had an Oncotype Dx recurrence score available including 1273 pN0 patients and 128 pN1 patients with 173 (14%) and 16 (13%), respectively, having a recurrence score >25 warranting chemotherapy. Notably, no patient with pN2-3 disease had an oncotype performed.

Conclusions: While few cN0 postmenopausal women with HR+/HER2- tumors had nodal pathology that warranted ALND, receipt of nodal irradiation or indicated the need for chemotherapy, in 13% SLNB would have an impact on consideration for PBI. If whole breast radiation therapy is indicated based on preoperative findings, SLNB is unlikely to change management. Among patients eligible for PBI, findings from SLNB may help refine selection among postmenopausal women with this tumor profile.

Table.

Characteristic	SLNB only (N=1766)	ALND appropriate post SLNB (N=20)	P value	Remained PBI eligible (N=1478)	Became PBI ineligible post SLNB (N=227)	P value
Median age at surgery	62	58	0.3	62	61	0.02
Tumor size			<0.001			<0.001
<5mm	240 (100%)	0 (0%)		233 (98%)	5 (2%)	
6-10mm	531 (99.8%)	1 (0.2%)		483 (91%)	48 (9%)	
11-20mm	714 (99%)	8 (1%)		601 (84%)	115 (16%)	
21-30mm	214 (97%)	7 (3%)		161 (73%)	59 (27%)	
31-50mm	62 (94%)	4 (6%)		0	0	
>50mm	5 (100%)	0 (0%)		0	0	
Tumor differentiation			0.3			<0.001
Well	380 (99.7%)	1 (0.3%)		346 (92%)	29 (8%)	
Moderately	1084 (99%)	15 (1%)		906 (86%)	152 (14%)	
Poorly	302 (99%)	4 (1%)		226 (83%)	46 (17%)	
Tumor Histology			0.2			0.7
IDC	1407 (99%)	14 (1%)		1180 (86%)	187 (14%)	
ILC	227 (99%)	3 (1%)		190 (90%)	21 (10%)	
Mixed	95 (99%)	1 (1%)		72 (81%)	17 (19%)	
Other	37 (95%)	2 (5%)		36 (95%)	2 (5%)	
Oncotype Score (*if performed N=1401)			>0.9			>0.9
≤25	1179 (99.7%)	3 (0.3%)		1050 (91%)	99 (9%)	
>25	219 (100%)	0 (0%)		195 (91%)	19 (9%)	

1148123 - Incidence of unsuspected regional lymph node involvement in patients with favorable-risk invasive ductal carcinoma of the breast

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Background/Objective: In patients with invasive breast cancer without clinically or radiographically-detected lymph node involvement, the standard of care involves sentinel lymph node biopsy, which in recent decades has substantially mediated the need for axillary lymph node dissection. Preoperative radiographic evaluation such as magnetic resonance imaging and axillary ultrasound of regional lymph nodes have similar statistical profiles in evaluating axillary nodal status. In this study, we aimed to determine the factors correlating to positive surgical nodal status in patients diagnosed with invasive ductal carcinoma with a favorable risk profile.

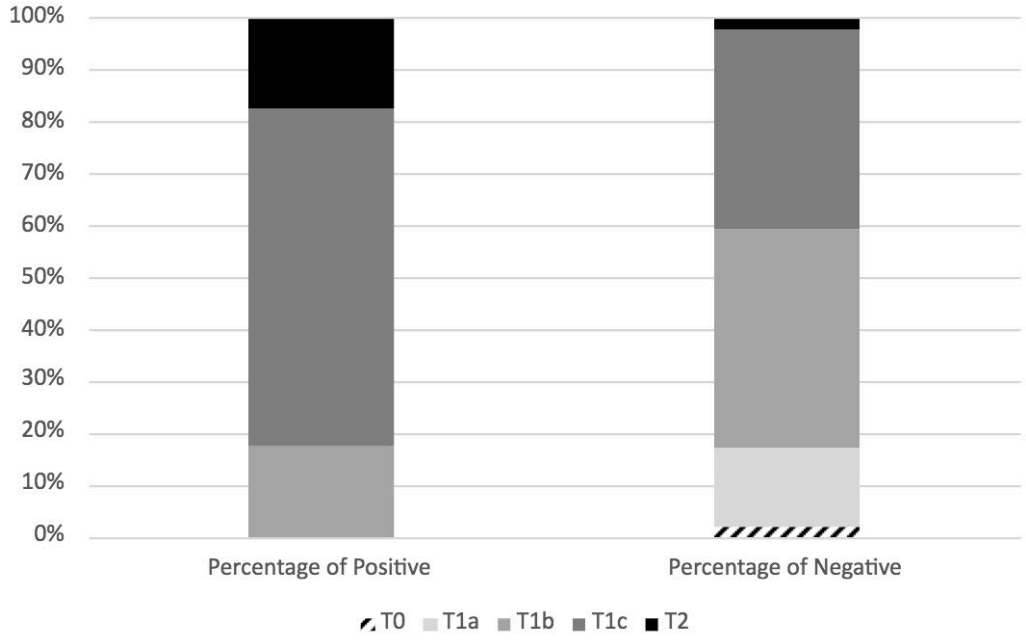
Methods: This is a retrospective, single-site, case-control study of radiographically node-negative patients over 40 years old from January 2010 to December 2014. Patients with unifocal, estrogen receptor-positive, HER2-negative invasive ductal carcinoma, measuring 1.5 cm or smaller by imaging,

who have undergone surgical excision and lymph node biopsy were included. The primary outcome was lymph node involvement. Patients were stratified by age, body mass index (BMI), Ashkenazi Jewish ancestry, surgical tumor features, and Charleston Comorbidity Index. We performed statistical analysis to determine which clinical or pathological features correlated with node-positivity.

Results: Data from 233 patients met the initial inclusion criteria, which was selected to 194 who underwent lymph node biopsy during excisional surgery. The mean age was 68.7 years (standard deviation (SD) = 11.8). Mean BMI was 26.2 (SD = 4.6). Forty-four percent were of Ashkenazi Jewish decent, and mean Charleston Comorbidity Index was 4.82 (SD = 1.65). Following surgical lymph node biopsy, 17 patients out of 194 (8.8%) were found to be pathologically lymph node positive. Correlative tumor features were size ($p<0.0011$) with a significantly profound positive trend when stratified by tumor stage (gamma trend coefficient (G) = 0.743; $p<0.001$). The mean number of lymph nodes biopsied for positive-node patients was 3.2 (SD =1.3) versus 2.2 (SD = 1.2) for node-negative patients ($p=0.006$). Progesterone receptor status was nearly statistically significantly protective for lymph node involvement ($p=0.06$). In these 4 years of data, we found no statistically significant correlation of nodal status with age (including subgroup analysis by decade of life; G = -0.005l $p=0.99$), Ashkenazi Jewish ancestry, BMI, Charleston Comorbidity Index, Nottingham grade, history of previous breast cancer or previous axillary dissection.

Conclusions: The results of this study provide valuable insight on the factors associated with lymph node positivity. Our results suggest that minimally invasive techniques such as cryoablation may be suitable in a low risk population, specifically, patients with tumors smaller than 0.5cm (T1a). Our data shows that other factors, in addition to age, need to be considered when evaluating a patient's risk for lymph node positivity. Limiting factors include the yield of lymph-node positive patients. We will continue to collect data from January 2015-December 2020 and we plan to explore the correlation of preoperative radiographic size to lymph node status.

Figure. Surgical specimen tumor stage by nodal status



1148184 - Is nodal staging necessary for older patients with HER2-positive or triple-negative breast cancers?

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Background/Objective: The Choosing Wisely campaign recommends selective sentinel lymph node biopsy (SLNB) in clinically node-negative (cN0) women aged ≥ 70 years with ER positive breast cancer. However, the guidelines do not extend to women with Her2 positive or triple-negative breast cancer (TNBC), despite the fact that tumor biology outweighs nodal status when determining systemic therapy recommendations in these patients. We sought to determine the rate of SLNB positivity as well as differences in adjuvant therapy recommendations, local recurrences and survival in this cohort

Methods: Using our IRB approved database, a retrospective chart review was performed of all Her2 positive or triple-negative T1-T2, cN0 primary breast cancer cases who underwent an operation at our institution from 2016-2020. Demographics, clinical characteristics, staging and adjuvant therapy plans were recorded. Overall survival and recurrences were assessed

Results: We identified 28 TNBC and 23 Her2 positive T1-T2 cN0 breast cancer patients aged ≥ 70 years treated surgically from 2016 to 2020. Of the 28 TNBC patients, 27 underwent a SLNB. In these, only 2 had a positive SLNB (7.4%) and both were pN2. Chemotherapy (CTX) was not recommended for 9 patients—3 with T1a tumors, 6 for significant co-morbidities. For the 17 patients in whom CTX was recommended, 3 refused and 3 stopped therapy early due to intolerance. One patient with TNBC developed an in-breast recurrence. In the Her2 positive cohort, none of the 23 patients received neoadjuvant therapy and 21 underwent a SLNB. Only 2 of 21 (9.5%) had a positive SLNB. Chemotherapy was not recommended for 5 patients—1 with T1a tumor, 2 refused, 2 for significant co-morbidities. There were no breast cancer related deaths in either cohort

Conclusions: The rate of SLNB positivity in T1-T2, cN0 women aged ≥ 70 years with Her2 positive or TNBC disease in our patient population was low at <10%. Since tumor biology is the primary driving force behind systemic therapy recommendations for these patients, nodal status has minimal impact. De-escalation of axillary surgery by omitting SLNB should be considered in this cohort, especially for patients with significant medical co-morbidities and those who refuse systemic therapy. Further investigation using data from national multi-institutional registries would help determine the impact, if any, of nodal staging in older patients with Her2 positive or TNBC disease

1148571 - Axillary clearance for cN0 breast cancer when Z011 criteria are not met: Is it worth it?

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Background/Objective: The Z0011 Trial led to a radical shift in axillary management in breast cancer. Pre-Z0011, Axillary lymph node dissection (ALND) was the standard of care for patients whose sentinel node biopsies (SLNBs) contained metastases. Those women who do not fit the Z0011 trial criteria however, are still recommended to undergo ALND. ALND carries a significant risk of morbidity, such as lymphedema. There is scant data on the added benefit of ALND in women with upfront clinically negative axillary lymph nodes who do not fit the Z0011 criteria. This study aims to identify the lymph node yield of ALND in patients not suitable for surveillance as per Z0011 criteria.

Methods: All women who had SLNB followed by ALND from 2010-2015 were included in this study. A retrospective review of data from a prospectively maintained cancer database in conjunction with electronic patient records was performed.

Results: From 2010-2015, 856 patients had operations for breast cancer. 71 patients met the inclusion criteria. All were female, and median age was 56 (IQR = 45-69). 65% had invasive ductal carcinoma and 20% had lobular carcinoma. 92% showed oestrogen receptor positivity and 80% showed progesterone receptor positivity. 15% were HER2 positive. 28 (39.4%) had mastectomy and 43 (60.6%) had breast-conserving surgery, of whom 12 (16.9%) subsequently had completion mastectomy. Median sentinel lymph node yield was 2 (IQR = 1-3) with median of 1 positive node (IQR = 1-1). 28 (39%) of women had additional positive nodes on ALND, while 43 (61%) did not. Median lymph node yield for ALND was 12 (IQR 7-16). In the patients who had further positive nodes on ALND, the median number of involved nodes was 2 (IQR = 1 – 5). 67 (94%) patients had adjuvant chemotherapy and 57 (80%) had adjuvant radiotherapy. The average length of stay (LOS) for patients undergoing ALND as a second procedure was 3 days.

Conclusions: Currently, women who fall outside of Z0011 criteria with SLNB metastases are recommended for ALND. In this cohort, 61% of women had no further positive lymph nodes excised at the time of ALND, and therefore were unlikely to have derived benefit from this additional procedure. The added risk of morbidity alongside a second hospital stay in patients with active malignancy are significant issues with undergoing ALND. Further research is warranted help predict which patients, lying outside Z011 criteria, can be spared the morbidity of an ALND.

1121089 - Axillary node dissection vs sentinel lymph node biopsy in early-stage breast cancer patients with three positive sentinel lymph nodes

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Background/Objective: Sentinel lymph node biopsy(SLNB) was associated with similar survival outcome compared with axillary lymph node dissection(ALND) in patients with early-stage breast cancer and limited sentinel node metastasis (<3 positive nodes) who underwent breast conservation and systemic therapy. However, there is a paucity of data in patients with 3 positive sentinel lymph nodes. The aim of our study was to evaluate the impact of SLNB on survival of early breast cancer patients with 3 positive sentinel lymph nodes using the National Cancer Database(NCDB).

Methods: Female patients with clinical T1-T2 unilateral invasive breast cancer, clinical node-negative, positive sentinel lymph nodes, no distant metastasis, who underwent breast conversation therapy between 2012-2016 were retrospectively analyzed. Patients with positive margin, incomplete survival data(<1m), who underwent neoadjuvant therapy or second primary cancer were excluded. The primary outcome was 5-year overall survival(OS). Descriptive statistics and Cox regression multivariate analysis were used.

Results: Among 16,170 SLN positive patients with breast conservation therapy, 11,022 (68.2%) patients underwent SLNB alone and 5,148 underwent SLNB+ALND. At a median follow-up of 4.2 years in SLNB group versus 4.5 years in ALND group, Overall survival was higher in SLNB group compared to the ALND group. (5-year OS, 95.8% with SLNB vs. 95.2% with ALND, p=0.03). In SLNB alone group, no statistically significant difference was found in OS between patients with 1-2 positive SLN and 3 positive SLN. (p=0.32). Among patients with 3 positive nodes, there was no significant difference in OS between SLNB alone and ALND. (5-year OS, 92.9% SLNB alone vs. 93.0 % with ALND, p=0.86). Hazard ratio for treatment-related OS was 1.07 (95% CI: 0.52-2.22) without adjustment and 0.94(95%CI:0.44-2.01) after adjusting for age, grade, tumor size, lymphovascular invasion, Hormonal receptor (HR)status, HER2 status and adjuvant therapy. HR status and adjuvant therapy were independent prognostic factors associated with OS.

Conclusions: Among patients with 3 positive SLN metastatic breast cancer undergoing breast conservation and systemic therapy, omission of ALND is not associated with worse survival and could be considered.

Table. Cox regression multivariate analysis associated with 5-year overall survival in patients with 3 positive nodes

Variables			
	Hazard ratio	95% Confidence Interval	p value
ALND vs. SLND	0.94	0.44-2.01	0.85
Age>50 vs. <50 y	0.96	0.42-1.93	0.80
Primary tumor size (cm, continuous)	1.01	0.98-1.05	0.45
Grade (III vs I)	1.04	0.34-3.23	0.95
HR status (negative vs. positive)	2.63	1.11-6.05	**0.02**
HER2 status (negative vs. positive)	0.91	0.34-2.44	0.86
LVI (yes vs. no)	0.66	0.31-1.38	0.27
Adjuvant therapy (yes vs. no)	0.18	0.06-0.55	**0.003**

1143015 - Immunohistochemistry for sentinel lymph node assessment in invasive lobular carcinoma

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Background/Objective: Invasive lobular carcinoma (ILC) has a distinct histologic appearance characterized by single cell and small cell cluster infiltration. This pattern is seen in the breast and involved lymph nodes. Whether cytokeratin immunohistochemistry (IHC) adds clinical value to sentinel lymph node (SLN) assessment for patients with ILC is unresolved. Thus, we sought to evaluate the effect of IHC on SLN positivity rates and surgical treatment in ILC patients.

Methods: We evaluated ILC patients treated with SLN surgery at our institution 9/2008 - 8/2021. IHC for SLN assessment was performed at the pathologist's discretion. Differences between groups evaluated with and without IHC were compared. Statistical analyses were performed with chi-square tests and multivariable logistic regression.

Results: We identified 611 cases of ILC in 602 patients, all female, median age 63 years. 599 (98%) were cN0, 97% had hormone receptor+/HER2- tumors. Two patients failed SLN mapping leaving 609 analyzable cases of whom 44 (7.2%) had isolated tumor cells (ITCs, pN0i+), 438 (71.9%) were pN0 without ITCs, and 127 (20.9%) pN+ with pN1mi or greater disease. IHC was performed in 302 cases (49.3%) and was not associated with cT or pT category nor tumor grade. IHC was performed more frequently in cases where frozen section SLN evaluation was negative (51.7%) than when frozen section of the SLN showed any focus of metastatic disease (33.8%). IHC use increased detection of SLN+ disease with the inclusion of ITCs (35.5% with IHC versus 20.8% without IHC, p<0.001). No difference in SLN positivity was observed when ITCs were excluded (20.9% with IHC versus 20.8% without IHC, p=0.90). With the inclusion of ITCs, mean total number of positive SLNs was 1 in patients where IHC was used and 2 in patients without IHC assessment, p=0.05 and when pN0i+ disease was excluded, the mean

number of positive SLNs was 2 with and without IHC, p=0.23. There was no difference in ALND rates with IHC use for SLN analysis (11.0% with IHC vs 15.0% without IHC, p=0.14).

Conclusions: While IHC improved detection of pN0i+ disease (ITCs) among patients with ILC, there was no increase in upstaging to pN1mi or higher categories of nodal disease, ALND rates, and no significant difference in the total number of positive nodes. Based on its distinctive histologic appearance, addressing whether or not ITCs are clinically significant in SLNs of ILC patients might support the use of IHC for SLN assessment if very low volume nodal disease proves clinically relevant. However, with no increase in upstaging to pN+ disease, our data suggest IHC is not necessary for SLN evaluation in patients with ILC.

SLN/NAC

1147662 - Are false-negative rates of sentinel lymph node biopsy after neoadjuvant chemotherapy really associated with poor prognosis in clinically node-positive disease at diagnosis?

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Background/Objective: Despite relatively higher false negative rate (FNR) in patients with cN(+) disease undergoing sentinel lymph node biopsy (SLNB) after neoadjuvant chemotherapy (NAC), high rates of axillary relapses were interestingly not seen in published series without axillary lymph node dissection (ALND). The aim of the present study is to evaluate the characteristics and outcome of patients with residual tumor in ALND with a pathologic complete response in SLNB following NAC

Methods: Between January 2004 and 2021, 704 patients (cT1-4N1-3M0) underwent SLNB and ALND. Of those, 207 with ypSLN(-) disease were analyzed to determine the characteristics associated with false negative rates and outcomes in patients with residual disease (RD) in ALND.

Results: Median age was 47 (25-80). Of those, 157 (76%) presented with cT1-2 and cN1 disease at the time of diagnosis. Following NAC, 78.7% of patients underwent SLNB with blue dye (isosulfan blue) alone, and the remaining (21.3%) underwent SLNB with combined technique (blue dye and 99Tc-labeled colloid injection). The false negative rate was estimated as 11.6% (24/207) in the whole group. Having more than 2 SLNs removed or a pathologic complete response in the breast or clipping the suspicious LN before NAC decreased the FNRs to 5.7%, 4.8% and 3.3%, respectively. Of patients with cN1 (n=157), the FNRs were 10.2% blue dye alone and 6.7% in combined technique. Removal of more than one SLN in cN1 subgroup further decreased the FNRs to 7.7% in blue dye alone group and 3.7% in combined technique group. Patients with FNR having RD in ALND were more likely to have a partial response in breast (83.3% vs 56.8%, p=0.014), low Ki-67 values (50% vs 11.4%, p=0.001), less likely to have non-luminal type tumors (33.3% vs 48.1%, p=0.253), and more prone to have N1 disease (62.5% vs 77.6%, p=0.170) that did not reach the statistical significance. At a median follow-up time of 36 months (range, 9-137), no significant difference was found in local recurrence free (RD(+); 100% vs RD(-); 93.4%, p=0.525), disease free (RD(+); 89.7% vs RD(-); 76.7%, p=0.904) and disease specific survival (RD(+); 92.3% vs RD(-); 81.1%, p=0.864) rates between patients with or without RD in the ALND. Having a completion ALND did not change the systemic treatment strategy in patients with FNR since all patients with HER2(+) and triple-negative tumor type (n=10) were found to have residual tumor in breast.
Conclusions: Our findings suggest that low FNRs could be achieved in those patients with with pCR in breast, with removal more than 2 SLN and by using targeted axillary dissection techniques. Using a blue

dye technique alone could provide acceptable low FNRs in those patients with cN1 before NAC and at least one SLN removed. Finally, presence of residual tumor in ALND among those with ypSLN-negative don't affect the outcome negatively and change the treatment modality.

1146578 - Does adopting Z-1071 differ by breast fellowship training?

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Background/Objective: Women diagnosed with breast cancer and in need of chemotherapy are currently often treated with neoadjuvant chemotherapy. It is well known that tumor size may be reduced to facilitate more conservative surgery. However, there has been some debate regarding the accuracy of axillary management in these patients. The ACOSOG Z-1071 trial suggested that sentinel lymph node biopsy may be appropriate in a subset of neoadjuvant patients, such as in whom 3 sentinel lymph nodes were identified, dual tracer was used, and clipped node removed. Based on this information, our study aims to evaluate the lymph node removal practices in the breast cancer patient receiving neoadjuvant chemotherapy at our multihospital system. This was compared among 3 different groups of surgeons: breast fellowship trained surgeons, high volume surgeons, and low volume surgeons.

Methods: Patients with breast cancer (age 18 and over) and who underwent neoadjuvant therapy from January 2000 to December 2017 were identified from a retrospective chart review within our multihospital system. Patients were excluded with Stage 4 breast cancer at the time of diagnosis, bilateral cancer, and male gender. The patients were stratified into 3 groups, those managed by: breast fellowship trained surgeons, high volume surgeons, or low volume surgeons. The axillary lymph node management practice of the 3 groups were then evaluated.

Results: A total of 675 women met our criteria. There was a statistically significant difference in the axillary management by surgeon type (p-value = 0.0241). While all surgeons performed axillary lymph node dissection (ALND) in the majority of cases, our data showed that fellowship-trained surgeons performed sentinel lymph node biopsy (SLNB) more often after neoadjuvant therapy (28.7%), versus high volume general surgeons (17.5%) and low volume general surgeons (18.5%). These results are outlined in Table.

Conclusions: Management of the axilla in breast cancer patients is evolving with the current use of neoadjuvant therapy. Increased axillary surgery is associated with increased potential complications. Our study evaluated the use of SLNB following neoadjuvant chemotherapy in our multihospital system. Fellowship-trained breast surgeons were identified to utilize SLNB more frequently than their counterparts.

Table. Axillary management of neoadjuvant patients, by surgeon type

	Fellowship-Trained Breast Surgeons	High Volume General Surgeons	Low Volume General Surgeons	p-value
ALND performed	169 (56.1%)	153 (67.1%)	95 (65.1%)	0.0241
SLNB performed	**132 (43.9%)**	75 (32.9%)	51 (34.9%)	

1147183 - The clinical utility of Magseed markers in the de-escalation of axillary surgery

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Background/Objective: De-escalation of axillary surgery in the treatment of lymph node (LN) positive breast cancer is facilitated by the marking of involved nodes which, removed together with sentinel nodes, constitute a targeted axillary dissection (TAD). The clipping or marking of biopsied, involved nodes in the context of neoadjuvant chemotherapy (NACT) is necessary to increase accuracy of surgery. We report our experience using the paramagnetic Magseed (Endomag®, Cambridge, UK) marker.

Methods: Local audit approval was obtained. A prospectively-maintained database of all Magseeds inserted into the axilla was interrogated in the following settings: 1. cN1/2 patients undergoing NACT followed by TAD 2. Patients who met ACOSOG-Z0011 criteria who had 1-2 suspicious or pathologically-proven nodes undergoing primary surgery with removal of the clipped node and SLNB, which we termed 'primary TAD' 3. A variety of indications such as excision of axillary recurrence or diagnostic excision of suspected haematopathological malignancy. The primary endpoint was the successful removal of the Magseed-containing axillary LN.

Results: 145 Magseeds were inserted (in 136 patients) from October 2018-August 2021. Mean (+/-SD) age was 55 years (+/-13.3). Pre-operative indications, primary tumour type and axillary ultrasound findings are summarised in the table. The receptor subtypes and age differed significantly between the primary surgery and NACT groups. All inserted Magseeds were retrieved. In the NACT setting, the first 48 patients had 49 Magseeds inserted after completion of NACT (metastatic lymph nodes were initially marked using an O-Twirl marker at the time of tissue. A change in practice ensued whereby the Magseed was placed into a metastatic LN at the at commencement of NACT. In the following 27 patients who had 30 Magseeds inserted, only 1/30 (3.3%) Magseed was found outside the node. There was a significant difference between the 2 groups for Magseed misplacement (p=0.014). Of the total 75 patients in the NACT group, 44 (59%) had axillary pathological complete response (pCR), of which 28/36 (pCR rate 78%) were HER2 positive and 10/21 (pCR rate 48%) were triple-negative receptor phenotype. In the primary TAD group, 44 patients had 48 Magseeds inserted pre-operatively. 1/48 (2.3%) of the Magseeds were found outside a node. 34/48 of the Magseed-marked nodes were found to be in a sentinel lymph node (71%, 95% CI: 57-84%). 17 patients had a Magseed insertion for other reasons:

localising a LN for diagnostic excision (n=4), regional recurrence (n=9), axillary conservation in patients with de novo Stage IV disease (n=4). All Magseeds were found in the LNs.

Conclusions: The use of Magseeds for axillary nodal marking has been shown in this single centre audit to be safe and accurate, facilitating a high retrieval rate. We recommend this technique as suitable for the practice of axillary node localisation – especially in the setting of TAD following NACT where placement at the start of treatment led to the higher localisation rate compared to insertion at the end of NACT.

Table. Patient demographics, oncology data

Characteristic per patient	NACT-TAD (n=75)	Primary TAD (n=44)	Other (n=17)	Total (n=136)
Age (years) mean (SD)	52.4 (11.8)	59.2 (14.7)	56 (13.5)	55 (13.3)
Primary histological type	n (%)	n (%)	n	n
IDC	67(89)	36(82)	12	115 (85)
ILC	4(5)	4(9)	1	9 (7)
Mixed IDC/ILC	3(4)	3(7)		6 (4)
Mucinous	1(1)	1(2)		2 (1)
Other			4	4 (3)
Primary phenotype*	n (%)	n (%)	n	
ER + / HER2 –	18(24)	38(86)	5	61 (46)
ER + / HER2 +	12(16)	1(2)	4	17 (13)
ER - / HER2 +	24(32)	2(5)	1	27 (20)
TNBC	21(28)	3(7)	3	27 (20)
Number of axillary US abnormal nodes* (n) median (IQR)	2 (1-4)	1 (1-2)	1 (1-2)	N/A
Number of Magseeds® placed (patients)				
1	71	40	16	127 (93)
2	4	4	1	9 (7)
Patients with involved SNs (non-Magseed)			N/A	
0	59 (79)	18 (41)		
1	9 (12)	7 (16)		
>1	7 (9)	19 (43)		
Patient went on to have completion ALND n (%)	19/75 (25.3)	17/44 (38.6)	0(0)	
Characteristics per Magseed	**NACT-TAD (n=79)**	**Primary TAD (n=48)**	**Other (n=18)**	**Total n= 145 (%)**
Magseed node = SN^	n (%)	n (%)	N/A	
Yes	45(57)	34(71)		
No	34(43)	14(29)		
Total SNs retrieved (non-Magseed/clipped) in TAD	Median 3 IQR 2-4		N/A	
Magseed/clipped node involved?	25(32%) Ax.pCR rate 59% overall	46 (96)	11	

* for breast cancer only (n=132) as four patients in the 'other' group were non-breast cancer pathology.
^where Magseed marked node was isotope 'hot' + /- blue

NACT – Neo-adjuvant Chemotherapy; TAD – Targeted Axillary Clearance; n refers to patient numbers unless specified otherwise; SD – sample standard deviation; IDC – invasive ductal carcinoma not otherwise specified; ILC – invasive lobular carcinoma; ER – Estrogen Receptor; HER2 – Human Epidermal Growth Factor Receptor 2; TNBC – Triple receptor negative breast cancer; U3 Ultrasound indeterminate; U4 ultrasound suspicious; U5 – ultrasound malignant; IQR – interquartile range; SN – sentinel node.

1147370 - Surgical management of the axilla in invasive lobular carcinoma in the Z1071 Era: A propensity-score matched analysis of the National Cancer Database

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Background/Objective: In patients with invasive lobular carcinoma (ILC) and clinically positive nodes (cN1) who demonstrate an axillary clinical response to neoadjuvant chemotherapy (NAC), the outcomes of sentinel lymph node biopsy (SLNB) compared to axillary lymph node dissection (ALND) are not well studied. We sought to evaluate axillary surgical management practice patterns and the resultant impact on overall survival (OS) in cN1 ILC patients.

Methods: The National Cancer Database (NCDB) was queried from 2012 to 2017 for women with cN1 ILC who demonstrated an axillary clinical response (partial or complete response) to neoadjuvant

chemotherapy treated with axillary surgical management. Propensity-score matching was performed between SLNB and ALND cohorts. Kaplan Meier and Cox regression analyses were performed to allow for comparison of OS by axillary management strategy and to identify factors predictive of OS overall and in the ypN+ patients.

Results: Of 1,390 patients, 1,192 were luminal A ILCs (85.8%). 143 patients (10.3%) had a complete axillary clinical response (cCR), while 1,247 (89.7%) had a partial clinical response in the axilla. Majority of patients underwent mastectomy (n=904, 65.0%) and ALND (n=901, 64.8%) at primary operation. Definitive axillary management strategy was SLNB in 211 patients (15.2%) vs. ALND in 1,179 patients (84.8%). Utilization of SLNB for definitive axillary management increased from 8% to 16% during the study period. Residual nodal disease on pathology was noted in 1,151 patients (82.8%). Adjuvant endocrine therapy was utilized in 1,175 patients (84.5%), while adjuvant chemotherapy was administered in 827 patients (59.5%), and axillary radiation was administered to 690 patients (49.6%). Among 201 propensity-score matched patients stratified by SLNB vs. ALND, mean OS did not significantly differ between groups (81.6±1.8 vs. 81.4±2.0 months; p=0.56). Cox regression analysis of the entire selected cohort demonstrated that increasing age, grade, HER2+ and triple-negative tumors (vs. luminal A), and partial clinical response (vs. cCR) were unfavorable OS predictors ($p<0.02$ for each). Similarly, in ypN+ patients, increasing age, clinical T4 (vs. T1) status, HER2+ and triple-negative tumors (vs. luminal A), and partial clinical response (vs. cCR) were significant poor prognosticators (all $p<0.03$). The definitive axillary surgical procedure (SLNB vs ALND), and the administration of adjuvant axillary radiation, did not demonstrate a significant influence on OS in either model.

Conclusions: In this limited dataset of cN1 ILC patients who demonstrated a clinical response to NAC in the axilla, the choice of SLNB vs. ALND did not affect OS. While high level clinical trial data remains forthcoming, caution should be exercised in selecting patients for SLNB as definitive axillary nodal treatment. Further axillary therapy may be warranted with ypN+ disease and should be discussed in a multidisciplinary setting.

1148105 - Incorporating lymphovenous anastomosis in clinically node-positive women receiving neoadjuvant chemotherapy: A shared decision-making model and nuanced approach to the axilla in the era of clinical uncertainty

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Background/Objective: Lymphedema remains a risk for 25%-40% of breast cancer patients who require an axillary dissection (ALND) and radiation. Lymphatic microsurgical preventative healing approach (LYMPHA) may mitigate lymphedema up to 30% by restoring the physiologic lymphatic drainage immediately after ALND. Currently, completion ALND (cALND) versus radiation after neoadjuvant therapy (NAC) is being addressed by the Alliance A11202 trial, leaving a paucity of data to guide practice. Our study describes the implementation process of LYMPHA into clinical practice after NAC for node positive breast cancer in the current clinical context.

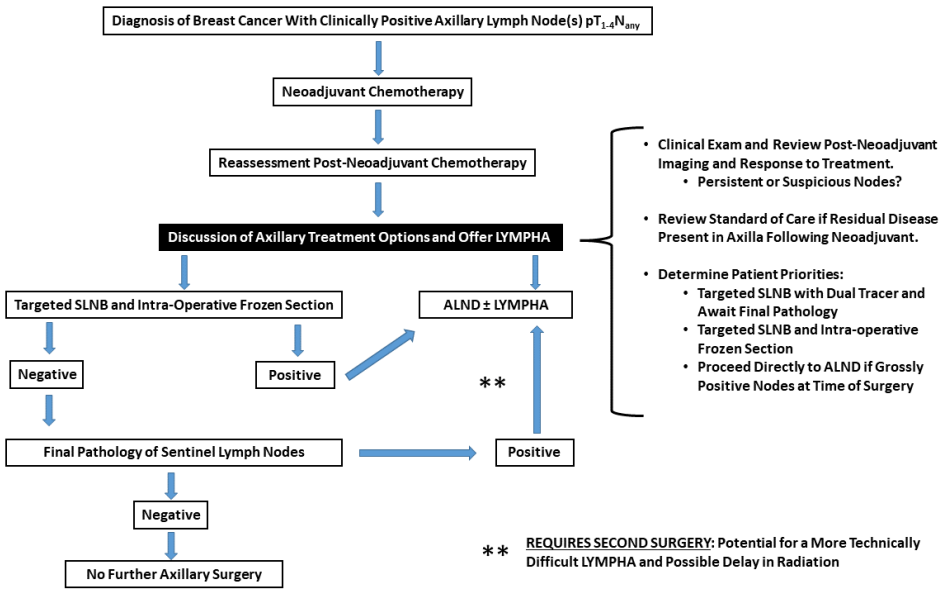
Methods: We reviewed a prospective database of LYMPHA in node-positive patients (cT1-4,Nany) who received NAC followed by axillary surgery +/- immediate LYMPHA from October 2020-2021. The

evolution of the surgical approach is described. Specifically, those downstaged to clinically negative nodes post-NAC were offered targeted SLNB with dual-tracer and intraoperative frozen section (FS). Patients were reminded the standard of care for any node positive is cALND. Immediate cALND with LYMPHA was performed for grossly positive nodes, or all positive SLNs; cALND was omitted for those with negative SLNs. For microscopic disease on frozen section, a shared decision was made preoperatively given patients differing valuation of the benefit and risks of cALND +/- LYMPHA, versus no cALND. LYMPHA was offered as an option as part of an evaluation of the procedure. General and plastic surgeon teams used a lateral approach with blue and indocyanine green/SPY upper arm mapping. Arm lymphatics were tagged on lateral dissection pending decision to proceed.

Results: A total of 16 patients were included; mean age was 50 (range 33-75) with Stage IIA to IIIB breast cancer. Of these, 6 (38%) were triple-negative , 5 (31%) ER/PR+ HER-2 negative, 5 (31%) HER-2 positive. Eight women (50%) had persistent axillary adenopathy, thus underwent ALND and LYMPHA. Of these, 3 (37.5%) had pathologic nodal disease, and 5 (62.5%) were node-negative, confirming the limitations of pre-operative imaging. As a result, the subsequent 8 (50%) underwent targeted SLNB with FS. Of these, 4 (50%) had multiple positive lymph nodes and underwent cALND and LYMPHA, adding 1 hour operative time. Three (37.5%) patients had negative FS avoiding ALND. One patient (12.5%) had a negative FS but upstaged on final pathology, 1 patient (12.5%) had 1/3 positive SLNs on FS. Both opted for no cALND based on preoperative discussion and received adjuvant radiation +/- chemotherapy. LYMPHA effects were limited to a blue inner arm tattoo. To date, no patients have developed lymphedema despite all of them receiving axillary radiotherapy. Figure is our proposed patient focused algorithm for the management of the axilla post-NAC.

Conclusions: As adjuvant nodal radiation and systemic therapy continue to improve, the benefit of a cALND in patients with limited residual disease has been called into question. In the era of clinical uncertainty, we propose a nuanced approach to the axilla by utilizing a shared decision model with patients, incorporating targeted SLNB with FS with completion node dissection when required and desired by the patient, coupled with LYMPHA in a simple stepwise treatment pathway.

Figure. Shared decision model and algorithm for management of the axilla following neoadjuvant chemotherapy with the incorporation of LYMPHA



1147630 - Axillary recurrence in clinically node-positive breast cancer following neoadjuvant chemotherapy and surgery

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Background/Objective: The 2019 St. Galen International Consensus Guidelines support Targeted Axillary Dissection (TAD) for clinically node positive (cN+) breast cancer patients who respond to neoadjuvant chemotherapy (NAC). Targeted Axillary Dissection is defined as sentinel node biopsy using dual tracers, removal of at least 3 lymph nodes and confirmation of excision of the pretreatment biopsied positive node ("clipped node").

Methods: Our aim was to measure the proportion of patients who are spared classic axillary lymph node dissection (ALND) by application of TAD, assess the success rate of clipped node retrieval, and to estimate the axillary recurrence risk for these patients. All cN+ patients who underwent curative intent surgery after NAC, from 1/2016 to7/2021, at our institution were assessed. Patients with inflammatory breast cancer who underwent modified radical mastectomy were excluded from our study.

Results: 293 cN+ patients underwent NAC. After NAC, 52 (18%) underwent initial axillary dissection while 241 (82%) underwent TAD. The clipped node was retrieved in 125 of 193 (65%) when dual trace was used but only 19 of 48 (40%) when only 1 tracer was used (P<0.05). The clipped node was retrieved in 97 of 115 (84%) when the clipped node was marked preoperatively (wire, US guided ink injection, or other) as compared to only 48 of 126 (38%) when there was no preoperative localization of the clipped node (P<0.05). when using dual tracer and preoperative marking the clipped node was retrieved in 81 of 96 patients (85%) 127 TAD patients who were pathologically node-negative did not undergo ALND. After a median follow-up of 25 months no axillary recurrences were observed. 38 TAD patients who were pathologically node positive did not undergo ALND and after a median follow-up of 14 months no axillary recurrences were observed. By comparison after a median follow-up of 27 months, the Kaplan-Meier 24-month axillary recurrence risk for the cN+ NAC patients who underwent ALND was 3%.

Conclusions: Axillary recurrence risk is low in cN+ patients treated with NAC even when ALND is not performed. Notably, though follow-up is short, no axillary recurrences were observed among the patients with positive node after NAC who did not undergo ALND. Using dual tracer and marking the clipped node preoperatively are associated with significant higher rate of clipped node retrieval.

Table. Axillary recurrence in clinically node-positive breast cancer following neoadjuvant chemotherapy and surgery

			[b]Axillary Recurrence (%)		
[a]*Group*	Number of patients	Median follow up (months)	12 mo	24 mo	36 mo
ALND_N-	20	40.2	0	6	6
ALND_N+	108	24.8	1	3	3
TAD_N-	127	24.8	0	0	0
TAD_N+	38	14.4	0	0	0

[a]Definitive axillary surgery done after NAC before recurrence, ALND_N- post NAC pathologically node negative who underwent ALND, ALND_N+ post NAC pathologically node positive who underwent ALND, SLN_N- post NAC pathologically node negative who underwent TAD, SLN_N+ post NAC pathologically node positive who underwent TAD, [b]ipsilateral axillary, infraclavicular and supraclavicular (excludes internal mammary and contralateral axila)

1148524 - Assessing long-term survival outcomes in node-positive breast cancer patients who undergo sentinel lymph node biopsy after neoadjuvant chemotherapy: A systematic review and meta-analysis

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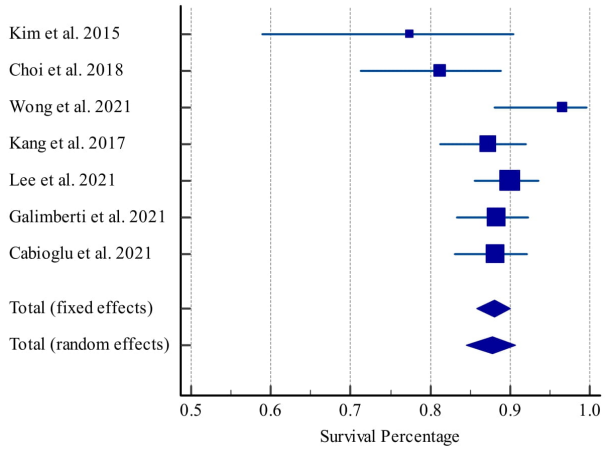
Background/Objective: The use of sentinel node biopsy (SNB) after neoadjuvant chemotherapy (NACT) in breast cancer patients who were initially node positive but converted to clinically/radiologically node-negative remains controversial due to variations in false negative rates and a paucity of long-term outcomes. The aim was to undertake a systematic review and meta-analysis to assess 5-year disease free survival (DFS) and overall survival (OS) within this cohort and compare it to node positive patients undergoing axillary clearance after NACT.

Methods: The study was performed in accordance with PRISMA and MOOSE guidelines. A systematic literature search of relevant databases was conducted to identify studies assessing 5-year DFS and OS after SNB alone in histologically confirmed node positive patients who had undergone NACT. Results are reported as a pooled estimate for OS and DFS alone and as an odds ratio (OR) with 95 per cent confidence interval using the Cochrane–Mantel–Haenszel method for meta-analysis between groups.

Results: Seven studies involving 1014 patients who had a negative SLNB after NACT were included. The pooled estimates of 5-year DFS and OS in patients with a negative SNB after NACT were 87.9% (95% CI: 84.5-90.7%) and 93% (95% CI: 87.8-96.8%). A forest plot of a pooled estimate for 5-year DFS is shown in Figure. Patients with a positive SNB (residual disease) who underwent axillary clearance had a reduced 5-year DFS (OR = 0.52; CI:0.39-0.69; p<0.01) and OS (OR = 0.36; 0.13-0.98; p=0.05) compared to patients with a negative SNB after NACT. There was no significant difference in DFS between patients who had a negative SNB after NACT compared to those who underwent axillary clearance and had no residual disease (OR =1.65; CI: 0.71-3.79; p = 0.24).

Conclusions: Initially node positive patients who achieve a complete pathological response in the axilla after NAC with a negative SNB have high rates of DFS and OS after 5 years. Patients with residual disease have significantly reduced DFS and may still warrant further axillary treatment.

Figure. Forest plot of pooled estimate of 5 year DFS in initially node-positive patients with negative SNB after NACT



1148422 - Omitting ALND in patients with clinically node-positive breast cancer after NAC

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Background/Objective: De-escalating axillary surgery has been a major focus of avoiding morbidity in breast cancer surgery. For patients with clinically node-positive breast cancer, the current recommendation in those receiving neoadjuvant chemotherapy (NAC) is to undergo an axillary node dissection (ALND) if any residual disease is found on sentinel node biopsy/targeted axillary dissection (SLNB/TAD). Our study aims to determine the necessity of ALND in this scenario and identify factors that may predict safe omission in selected patients.

Methods: A retrospective analysis of the National Cancer Database was done. The study cohort consisted of women with clinical node-positive breast cancer diagnosed from 2012-2018. All patients received NAC, followed by a positive SLNB and underwent an ALND. The primary outcome was patients who had a positive SLNB with a subsequent negative ALND. Descriptive statistics were performed to examine possible tumor characteristics associated to the primary outcome.

Results: Of 5,545 patients with clinically node-positive breast cancer that received NAC and had a positive SLNB, 2,138 patients (38.5%) had a negative ALND. The majority of patients had an age range between 40-54 years (43%; mean age of 51.5). Common tumor characteristics were invasive ductal carcinomas (83.7%), grade 3 (49.5%), triple-negative receptor status (19.4%) and having 1 positive sentinel lymph node (54.5%).

Conclusions: A subset of patients demonstrated no further nodal involvement and therefore may have been able to omit ALND to avoid morbidity. Further research is needed to identify which specific subset of patients would potentially benefit from omitting an ALND.

Table. Patient and tumor characteristics (N=2,138)

Age	
<40	365 (17.1%)
40-54	920 (43%)
55-69	705 (33%)
70+	148 (6.9%)
Histology	
IDC	1,789 (83.7%)
ILC	108 (5.1%)
Other	241 (11.2%)
Grade	
1	117 (5.5%)
2	752 (35.1%)
3	1,106 (49.5%)
4	5 (0.2%)
Missing/unknown	158
Tumor markers	
HR+/Her2-	976 (4.5%)
HR+/Her2+	368 (17.2%)
HR-/Her2+	217 (10.1%)
Triple negative	414 (19.4%)
Missing/unknown	163
Number of positive sentinel nodes	
1	1,164 (54.5%)
2	411 (19.2%)
3	150 (7%)
4	70 (3.3%)
5+	343 (16%)

1148516 - Outcomes for sentinel node-positive breast cancer patients following neoadjuvant therapy without axillary node dissection

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Background/Objective: There is current equipoise regarding axillary dissection or axillary radiation following neoadjuvant therapy and ypN1 disease. Ongoing trials to answer this question are not likely to report results for a number of years. This study was undertaken to identify patients who might be able to avoid axillary node dissection in this setting.

Methods: We identified 523 patients undergoing neoadjuvant therapy at our institution between 2008 and 2019. 308 patients had 1-3 positive lymph nodes following neoadjuvant therapy and 84 of these patients had 5 or less lymph nodes removed at surgery. Multiple clinicopathologic factors were investigated as well as local and distant recurrences and survival.

Results: In the final cohort of 84 patients, 45 (53.6%) had mastectomy and 39 (46.4%) had breast conservation (BC). The median number of lymph nodes examined was 3. The median number of positive lymph nodes was 1. The majority of patients in both groups received radiation with 77.8% and 94.9% of those who had mastectomy and BC respectively. While all patients received neoadjuvant systemic therapy, 63 (75%) underwent neoadjuvant chemotherapy and 26 (31.0%) underwent neoadjuvant hormone therapy. The majority of patients were clinical Stage 2 (56%) while 27.4% were clinical Stage 3 and 16.7% were clinical Stage one. 73 (87.0%) were ER positive, 9 (10.7%) were triple-negative and 15 (17.9%) were Her2 positive. Median follow-up for the entire cohort was 3.7 years. Of the 5 patients identified with recurrent disease, 2 had local recurrences, 2 had regional recurrences, 1 had local and regional recurrence, and 1 had distant recurrence. All patients from this cohort are alive.

Conclusions: Although the sample size was small, the very low number of recurrences (local or distant) argue against the need for completion axillary node dissection in patients with 1-3 positive nodes following neoadjuvant therapy. These data may be helpful when discussing risk and benefit of axillary node dissection to aid in shared decision making with patients.

Stage IV

1148346 – Patient-reported outcome measures in patients with t4 breast cancer treated with mastectomy with and without reconstruction

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Background/Objective: Patients with T4 locally advanced breast cancer are recommended to undergo trimodality therapy with neoadjuvant chemotherapy, modified radical mastectomy, and post-mastectomy radiotherapy (PMRT). An initial flat closure without reconstruction is recommended for patients with inflammatory breast cancer (T4d). While some T4a-c patients elect immediate reconstruction (IR), many postpone reconstruction to decrease risk for complications. Patient reported outcome measurements among this group of patients are not well-studied. Our aim was to determine if BREAST-Q scores differ among patients with T4 breast cancer undergoing mastectomy with and without reconstruction.

Methods: Patients diagnosed with clinical T4 breast cancer without evidence of distant metastatic disease between 1/2018-12/2020 who underwent mastectomy with or without reconstruction at our institution were included in the study. All patients were eligible and requested to complete the BREAST-Q at baseline and at 6 months, 1 year, and 2 years postoperatively. Physical well-being of the chest (PWB-CHEST) and psychosocial wellbeing (PSWB) domains were scored on a scale of 0-100 and compared between mastectomy without reconstruction (M-alone) and mastectomy with reconstruction (M-recon). M-recon patients were further separated into immediate reconstruction (IR) and delayed reconstruction (DR) groups. Univariate analysis was performed to compare patient and tumor characteristics among the groups.

Results: Of the 121 patients identified, 101 (83.5%) responded to BREAST-Q and were included in the analysis. Overall, there were 60 patients (59%) in the M-alone group and 41 patients (41%) in the M-recon group. Of the M-recon patients, 19 (46%) had IR and 22 (54%) had DR. M-recon patients were younger and more likely to elect contralateral prophylactic mastectomy (Table). Post mastectomy radiation was administered to 60 (100%) M-alone patients, 22 (100%) DR and 18 (94.7%) IR. Among patients electing reconstruction, 12 (28%) experienced a postoperative complication. Response rate to the BREAST-Q was similar between M-alone and IR groups at the preoperative and postoperative timepoints but was significantly lower for M-alone at 6 months, 1 year, and 2 years postop. When comparing M-alone and IR groups, no differences were seen in PSWB at prior to surgery (65.8 vs 62.8), 1-year post op (65.2 vs. 61.4), or 2-year post op (72.1 vs. 66.8). However, PWB-CHEST, was significantly worse among IR patients compared to M-alone patients immediately postoperatively (42.4 vs. 65.1, p=0.04) and at 2 years (58.7 vs. 74.4, p=0.04). Among all groups at 2 years postop, PWB-CHEST scores ranged from lowest 58.7 in the IR group, 64.9 in the DR group, and highest 76.0 in the M-alone group.

Conclusions: Psychosocial well-being scores among T4 breast cancer patients with and without reconstruction did not differ at any postoperative timepoints, while physical well-being of the chest was significantly worse among patients with IR in the immediate postoperative period and at 2 years. Strategies to improve chest wall well-being among T4 breast electing reconstruction are an important direction for future work.

Table. Patient characteristics by reconstruction

		Reconstruction			
Characteristic	**Overall, N = 101**	**Delayed, N = 22**	**Immediate, N = 19**	**None, N = 60**	**p-value**
Mean Age	51.4	46.6	46.0	54.9	0.004
Clinical N, n (%)					0.2
N0	4 (4.0%)	1 (4.5%)	0 (0%)	3 (5.0%)	
N1	79 (78.2%)	19 (86.4%)	16 (84.2%)	44 (73.3%)	
N2	9 (8.8%)	2 (9.1%)	3 (15.8%)	4 (6.7%)	
N3	9 (8.8%)	0 (0%)	0 (0%)	9 (15.0%)	
Histology, n (%)					0.3
IDC	95 (94.1%)	21 (95.5%)	17 (89.5%)	57 (95.0%)	
ILC	3 (3.0%)	0 (0%)	2 (10.5%)	1 (1.7%)	
Mixed	3 (3.0%)	1 (4.5%)	0 (0%)	2 (3.3%)	
ER Status, n (%)					0.2
Positive	49 (48.0%)	7 (31.8%)	11 (57.9%)	31 (51.7%)	
Negative	52 (51.5%)	15 (68.2%)	8 (42.1%)	29 (48.3%)	
PR Status, n (%)					0.6
Positive	40 (39.6%)	7 (31.8%	9 (47.4%)	24 (40.0%)	
Negative	61 (60.4%)	15 (68.2%)	10 (52.6%)	36 (60.0%)	
HER2 Status, n (%)					0.7
Positive	40 (39.2%)	8 (36.4%)	9 (47.4%)	23 (38.3%)	
Negative	62 (60.8%)	14 (63.6%)	10 (52.6%)	37 (61.7%)	
Pathologic T, n (%)					0.2
T0	34 (33.7%)	12 (54.5%)	7 (36.8%)	15 (25.0%)	
T1	31 (30.4%)	5 (22.7%)	7 (36.8%)	19 (31.7%)	
T2	17 (16.8%)	3 (13.6%)	2 (10.5%)	12 (20.0%)	
T3	7 (6.9%)	2 (9.1%)	1 (5.3%)	4 (6.7%)	
T4	12 (11.9%)	0 (0%)	2 (10.5%)	10 (16.7%)	
Pathologic, n (%)					0.4
N0	45 (44.6%)	12 (54.5%)	9 (47.4%)	24 (40.0%)	
N1	22 (21.8%)	3 (13.6%)	6 (31.6%)	13 (21.7%)	
N2	21 (20.8%	6 (27.3%)	3 (15.8%)	12 (20.0%)	
N3	13 (12.9%)	1 (4.5%)	1 (5.3%)	11 (18.3%)	
CPM, n (%)					0.009
Yes	20 (19.8%)	8 (36.4%)	6 (31.6%)	6 (10.0%)	
No	81 (80.2%)	14 (63.6%)	13 (68.4%)	54 (90.0%)	
Radiation, n (%)					0.2
Yes	100 (99.0%)	22 (100.0%)	18 (94.7%)	60 (100%)	
No	1 (1.0%)	0 (0%)	1 (5.3%)	0 (0.0%)	

Time to Treatment

1148363 - Increased use of neoadjuvant endocrine therapy in the elderly population during the COVID-19 pandemic

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Background/Objective: The recent NACOP data suggests that surgery should be offered where possible to elderly women. During the COVID 19 pandemic neoadjuvant endocrine therapy (NAET) has been used as a temporising measure due to restriction in access to operating capacity. Postmenopausal ER+ women were the lowest priority and therefore started on NAET until surgical capacity increased. Prior to this our use of endocrine therapy was limited to oestrogen receptor (ER+) patients not deemed fit for surgery due to comorbidities.

Methods: In this retrospective single center study, patients over the age of 60 who had undergone treatment for newly diagnosed breast cancer in a tertiary referral centre during the COVID-19 pandemic between March 2020 and April 2021 were analyzed. A total of 125 patients were examined of which 46 patients received NAET. Patients undergoing NAET were further stratified by duration of NAET into 2 groups with 10 patients having received NAET for more than 6 months and 36 patients having received NAET for less than 6 months with mean ages in both groups being 74 and 69 respectively. All patients examined went on to have surgical intervention. Factors considered when assessing these patients include tumour size, nodal involvement, tumour type and receptor status.

Results: The NAET group that underwent treatment for less than 6 months presented a significant down stage in tumour size of 2.35mm (95% CI 0.236-4.456, p=0.03), with average tumour size prior to and after treatment being 21mm and 18.65mm respectively. The subset of patients undergoing NAET for more than 6 months had a larger on average reduction in tumour size of 4.8mm but this was not significant (95% CI -3.6 -13.2, P=0.23). 12 patients out of the 46 (of which 4 were in the NAET more than 6 months group) showed a greater than 30% reduction in tumour size and thus a partial response, 2 had progressive disease and the rest had stable disease according to the RECIST criteria. Irrespective of duration of treatment, over 80% of patients undertaking NAET had no change in nodal status.

Conclusions: Our findings suggest that the utilization of NAET in the elderly population as a temporising measure during the COVID 19 pandemic had no significant adverse effect. In addition, for many patients it resulted in reduction of tumour size regardless of duration of treatment. Thus, it can be inferred that the implementation of these emergency guidelines during the pandemic did not negatively affect this cohort in terms of disease progression.

1148179 – Survivor-generated breast cancer awareness on digital platform among sex workers during COVID-19 pandemic: Interim results of prospective observational study

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Background/Objective: Covid pandemic has witnessed the effective use of digital platform. The study aims to evaluate the effectivity of survivor generated breast cancer awareness through digital medium.

Methods: A prospective observational study was conducted by a survivor group under supervision of Breast physician Group A (n=1532 sex-workers between 25-60 years from a red light district) included as intervention arm. They were given awareness via digital platform (experience sharing, breast self-examination) They were given structured questionnaires and targeted task of BSE. Feedback was taken digitally at 7days , 3months and 6 months. Further follow-up is planned at 12m, 24m. The participants are asked to respond digitally after each round. Group B (n=1490 age matched sex-workers from another RLD) included as control arm. The data was analysed using chi-square test, SPSS version24

Results: At the end of 6months 80 patients in intervention arm responded digitally (28 lump, 12 mastalgia). The patients with lump were evaluated by triple assessment at a teaching hospital. 39 were diagnosed as BBD and 1 had malignancy. 10 individuals from the control population spontaneously reported(1 lump, 9 mastalgia). It was found that response rate was significantly higher in sex-worker with intervention compared to control group.(chi-square statistic: 16.4499. p-value: 0.00005).The type of complaint(lump versus mastalgia) in both group shows stronger association in favour of lump(chi-square statistic: 6.5217. p-value: 0.010656).

Conclusions: Developing countries lack mammographic based screening programme. This is related to younger median age (46 years) and economical hindrances. Clinical breast examination also has logistic issues in a hugely populated country. Use of digital technology and feedback is likely to be effective and valid. The study emphasizes the role of digital technology in generating awareness .

1148384 - COVID-19 and the increase in neoadjuvant endocrine therapy: Patient outcomes in terms of time to surgery and tumour staging

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Background/Objective: During the COVID 19 pandemic neoadjuvant endocrine therapy (NAET) has been used as a temporising measure due to restriction in access to operating capacity. When compared to other neoadjuvant therapies, such as chemotherapy, the use of NAET is not well-established, but an assessment of its outcomes may advocate for a more prominent role in the clinical setting.

Methods: A retrospective case note review analysed 285 ER-positive patients, 78 of whom received neoadjuvant endocrine therapy and the remaining 207 received surgery first. Data including tumour size and nodal status were collected from diagnostic measurement and post-operative pathology in both

groups, and compared to durations of treatment and surgery waiting times. The patients on NAET were identified and analysed using the RECIST criteria to assess response to treatment.
Results: A statistically significant mean reduction of 3.06mm (25.4 vs 22.34mm) was found in the NAET group (95% CI 0.03-6.08, p = .028). No significant correlation was found between duration of neoadjuvant endocrine therapy, with a mean value of 69 days, and change in tumour size. In the patient cohort that received surgery first, there was no statistical significance change in tumour size and no significant correlation was found between time to surgery, with a mean value of 37 days, and change in tumour size. 10.26% of NAET patients had upstaged nodal status by time of surgery, compared to 16.91% in the surgery-first cohort. Further analysis of NAET cohort (n = 78) identified 1 patient with a complete response, 19 patients with partial response, 47 patients with stable disease and 11 patients with progressive disease according to the RECIST criteria. 75% of NAET patients with negative or weak progesterone receptor status showed either stable disease or progressive disease.

Conclusions: Neoadjuvant endocrine therapy can be used to safely delay surgery and in some patients, can significantly reduce tumour size and prevent nodal upstaging. Progesterone receptor negativity may be associated with a lack of response. This provides rationale to continue research into the identification of patients that would benefit from neoadjuvant endocrine therapy.

1142943 – Time-to-surgery for breast cancer patients: A quality improvement project

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Background/Objective: The practice of multidisciplinary medicine is fundamental to providing breast cancer patients the highest quality of treatment. While prompt surgical intervention is essential in securing optimum outcomes, the scheduling of consultations with specialty providers can often create delays between initial diagnosis and surgery. Our aim was to identify potential causes for delay and then develop improvement measures which would allow us to deliver more timely care.

Methods: Our data included 207 patients; 122 in a pre-intervention group and 85 in a post-intervention group. With the pre-intervention patients we tracked the length of time between initial breast cancer diagnosis to eventual surgery. Our goal was to identify any rate-limiting steps and work to reduce delays. By examining the different processes—including the time to plastic and reconstructive surgery (PRS) consult, obtaining genetic testing results and scheduling the breast surgeon consult—we were able to determine where delays occurred. We found the time to PRS consultation to be the longest wait and the most adjustable variable. We then compared the 2 groups to assess the efficiency of the intervention.

Results: In our pre-intervention group we found the median time to breast surgeon consult was significantly longer for patients who utilized additional consults, as compared to the breast surgeon-only group (9 vs 7 days, $p<0.05$). In particular, patients who experienced the longest surgical delay were those more likely to have had a PRS consultation as part of their multi-disciplinary treatment process (34.5% vs 13.5%, $p<0.05$). By sharing this information with the PRS team we were able to establish PRS appointment times reserved specifically for breast cancer patients which shortened the traditional wait time. In our post-intervention group, we noted the interval for all aspects of the pre-surgical timeline

was statistically different between the groups. Time from breast cancer diagnosis to surgery and breast surgeon consult to surgery was significantly less in the post-intervention group (35 days vs 28 days and 25 days vs 20 days respectively). (See Table.)

Conclusions: Notable differences were found between the pre- and post-intervention groups with regards to the time to surgery. However, by working with the PRS team members and implementing appointment times reserved specifically for newly diagnosed breast cancer patients we were able to shorten the wait time. By decreasing time from initial diagnosis to surgery, we are able to offer our patients the best possible prognosis. Additionally, these measures allow us to increase patient satisfaction and improve institutional efficiency.

Table. Time-to-surgery for breast cancer patients

Variable	Pre-Intervention	Post-Intervention	P-value
Diagnosis to Surgery	35.05±19.05	28.08±9.58	<.0001
Diagnosis to Breast Surgeon Consult	10.31±7.02	7.94±5.06	0.0016
Diagnosis to PRS Consult	27.12±38.53	17.76±12.48	<.0001

1138786 – Time-to-surgery and the impact of delay in the neoadjuvant setting on triple-negative and HER2-positive breast cancers with pathologic complete response

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Background/Objective: Studies have shown triple-negative breast cancer (TNBC) and HER2 + breast cancer with pathologic complete response (pCR) after neoadjuvant chemotherapy(NCT) have better survival than those who do not. Delayed time to treatment is associated with worse survival. The aim of our study was to investigate whether time to surgery (TTS) impacts survival in patients with HER2+ and TNBC with pCR after NCT, and examine factors associated with prolonged TTS.

Methods: A review of women diagnosed with unilateral invasive breast cancer (cT1-T4, N1-2, M0) with no prior breast cancer or other malignancies was conducted using the National Cancer Database. Patients who had pCR (ypT0,ypN0) after NCT and surgery between 2006 to 2016 were selected. TTS was defined as from initial cancer diagnosis to the time of definite surgery, and grouped as <150days, 151-180,181-210, and >210 days. Primary outcome was 5-year Overall survival (OS). Descriptive statistics and Cox proportional hazard models were used.

Results: 5,405 patients met inclusion criteria; 2,947(54.5%) had TNBC and 2,458(45.4%) had HER2 + breast cancer. Median days from diagnosis to NCT and definite surgery were 28 vs.28 (p=0.94), and 188 vs. 181 (p=0.002) for TNBC and HER2+ cancers, respectively. Black race, Hispanic ethnicity, noninsured status, residence in a low income or rural area, clinical Stage II disease, and non-receipt of radiation or immunotherapy were associated with treatment delays. TTS was an independent prognostic factor of OS along with age, tumor histology , molecular subtype, clinical stage and lymphovascular invasion on

multivariate analysis. Patient with TTS between 151-180 and 181-210 days had statistically significant better 5-year OS as compared with those >210 days and less than 150 days (93.9%, 94.2% vs. 90.9%, 90.3%, respectively, p=0.002). After adjusting other covariates, patients with TTS 180-210 days had the best OS survival with an adjusted Hazard ratio of 0.67, 95%CI (0.49-0.91), (p=0.01), compared with patients with TTS >210 days.

Conclusions: Disparities in social economic status and associated delay to surgical treatment might impact overall survival in TNBC and HER2+ breast cancer with pCR after NCT.

Table. Prognostic factors impacting 5-year OS, using Cox Proportional Hazards analysis

	Univariable analysis		Multivariable analysis	
	HR (95% CI),	p value	HR (95% CI),	p Value
Time to NCT (<4wks vs. >4wks (ref))	1.01(0.80-1.23)	0.95		
TTS (<150 vs. >210(ref)	1.14(0.81-1.61)	0.44	1.05(0.74-1.49)	0.79
TTS (151-180 vs. >210(ref)	0.72(0.53-0.96)	**0.03**	0.77(0.57-1.05)	0.09
TTS (181-210 vs. >210 (ref)	0.65 (0.48-0.89)	**0.006**	0.67(0.49-0.91)	0.01
Age	1.02(1.01-1.03)	**<0.001**	1.02(1.01-1.03)	0.004
White vs. Black (ref)	1.05(0.82-1.35)	0.69		
Hispanic vs. Not Hispanic(ref)	0.83(0.57-1.22)	0.35		
Private insurance vs. not insured	0.91(0.52-1.59)	0.73		
Medicaid/Medicare vs. not insured	1.38(0.78-2.43)	0.27		
Income <46k or 63k vs. >46k or 63k(ref)	1.25(1.01-1.55)	**0.04**		
Metro vs. rural (ref)	0.66(0.33-1.33)	0.25		
Urban vs. rural (ref)	0.91(0.43-1.92)	0.81		
Community program vs. academic program	1.36(0.82-2.28)	0.23		
Comprehensive community vs. academic	1.45(1.10-1.93)	**0.01**		
Charlson score 0 vs. 3	0.33(0.11-1.05)	0.05		
1 vs.3	0.47(0.15-1.53)	0.21		
2 vs. 3	0.83(0.23-3.03)	0.78		
Ductal vs. lobular (ref)	0.24(0.11-0.51)	<0.001	0.27(0.12-0.59)	0.001
Well differentiated vs. poor differentiated	0.67(0.09-4.76)	0.69		
Moderate differentiated vs. poor differentiated	1.24(0.91-1.67)	0.18		
cStage I vs. III	0.43(0.06-3.07)	0.94		
cStage II vs I	0.45(0.36-0.57)	<0.001	0.51(0.40-0.64)	0.006
LVI positive vs negative(ref)	1.58(1.14-2.17)	0.005	1.53(1.10-2.11)	0.01
TNBC vs. HER2+(ref)	1.48(1.17-1.87)	0.001	1.46(1.08-1.98)	0.015
Adjuvant chemo yes vs. no(ref)	0.90(0.69-1.18)	0.45		
Lumpectomy vs Mastectomy(ref)	0.70(0.55-0.89)	**0.004**		
Radiation yes vs No(ref)	0.87(0.67-1.13)	0.29		
Immunotherapy yes vs No(ref)	0.56(0.41-0.75)	**<0.001**		

Tumor Genetics

1148175 - Discordant chemosensitivity pattern in T4b lesions is related to morphologic heterogenity and distribution of cancer stem cells in tumor microenvironment

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Background/Objective: Optimum NST induced cytoreduction in T4b breast cancer is a challenge. The response pattern is discordant in the skin and parenchymal core of the cancer. To study the morphologic heterogeneity at the core and peripheral part of the tumor.

Methods: 45 patients with post NST T4b lesions were included in the study. Tissue was taken from the skin involved zone and core of the residual tumour. The tissues were studied histopathologically with reference to density of malignant cells , tubule formation, nuclear pleomorphism ,mitotic score, lymphocytic infiltration and blood vessels at the periphery of cell clumps. The results were analysed using t-test (first 3) or chi-square (last 3) using SPSS version24.0. The cancer stem cell population at inner and outer aspect was studied using CD 44 IHC marker.

Results: 45% luminal, 40% were Her2-positive enriched and 15% TNBC were found. The density of malignant cells (p 0.023), mitotic score(p 0.0184),nuclear pleomorphism(p 0.0290),and vascular congestion (p 0.0233) was significantly more persistent after chemotherapy at the dermal component while tumor-infiltrating lymphocyte(p 1.0) and tubule formation(p 0.25) was insignificant. T outer CSC was significantly more than T inner CSC (p=0.01).The effect was independent of biological subtypes(p 0. 32).

Conclusions: Breast cancer is less sensitive to NST in presence of gross skin involvement. The disease shows a heterogenous pattern and response to treatment in T4b lesions. It may be attributed to the cancer stem cell distribution in the micro environment and blockade of dermal microcirculation.

1148592 - Breast cancer hormone receptor expression: Is re-examination necessary?

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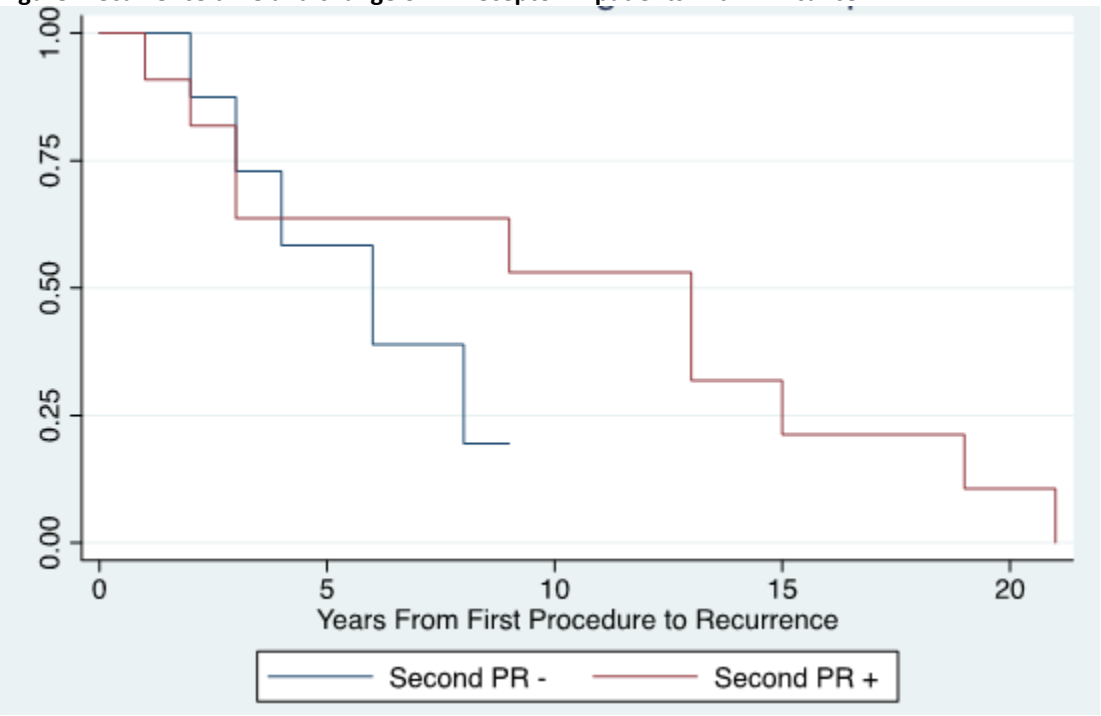
Background/Objective: Hormone receptor and cell marker assays enable targeted treatment of estrogen receptor (ER) and progesterone receptor (PR) positive breast cancers.1 Change in ER and PR status after chemotherapy has been reported to occur at non-negligible rates.2 Given the invasive nature of repeat biopsies in the metastatic or progression of disease setting, especially biopsies of the chest wall, sternum or bone, and impact of marker status on treatment approach3, gathering data on the rate of biopsy discordance is important.4 We examine ER and PR expression in breast cancer progression or recurrence.

Methods: Single institution study identified twenty-five women age > 30 with breast cancer that required a second biopsy at a distant site (distant biopsy) after progression or recurrence of treated breast cancer. ER and PR status of initial diagnostic biopsy and distant biopsy were re-coded based on primary and secondary markers and the site of distant biopsy. Time from diagnostic biopsy to recurrence was calculated. Association of study metrics with the change of status of receptors was assessed with t-test and chi-squared testing. A Kaplan-Meier analysis was set up with time to recurrence approximately equal to assessment of distant biopsy tumor receptors. Time to recurrence was evaluated for change in the status of secondary progesterone receptor (second PR- vs. second PR +) in consistently ER+ subgroup. The statistical difference was evaluated with log rank test.

Results: In primary ER+ biopsy (22 of 25 total), 10% changed to ER- on distant biopsy. Of the patients with a primary PR+ biopsy (16 of 23 total), 37.5% changed to PR- upon their second biopsy. Where distant biopsy remained ER+ and PR+, the most common site of distant biopsy is axillary lymph nodes. In the Kaplan-Meier analysis, the short-term (5 year) time to cancer recurrence among ER+ patients showed no difference between patients with distant biopsy remaining PR+ versus those with change to PR- in terms of time to recurrence. However, beyond 5 years the timing of recurrence for patients with primary ER+ PR+ cancer remains PR+ on distant biopsy is later as compared to patients whose primary ER+ PR+ cancer becomes PR- on distant biopsy (p = 0.0031, Figure).

Conclusions: Hormone receptor expression changed in 37.5% of patients with breast cancer recurrence or progression of disease. Our findings indicate an association between the site of distant biopsy and concordance in ER+ and PR+ receptor expression, as well as an association between time to recurrence and PR discordance. Biomarker status should be reassessed in progression of disease and cancer recurrence.

Figure. Recurrence time and change of PR receptor in patients with ER+ cancer



1148272 - High expression of alpha-V-beta8 Integrin as a predictive biomarker of neoadjuvant chemotherapy in triple-negative breast cancer

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Background/Objective: Introduction: More than half of breast cancer patients do not completely respond to neoadjuvant chemotherapy. Thus, a predictive biomarker is in urgent need. In vitro studies have shown that integrin alpha-V-beta8 (beta8) mediate angiogenesis and suppress anti-cancer immunity by regulatory T-cell infiltration via TGFβ signaling. Since some highly proliferative cancer respond to chemotherapy better, we hypothesized that high beta8 expression to be a predictive biomarker of neoadjuvant chemotherapy

Methods: Total of 8078 breast cancer patients from multiple cohorts including TCGA, METABRIC, and 11 GEO databases were analyzed.

Results: Beta8 is expressed higher in cancer compared with normal breast. Using single-cell sequence cohort, beta8 was expressed by cancer and stromal cells, and not by T or B lymphocytes nor myeloid cells. Angiogenesis-related genes; VEGFB, PECAM1, ANGPTI, ANGPT2 and JAM2 were increased in high beta8 cancer in both METABRIC and GSE96058, but it did not enrich angiogenesis gene set. Similarly, TGF-beta response score and regulatory T-cell infiltration were elevated in beta8 high cancer in TCGA, but this was not validated by the other cohorts. In order to investigate which pathway is activated in beta8 high breast cancer, the HALLMARK collection, PID and KEGG gene set enrichment analyses were conducted, and we found that WNT/beta-catenin signaling and cell proliferation-related gene sets were consistently enriched in all 3. We further found that beta8 were high in triple-negative subtypes, and higher in primary compared to metastatic tumor. However, there was no consistent association between beta8 level and Nottingham histologic grade, Ki67 expression, stage, nor lymph node involvement. There was no difference in disease-free, disease-specific nor overall survival in any of the cohorts. Using in vitro system, we found that beta8 levels strongly correlated with response to paclitaxel, docetaxel, cisplatin and 5-FU (all $r>0.6$). Finally, we found that pathologic complete response rate after neoadjuvant chemotherapy of high beta8 tumor was significantly higher than low beta8 in triple-negative breast cancer of GSE25600 cohort (93% vs 69%, $p<0.001$).

Conclusions: : We were unable to validate the previous reports based on experimental studies that beta8 is associated with angiogenesis and regulatory T-cell infiltration via TGF-beta signaling in multiple large patient cohorts. Beta8 is highly expressed in triple-negative subtype, and WNT/beta-catenin and cell proliferation gene sets were enriched although there was no correlation with neither grade nor Ki67. Beta8 levels was not association with survival, but high beta8 expression was a predictive biomarker for pathological complete response after neoadjuvant chemotherapy in triple-negative breast cancer.

Figure. High expression of alpha-V-beta8 Integrin as a predictive biomarker of neoadjuvant chemotherapy in triple-negative breast cancer