ABSTRACTS from the 38th Annual Miami Breast Cancer Conference®

Hear it on Friday, use it on Monday

ABSTRACTS
Learn how to use state-of-the-art breast cancer care strategies to optimize patient outcomes.

In March 2022, the 39th Annual Miami Breast Cancer Conference® will continue the tradition of providing value to attendees and enabling you to integrate the highest-quality methodologies into your clinic.

Using innovative virtual technology to deliver robust educational programming and top-notch presentations, next year’s program will feature world-class tumor board panels, multidisciplinary meet-the-expert sessions, poster talks, and lively debates to improve the care of patients with breast cancer.

All of the presenters were effective in presentation and knowledge base. This meeting is so important for my practice.

– 2021 Attendee

For more information, visit gotoper.com/go/MBCC22SG
Indication
TUKYSA is indicated in combination with trastuzumab and capecitabine for treatment of adult patients with advanced unresectable or metastatic HER2-positive breast cancer, including patients with brain metastases, who have received one or more prior anti–HER2-based regimens in the metastatic setting.

Select Safety Information

Warnings and Precautions

- **Diarrhea**: TUKYSA can cause severe diarrhea including dehydration, hypotension, acute kidney injury, and death. In HER2CLIMB, 81% of patients who received TUKYSA experienced diarrhea, including 12% with Grade 3 and 0.5% with Grade 4. Both patients who developed Grade 4 diarrhea subsequently died, with diarrhea as a contributor to death. Median time to onset of the first episode of diarrhea was 12 days and the median time to resolution was 8 days. Diarrhea led to TUKYSA dose reductions in 6% of patients and TUKYSA discontinuation in 1% of patients. Prophylactic use of antidiarrheal treatment was not required on HER2CLIMB.

If diarrhea occurs, administer antidiarrheal treatment as clinically indicated. Perform diagnostic tests as clinically indicated to exclude other causes of diarrhea. Based on the severity of the diarrhea, interrupt dose, then dose reduce or permanently discontinue TUKYSA.

CI = confidence interval; HER = human epidermal growth factor receptor; HR = hazard ratio; MBC = metastatic breast cancer; OS = overall survival; PFS = progression-free survival; T-DM1 = ado-trastuzumab emtansine.

Please see full Important Safety Information on the following pages.
RAISING THE STANDARD FOR SURVIVAL

In combination with trastuzumab + capecitabine

TUKYSA extended overall survival*1

The most common adverse reactions in patients who received TUKYSA (≥20%) were diarrhea, PPE, nausea, fatigue, hepatotoxicity, vomiting, stomatitis, decreased appetite, abdominal pain, headache, anemia, and rash.

Important Safety Information

**Warnings and Precautions**

- **Diarrhea:** TUKYSA can cause severe diarrhea including dehydration, hypotension, acute kidney injury, and death. In HER2CLIMB, 81% of patients who received TUKYSA experienced diarrhea, including 12% with Grade 3 and 0.5% with Grade 4. Both patients who developed Grade 4 diarrhea subsequently died, with diarrhea as a contributor to death. Median time to onset of the first episode of diarrhea was 12 days and the median time to resolution was 8 days. Diarrhea led to TUKYSA dose reductions in 6% of patients and TUKYSA discontinuation in 1% of patients. Prophylactic use of anti-diarrheal treatment was not required on HER2CLIMB. If diarrhea occurs, administer anti-diarrheal treatment as clinically indicated. Perform diagnostic tests as clinically indicated to exclude other causes of diarrhea. Based on the severity of the diarrhea, interrupt dose, then dose reduce or permanently discontinue TUKYSA.

- **Hepatotoxicity:** TUKYSA can cause severe hepatotoxicity. In HER2CLIMB, 8% of patients who received TUKYSA had an ALT increase >5 × ULN, 6% had an AST increase >5 × ULN, and 1.5% had a bilirubin increase >3 × ULN (Grade ≥3). Hepatotoxicity led to TUKYSA dose reductions in 8% of patients and TUKYSA discontinuation in 1.5% of patients. Monitor ALT, AST, and bilirubin prior to starting TUKYSA, every 3 weeks during treatment, and as clinically indicated. Based on the severity of hepatotoxicity, interrupt dose, then dose reduce or permanently discontinue TUKYSA.

- **Embryo-Fetal Toxicity:** TUKYSA can cause fetal harm. Advise pregnant women and females of reproductive potential of the potential risk to a fetus. Advise females of reproductive potential, and male patients with female partners of reproductive potential, to use effective contraception during TUKYSA treatment and for at least 1 week after the last dose.

**Adverse Reactions**

Serious adverse reactions occurred in 26% of patients who received TUKYSA; those occurring in ≥2% of patients were diarrhea (4%), vomiting (2.5%), nausea (2%), abdominal pain (2%), and seizures (2%). Fatal adverse reactions occurred in 2% of patients who received TUKYSA including sudden death, sepsis, dehydration, and cardiogenic shock.

Adverse reactions led to treatment discontinuation in 6% of patients who received TUKYSA; those occurring in ≥1% of patients were hepatotoxicity (1.5%) and diarrhea (1%). Adverse reactions led to dose reduction in 21% of patients who received TUKYSA; those occurring in ≥2% of patients were hepatotoxicity (8%) and diarrhea (8%).

The most common adverse reactions in patients who received TUKYSA (≥20%) were diarrhea, palmar-plantar erythrodysesthesia, nausea, fatigue, hepatotoxicity, vomiting, stomatitis, decreased appetite, abdominal pain, headache, anemia, and rash.
In combination with trastuzumab + capecitabine

TUKYSA reduced the risk of disease progression or death

**PRIMARY ENDPOINT**

PFS

46% reduction in the risk of disease progression or death

* HR = 0.54 (95% CI: 0.42–0.71); P <0.00001

* Median PFS: 7.8 months (95% CI: 7.5–9.8) in the TUKYSA arm vs 6.6 months (95% CI: 4.2–7.1) in the control arm

**EXPLORATORY ANALYSIS**

PFS AT 12 MONTHS

TUKYSA ARM

33% ~3x as many patients were progression-free

CONTROL ARM

12% (33.1%; 95% CI: 26.6-39.7) (12.3%; 95% CI: 6.0-20.9)

* Study design: HER2CLIMB was a randomized (2:1), double-blind, placebo-controlled trial of 612 patients with HER2-positive metastatic breast cancer (MBC) who received TUKYSA + trastuzumab + capecitabine (TUKYSA arm; n = 410) or placebo + trastuzumab + capecitabine (control arm; n = 202). Primary endpoint was PFS (time from randomization to documented disease progression or death from any cause) in the first 480 randomized patients. Secondary endpoints assessed in all randomized patients included OS (time from randomization to death from any cause). PFS was evaluated in accordance with RECIST criteria, version 1.1, by means of BICR. This exploratory analysis is descriptive only. These are estimates and not exact numbers. HER2CLIMB was not powered to assess a statistical difference between treatment groups at this time point.

**Lab Abnormalities**

In HER2CLIMB, Grade 3 laboratory abnormalities reported in ≥5% of patients who received TUKYSA were decreased phosphate, increased ALT, decreased potassium, and increased AST.

The mean increase in serum creatinine was 32% within the first 21 days of treatment with TUKYSA. The serum creatinine increases persisted throughout treatment and were reversible upon treatment completion. Consider alternative markers of renal function if persistent elevations in serum creatinine are observed.

**Drug Interactions**

- **Strong CYP3A/Moderate CYP2C8 Inducers:** Concomitant use may decrease TUKYSA activity. Avoid concomitant use of TUKYSA.

- **Strong or Moderate CYP2C8 Inhibitors:** Concomitant use of TUKYSA with a strong CYP2C8 inhibitor may increase the risk of TUKYSA toxicity; avoid concomitant use. Increase monitoring for TUKYSA toxicity with moderate CYP2C8 inhibitors.

- **CYP3A Substrates:** Concomitant use may increase the toxicity associated with a CYP3A substrate. Avoid concomitant use of TUKYSA where minimal concentration changes may lead to serious or life-threatening toxicities. If concomitant use is unavoidable, decrease the CYP3A substrate dosage.

- **P-gp Substrates:** Concomitant use may increase the toxicity associated with a P-gp substrate. Consider reducing the dosage of P-gp substrates where minimal concentration changes may lead to serious or life-threatening toxicity.

**Use in Specific Populations**

- **Lactation:** Advise women not to breastfeed while taking TUKYSA and for at least 1 week after the last dose.

- **Renal Impairment:** Use of TUKYSA in combination with capecitabine and trastuzumab is not recommended in patients with severe renal impairment (CLcr < 30 mL/min), because capecitabine is contraindicated in patients with severe renal impairment.

- **Hepatic Impairment:** Reduce the dose of TUKYSA for patients with severe (Child-Pugh C) hepatic impairment.

Please see Brief Summary of Prescribing Information on adjacent pages.

**References:**

TUKYSA® (tucatinib) tablets, for oral use

Brief summary of Prescribing Information (PI). See full PI. Rx Only

INDICATIONS AND USAGE

TUKYSA is indicated in combination with trastuzumab and capecitabine for treatment of adult patients with advanced unresectable or metastatic HER2-positive breast cancer, including patients with brain metastases, who have received one or more prior anti-HER2-based regimens in the metastatic setting.

DOSEAGE AND ADMINISTRATION

Recommended Dose

The recommended dosage of TUKYSA is 300 mg taken orally twice daily in combination with trastuzumab and capecitabine until disease progression or unacceptable toxicity.

Advise patients to swallow TUKYSA tablets whole and not to chew, crush, or split prior to swallowing. Advise patients not to ingest tablet if it is broken, cracked, or not otherwise intact. Advise patients to take TUKYSA approximately 12 hours apart and at the same time each day, with or without a meal. If the patient vomits or misses a dose of TUKYSA, instruct the patient to take the next dose at its usual scheduled time.

When given in combination with TUKYSA, the recommended dosage of capecitabine is 1000 mg/m² orally twice daily taken within 30 minutes after a meal. TUKYSA and capecitabine can be taken at the same time. Refer to the Full Prescribing Information for trastuzumab and capecitabine for additional information.

Dosage Modifications for Adverse Reactions

The recommended TUKYSA dose reductions and dosage modifications for adverse reactions are provided in Tables 1 and 2. Refer to the Full Prescribing Information for trastuzumab and capecitabine for information about dosage modifications for these drugs.

Table 1: Recommended TUKYSA Dose Reductions for Adverse Reactions

<table>
<thead>
<tr>
<th>Dose Reduction</th>
<th>Recommended TUKYSA Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>250 mg orally twice daily</td>
</tr>
<tr>
<td>Second</td>
<td>200 mg orally twice daily</td>
</tr>
<tr>
<td>Third</td>
<td>150 mg orally twice daily</td>
</tr>
</tbody>
</table>

Permanently discontinue TUKYSA in patients unable to tolerate 150 mg orally twice daily.

Table 2: Recommended TUKYSA Dosage Modifications for Adverse Reactions

<table>
<thead>
<tr>
<th>Severity</th>
<th>TUKYSA Dosage Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 3 without anti-diarrheal treatment</td>
<td>Initiate or intensify appropriate medical therapy. Hold TUKYSA until recovery to ≤ Grade 1, then resume TUKYSA at the same dose level.</td>
</tr>
<tr>
<td>Grade 3 with anti-diarrheal treatment</td>
<td>Initiate or intensify appropriate medical therapy. Hold TUKYSA until recovery to ≤ Grade 1, then resume TUKYSA at the next lower dose level.</td>
</tr>
<tr>
<td>Grade 4</td>
<td>Permanently discontinue TUKYSA.</td>
</tr>
<tr>
<td>Grade 2 bileftin (&gt; 1.5 to 3 × ULN)</td>
<td>Hold TUKYSA until recovery to ≤ Grade 1, then resume TUKYSA at the same dose level.</td>
</tr>
<tr>
<td>Grade 3 ALT or AST (&gt; 5 to 20 × ULN) OR Grade 3 bileftin (&gt; 3 to 10 × ULN)</td>
<td>Hold TUKYSA until recovery to ≤ Grade 1, then resume TUKYSA at the next lower dose level.</td>
</tr>
<tr>
<td>Grade 4 ALT or AST (&gt; 20 × ULN) OR Grade 4 bileftin (≥ 10 × ULN)</td>
<td>Permanently discontinue TUKYSA.</td>
</tr>
<tr>
<td>ALT or AST &gt; 3 × ULN AND Bileftin ≥ 2 × ULN</td>
<td>Permanently discontinue TUKYSA.</td>
</tr>
<tr>
<td>Other adverse reactions¹</td>
<td>Hold TUKYSA until recovery to ≤ Grade 1, then resume TUKYSA at the same dose level.</td>
</tr>
<tr>
<td>Grade 3</td>
<td>Permanently discontinue TUKYSA.</td>
</tr>
</tbody>
</table>

¹. Grades based on National Cancer Institute Common Terminology Criteria for Adverse Events Version 4.03

2. Abbreviations: ULN = upper limit of normal; ALT = alanine aminotransferase; AST = aspartate aminotransferase

Dosage Modifications for Severe Hepatic Impairment

For patients with severe hepatic impairment (Child-Pugh C), reduce the recommended dosage to 300 mg twice daily.

Dosage Modifications for Concomitant Use with Strong CYP2C8 Inhibitors: Avoid concomitant use of strong CYP2C8 inhibitors with TUKYSA. If concomitant use with a strong CYP2C8 inhibitor cannot be avoided, reduce the recommended dosage to 100 mg orally twice daily. After discontinuation of the strong CYP2C8 inhibitor for 3 elimination half-lives, resume the TUKYSA dose that was taken prior to initiating the inhibitor.

CONTRAINDICATIONS

None.

WARNINGS AND PRECAUTIONS

Diarrhea: TUKYSA can cause severe diarrhea including dehydration, hypotension, acute kidney injury, and death. In HER2CLIMB, 81% of patients who received TUKYSA experienced diarrhea, including 12% with Grade 3 diarrhea and 0.5% with Grade 4 diarrhea. Both patients who developed Grade 4 diarrhea subsequently died, with diarrhea as a contributor to death. The median time to onset of the first episode of diarrhea was 12 days and the median time to resolution was 8 days. Diarrhea led to dose reductions of TUKYSA in 6% of patients and discontinuation of TUKYSA in 1% of patients. Prophylactic use of anti-diarrheal treatment was not required in HER2CLIMB. If diarrhea occurs, administer anti-diarrheal treatment as clinically indicated. Perform diagnostic tests as clinically indicated to exclude other causes of diarrhea. Based on the severity of the diarrhea, interrupt dose, then dose reduce or permanently discontinue TUKYSA.

Hepatotoxicity: TUKYSA can cause severe hepatotoxicity. In HER2CLIMB, 8% of patients who received TUKYSA had an ALT increase > 5 × ULN, 6% had an AST increase > 5 × ULN, and 1.5% had a bilirubin increase > 3 × ULN (Grade ≥ 3). Hepatotoxicity led to dose reduction of TUKYSA in 8% of patients and discontinuation of TUKYSA in 1.5% of patients. Monitor ALT, AST, and bilirubin prior to starting TUKYSA, every 3 weeks during treatment, and as clinically indicated. Based on the severity of hepatotoxicity, interrupt dose, then dose reduce or permanently discontinue TUKYSA.

Embryo-Fetal Toxicity: Based on findings from animal studies and its mechanism of action, TUKYSA can cause fetal harm when administered to a pregnant woman. In animal reproduction studies, administration of tucatinib to pregnant rats and rabbits during organogenesis caused embryo-fetal mortality, reduced fetal weight and fetal abnormalities at maternal exposures ≥ 1.3 times the human exposure (AUC) at the recommended dose. Advise pregnant women and females of reproductive potential of the potential risk to a fetus. Advise females of reproductive potential to use effective contraception during treatment with TUKYSA and for at least 1 week after the last dose. Advise male patients with female partners of reproductive potential to use effective contraception during treatment with TUKYSA and for at least 1 week after the last dose. TUKYSA is used in combination with trastuzumab and capecitabine. Refer to the Full Prescribing Information for trastuzumab and capecitabine for pregnancy and contraception information.

ADVERSE REACTIONS

Clinical Trials Experience

Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in the clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in practice.

HER2-Positive Metastatic Breast Cancer (HER2CLIMB)

The safety of TUKYSA in combination with trastuzumab and capecitabine was evaluated in HER2CLIMB. Patients received either TUKYSA 300 mg twice daily plus trastuzumab and capecitabine (n=404) or placebo plus trastuzumab and capecitabine (n=197). The median duration of treatment was 5.8 months (range: 3 days, 2.9 years) for the TUKYSA arm.

Serious adverse reactions occurred in 26% of patients who received TUKYSA. Serious adverse reactions in ≥ 2% of patients who received TUKYSA were diarrhea (4%), vomiting (2.5%), nausea (2%), abdominal pain (2%), and seizure (2%). Fatal adverse reactions occurred in 2% of patients who received TUKYSA including sudden death, sepsis, dehydration, and cardiogenic shock.

Adverse reactions leading to treatment discontinuation occurred in 6% of patients who received TUKYSA. Adverse reactions leading to treatment discontinuation of TUKYSA in ≥1% of patients were hepatotoxicity (1.5%) and diarrhea (1%). Adverse reactions leading to dose reduction occurred in 21% of patients who received TUKYSA. Adverse reactions leading to dose reduction of TUKYSA in ≤2% of patients were hepatotoxicity (8%) and diarrhea (6%).

The most common adverse reactions in patients who received TUKYSA (≥20%) were diarrhea, palmar-plantar erythrodysesthesia, nausea, fatigue, hepatotoxicity, vomiting, stomatitis, decreased appetite, abdominal pain, headache, anemia, and rash.

Table 3: Adverse Reactions (≥10%) in Patients Who Received TUKYSA and with a Difference Between Arms of ≥5% Compared to Placebo in HER2CLIMB (All Grades)

<table>
<thead>
<tr>
<th>Adverse Reaction</th>
<th>TUKYSA + Trastuzumab + Capecitabine (N = 404)</th>
<th>Placebo + Trastuzumab + Capecitabine (N = 197)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grade (%)</td>
<td>Grade (%)</td>
</tr>
<tr>
<td></td>
<td>All 3 4 All 3 4</td>
<td></td>
</tr>
<tr>
<td>Gastrointestinal disorders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diarrhea</td>
<td>25 12 0.5 53 9 0</td>
<td></td>
</tr>
<tr>
<td>Nausea</td>
<td>58 3.7 0 44 3 0</td>
<td></td>
</tr>
<tr>
<td>Vomiting</td>
<td>36 3 0 25 3.6 0</td>
<td></td>
</tr>
<tr>
<td>Stomatitis¹</td>
<td>32 2.5 0 21 0.5 0</td>
<td></td>
</tr>
<tr>
<td>Skin and subcutaneous tissue disorders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Palmar-plantar erythrodysesthesia syndrome</td>
<td>63 13 0 53 9 0</td>
<td></td>
</tr>
<tr>
<td>Rash²</td>
<td>20 0.7 0 15 0.5 0</td>
<td></td>
</tr>
<tr>
<td>Hepatobiliary disorders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatotoxicity²</td>
<td>42 9 0.2 24 3.6 0</td>
<td></td>
</tr>
<tr>
<td>Metabolism and nutrition disorders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decreased appetite</td>
<td>25 0.5 0 20 0.0 0</td>
<td></td>
</tr>
</tbody>
</table>
3. Due to inhibition of renal tubular transport of creatinine without affecting glomerular function.

Concomitant use of TUKYSA with a CYP3A substrate increased the plasma concentrations of CYP3A substrates, which may increase the toxicity associated with a P-gp substrate. Consider reducing the dosage of P-gp substrates, where minimal concentration changes may lead to serious or life-threatening toxicities.

**P-glycoprotein (P-gp) Substrates:** Concomitant use of TUKYSA with a P-gp substrate increased the plasma concentrations of P-gp substrate, which may increase the toxicity associated with a P-gp substrate. Consider reducing the dosage of P-gp substrates, where minimal concentration changes may lead to serious or life-threatening toxicities.

**USE IN SPECIFIC POPULATIONS**

**Pregnancy**

Risk Summary: TUKYSA is used in combination with trastuzumab and capecitabine. Refer to the Full Prescribing Information of trastuzumab and capecitabine for pregnancy information. Based on findings in animals and its mechanism of action, TUKYSA can cause fetal harm when administered to a pregnant woman. There are no available human data on TUKYSA use in pregnant women to inform a drug-associated risk. In animal reproduction studies, administration of tucatinib to pregnant rats and rabbits during organogenesis resulted in embryo-fetal mortality, reduced fetal weight and fetal abnormalities at maternal exposures ≥ 1.3 times the human exposure (AUC) at the recommended dose. Advise pregnant women and females of reproductive potential of the potential risk to the fetus.

**Lactation**

Risk Summary: TUKYSA is used in combination with trastuzumab and capecitabine. Refer to the Full Prescribing Information of trastuzumab and capecitabine for lactation information. There are no data on the presence of tucatinib or its metabolites in human or animal milk or its effects on the breastfed child or on milk production. Because of the potential for serious adverse reactions in a breastfed child, advise women not to breastfeed during treatment with TUKYSA and for at least 1 week after the last dose.

**Females and Males of Reproductive Potential**

TUKYSA can cause fetal harm when administered to a pregnant woman. TUKYSA is used in combination with trastuzumab and capecitabine. Refer to the Full Prescribing Information of trastuzumab and capecitabine for contraception and infertility information.

**Pregnancy Testing:** Verify the pregnancy status of females of reproductive potential prior to initiating treatment with TUKYSA.

**Contraception:**

Females: Advise females of reproductive potential to use effective contraception during treatment with TUKYSA and for at least 1 week after the last dose. Males: Advise male patients with female partners of reproductive potential to use effective contraception during treatment with TUKYSA and for at least 1 week after the last dose.

**Infertility:** Based on findings from animal studies, TUKYSA may impair male and female fertility.

**Pediatric Use:** The safety and effectiveness of TUKYSA in pediatric patients have not been established.

**Geriatric Use:** In HER2CLIMB, 82 patients who received TUKYSA were ≥ 65 years, of whom 8 patients were > 75 years. The incidence of serious adverse reactions in those receiving TUKYSA was 54% in patients ≥ 65 years compared to 24% in patients < 65 years. The most frequent serious adverse reactions in patients who received TUKYSA were dehydration (9%), vomiting (6%), and nausea (5%). There were no observed overall differences in the effectiveness of TUKYSA in patients ≥ 65 years compared to younger patients. There were too few patients > 75 years to assess differences in effectiveness or safety.

**Renal Impairment:** The use of TUKYSA in combination with capcitabine and trastuzumab is not recommended in patients with severe renal impairment (ClCr < 30 mL/min estimated by Cockcroft-Gault Equation), because capcitabine is contraindicated in patients with severe renal impairment. Refer to the Full Prescribing Information of capcitabine for additional information in severe renal impairment. No dose adjustment is recommended for patients with mild or moderate renal impairment (creatinine clearance [ClCr] 30 to 89 mL/min).

**Hepatic Impairment:** Tucatinib exposure is increased in patients with severe hepatic impairment (Child-Pugh C). Reduce the dose of TUKYSA for patients with severe (Child-Pugh C) hepatic impairment. No dose adjustment for TUKYSA is required for patients with mild (Child-Pugh A) or moderate (Child-Pugh B) hepatic impairment.

<table>
<thead>
<tr>
<th>Table 4: Laboratory Abnormalities (≥20%) Worsening from Baseline in Patients Who Received TUKYSA and with a Difference of ≥5% Compared to Placebo in HER2CLIMB</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hematology</strong></td>
</tr>
<tr>
<td><strong>Grade (%)</strong></td>
</tr>
<tr>
<td>Decreased hemoglobin</td>
</tr>
<tr>
<td>Decreased phosphate</td>
</tr>
<tr>
<td>Increased bilirubin</td>
</tr>
<tr>
<td>Increased ALT</td>
</tr>
<tr>
<td>Increased AST</td>
</tr>
<tr>
<td>Decreased magnesium</td>
</tr>
<tr>
<td>Decreased potassium</td>
</tr>
<tr>
<td>Increased creatinine</td>
</tr>
<tr>
<td>Decreased sodium</td>
</tr>
<tr>
<td>Increased alkaline phosphatase</td>
</tr>
</tbody>
</table>

1. The denominator used to calculate the rate varied from 351 to 400 in the TUKYSA arm and 173 to 197 in the control arm based on the number of patients with a baseline value and at least one post-treatment value. Grades were based on NC-CTCAE v4.03 for laboratory abnormalities, except for increased creatinine which only includes patients with a creatinine increase based on the upper limit of normal definition for grade 1 (NC-CTCAE v5.0).

2. Laboratory criteria for Grade 1 is identical to laboratory criteria for Grade 2.

3. Due to inhibition of renal tubular transport of creatinine without affecting glomerular function.

4. There is no definition for Grade 2 in CTCAE v4.03.

5. Increased Creatinine: The mean increase in serum creatinine was 32% within the first 21 days of treatment with TUKYSA. The serum creatinine increases persisted throughout treatment and were reversible upon treatment completion. Consider alternative markers of renal function if persistent elevations in serum creatinine are observed.

**DRUG INTERACTIONS**

**Effects of Other Drugs on TUKYSA**

**Strong CYP3A Inducers or Moderate CYP2C8 Inducers:** Concomitant use of TUKYSA with a strong CYP3A or moderate CYP2C8 inducer decreased tucatinib plasma concentrations, which may reduce TUKYSA activity. Avoid concomitant use of TUKYSA with a strong CYP3A inducer or a moderate CYP2C8 inducer.

**Strong or Moderate CYP2C8 Inhibitors:** Concomitant use of TUKYSA with a strong CYP2C8 inhibitor increased tucatinib plasma concentrations, which may increase the risk of TUKYSA toxicity. Avoid concomitant use of TUKYSA with a strong CYP2C8 inhibitor. Monitor increased toxicity for TUKYSA toxicity with moderate CYP2C8 inhibitors.

**Effects of TUKYSA on Other Drugs**

**CYP3A Substrates:** Concomitant use of TUKYSA with a CYP3A substrate increased the plasma concentrations of CYP3A substrate, which may increase the toxicity associated with a CYP3A substrate. Avoid concomitant use of TUKYSA with CYP3A substrates, where minimal concentration changes may lead to serious or life-threatening toxicities. If concomitant use is unavoidable, decrease the CYP3A substrate dosage in accordance with approved product labeling.

**P-glycoprotein (P-gp) Substrates:** Concomitant use of TUKYSA with a P-gp substrate increased the plasma concentrations of P-gp substrate, which may increase the toxicity associated with a P-gp substrate. Consider reducing the dosage of P-gp substrates, where minimal concentration changes may lead to serious or life-threatening toxicities.
Medical Oncology

1. The Tolerance of CREATE-X Capecitabine Dosing in a United States TNBC Patient Population


7. Evaluation of the 21-Gene Recurrence Score (RS) Assay Results Following Successful Intraoperative Radiation Therapy (IORT) Treatment of Patients With Early-Stage Breast Cancer

8. Concordance of Tumor Response with Eribulin Use in Real-World Clinical Practice

13. Real-world Treatment Patterns and Tumor Response of Palbociclib Plus an Aromatase Inhibitor for Metastatic Breast Cancer: Flatiron Database Analysis


25. A Retrospective Cohort Study of Demographic, Clinical, and Treatment Characteristics of Patients With Metastatic Breast Cancer Who Have Received PARP Inhibitors

28. Primary Outcome Analysis of Invasive Disease-Free Survival for monarchE: Abemaciclib Plus Adjuvant Endocrine Therapy for High-Risk Early Breast Cancer

30. Open-Label, Phase 1 Study to Evaluate Duration of Severe Neutropenia After Same-Day Dosing of Eflapegrastim in Patients With Early-Stage Breast Cancer (ESBC) Receiving Docetaxel and Cyclophosphamide

35. Decreased Epithelial Mesenchymal Transition Process After AGTR-1 Gene Edition By Crispr/Cas9, Losartan, and PARP Inhibitor Treatment In Breast Cancer Cell Line

37. Treatment Outcomes Using Neoadjuvant Chemotherapy for HER2-Positive Breast Cancer in African American and Hispanic Women

42. The United States Retrospective Claims Database Analysis of Demographic, Clinical, and Treatment Characteristics of Metastatic Breast Cancer Patients receiving Olaparib

43. Lobular Cancer Responsiveness to Chemotherapy Is Equivalent to That of Ductal Cancer With Similar Genomic Profiles: An NCDB Analysis

44. Drivers of Oncologist Treatment Selection in HR+/HER2- Metastatic Breast Cancer

45. Neoadjuvant Chemotherapy Use in Elderly Patients

56. A Phase 2 Exploratory Study of Intravenous Cetirizine Versus Intravenous Diphenhydramine in the Prevention of Hypersensitivity Infusion Reactions in Patients With Breast Cancer and Other Malignancies

Surgical Oncology

5. A Prospective, Double-Blinded, Randomized Controlled Trial Comparing the Intraoperative Injection of Technetium Tc 99m Tilmanocept With Technetium Tc 99m Sulfur Colloid in Breast Cancer Lymphatic Mapping

9. Comparison of Immediate Breast Reconstruction Outcomes in Patients With and Without Prior Breast Cosmetic Surgical Procedures

11. Do Breast Surgeons Play an Important Role in a Clinic for Benign Breast Disease?

12. Caseload of Rural General Surgeons: A Focus on Breast Surgery

17 TIP. The Treatment of Breast Cancer With Percutaneous Thermal Ablation: A Phase 2 Screening Trial

18. The Impact on Management and Outcomes of Benign and High-Risk Breast Lesions After the Introduction of Vacuum-Assisted Excision

27. Radar Reflector Localization of Peripheral Nonpalpable Lesions During Skin-Sparing and Nipple-Sparing Mastectomy: A Novel Application Using the IDEAL Framework

40. Objective Comparison of Postoperative Activity After Sentinel Lymph Node Biopsy vs Axillary Node Clearance Using Wearable Activity Monitors

41. Pathologic Complete Response (pCR) Rates According to MammaPrint and BluePrint Test Results Are Consistent Among Pre- and Postmenopausal Patients

49. Registry Study of a Nonpalpable Verifiable Filament Marker of the Breast Tumor Bed

50. Breast Tissue Differentiation With High Wavenumber Raman Spectroscopy for Future Intraoperative Margin Analysis

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**Imaging and Radiation Oncology**


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**Multidisciplinary Specialties**

2. Landscape of Germline Mutations in DNA Repair Genes for Breast Cancer in a Multinational Region Located in the Southeast of the European Part of Russia

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15 TiP. The FLEX Real-World Data Platform Explores New Gene Expression Profiles and Investigator-Initiated Protocols in Early-Stage Breast Cancer

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39. Delay in Presentation and Management of Patients With Breast Cancer in Baghdad, Iraq

47. A Biomarker Assay Predicts Women Diagnosed With DCIS Without Microinvasion Are at Increased Risk for Breast Cancer-Specific Death

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55. BC200 RNA Changes In Breast Cancer Patients After Treatment
Review and commentary on the following abstracts from the 38th Annual Miami Breast Cancer Conference, hosted by Physicians’ Education Resource, LLC (PER®), were provided by the program chairs and planning committee.

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The Tolerance of CREATE-X Capecitabine Dosing in a United States TNBC Patient Population

Alaina J. Kessler, MD, MPH; Natalie S. Berger, MD; Lauren K. Margetich, MD; Erin L. Moshier, MS; and Paula Klein, MD

1Icahn School of Medicine at Mount Sinai, New York, NY. 2The Mount Sinai Hospital, New York, NY.

Background
Capecitabine has been shown to prolong overall survival in patients with triple-negative breast cancer (TNBC) with residual disease after neoadjuvant chemotherapy based on the CREATE-X study (UMIN000000843). The starting dose of capecitabine in CREATE-X was 1250 mg/m² twice per day on days 1 through 14 every 3 weeks. Fluoropyrimidine toxicity is higher in the United States compared with East Asia. The goal of this study was to evaluate the tolerance of capecitabine at a US urban clinic treating predominantly non-Asian patients.

Materials and Methods
We performed a retrospective chart review of patients with TNBC with residual disease from June 1, 2017, to June 1, 2020. Distributions of categorical variables were compared between capecitabine dosing groups using the χ²/Fisher’s exact test, as appropriate. All statistical analyses were conducted using SAS version 9.4 (SAS Institute).

Results
A total of 32 patients who met criteria were included (average [SD] age, 52.5 [9.6] years). Eight patients (25%) were Hispanic/Latinx, 11 (34.4%) were White, 10 (31.3%) were African American, and 2 (6.3%) were Asian. At diagnosis, 4 patients (12.5%) had clinical stage I disease, 16 (50.0%) had stage II disease, and 12 (37.5%) had stage III disease. Of the 16 patients (50.0%) prescribed capecitabine 1250 mg/m², 5 patients (31.3%) completed 8 cycles, all requiring dose reductions. Of the 283 patients in the CREATE-X study treated with this dose, 37.8% completed capecitabine treatment with the planned dose compared with 0% of patients in our cohort; 36.7% completed treatment with dose reduction compared with 31.3% in our cohort; and 25.4% discontinued treatment compared with 25.0% in our cohort. Of the 14 patients (43.8%) in our cohort prescribed the US standard dosing of 1000 mg/m², 4 patients (28.6%) completed 8 cycles with 1 patient requiring dose reductions. Four of the 14 patients (28.6%) discontinued capecitabine due to intolerance. The most common adverse events were hand-foot syndrome (62.5%), nausea (46.9%), and diarrhea (34.4%).

Conclusions
When compared with the study population in CREATE-X, no patients in our cohort tolerated 8 cycles of capecitabine 1250 mg/m² whereas 3 of 4 (75%) patients tolerated 8 cycles of capecitabine at 1000 mg/m². This treatment dose was not studied in CREATE-X. Trials in metastatic disease comparing these 2 doses demonstrated similar efficacy with less toxicity. Further studies are warranted in this curative-intent population.
Survival Benefit of Eribulin, But Not Capecitabine, for Metastatic Breast Cancer Is Associated With Baseline Absolute Lymphocyte Count in Peripheral Blood

Ayako Ueno1; Reina Maeda1; Takanori Kin1; Mitsuya Ito1; Kensuke Kawasaki1; Shoichiro Ohtani1

1Hiroshima City Hiroshima Citizens Hospital, Hiroshima, Japan.

Background
Eribulin and capecitabine are thought to be equally effective for metastatic breast cancer (mBC). Recently, growing evidence suggests that absolute lymphocyte count (ALC) in peripheral blood affects the efficacy of eribulin for mBC. The association between ALC and the efficacy of capecitabine is less studied. Here, we investigated how the efficacy balance between eribulin and capecitabine is influenced by baseline ALC.

Materials and Methods
We reviewed the medical records of 275 patients receiving eribulin (n = 125) or capecitabine (n = 150) for mBC at Hiroshima City Hiroshima Citizens Hospital between July 2011 and April 2019. Progression-free survival (PFS) was compared between patients with high ALC (≥1500/μL) and those with low ALC (<1500/μL) in each treatment group. Then, we investigated the relationship between the hazard ratio (HR) for PFS (eribulin vs capecitabine), taking into account patients’ baseline ALC levels. We used the Cox proportional hazards model; included covariates were age, hormonal and HER2 status, presence or absence of liver and other visceral metastasis, the number of involved organs, and the number of previous chemotherapy regimens.

Results
Median (interquartile range) ALC levels at baseline were 1107 (733-1485)/μL in the eribulin group and 1425 (1014-1773)/μL in the capecitabine group (P < .001). In the eribulin group, high ALC at baseline was significantly associated with longer PFS (adjusted HR, 0.50; 95% CI, 0.29-0.85; P = .010). On the other hand, in the capecitabine group, baseline ALC was not significantly associated with PFS (adjusted HR, 0.86; 95% CI, 0.58-1.28; P = .456). In the whole cohort, treatment with eribulin was significantly associated with worse PFS (adjusted HR, 1.44; 95% CI, 1.08-1.91). However, in patients with high ALC, PFS was similar or improved in the eribulin group. For patients with ALC ≥1500/μL, ALC ≥1900/μL, and ALC ≥2200/μL, adjusted HRs were 1.07 (95% CI, 0.64-1.82), 0.79 (95% CI, 0.29-2.11), and 0.67 (95% CI, 0.18-2.41), respectively.

Conclusions
Baseline ALC was significantly associated with PFS in the eribulin group, but not in the capecitabine group. This study suggested the potential role of ALC as a biomarker to predict the efficacy balance between eribulin and capecitabine in the treatment of mBC.

“[This is an] interesting analysis of baseline lymphocyte count comparing two chemotherapy regimens with differential impact on outcome. There has been a growing interest in lymphocyte counts and neutrophil/lymphocyte ratios in terms of outcome and immune function. Very intriguing, but [there was] no discussion on other factors that were associated with lymphocyte counts.”

-Debu Tripathy, MD
Evaluation of the 21-Gene Recurrence Score (RS) Assay Results Following Successful Intraoperative Radiation Therapy (IORT) Treatment of Patients With Early-Stage Breast Cancer

Barbara Schwartzberg, MD1; Kathryn Howell, MD2; Joyce Moore, MD1; Devchand Paul, DO, PhD3

1Western Surgical Care, Lone Tree, CO
2Rocky Mountain Cancer Centers, Littleton, CO
3Rocky Mountain Cancer Centers, Denver, CO

Background
An institutional review board–approved, single-institution clinical trial was designed to determine the efficacy and outcome of intraoperative radiation therapy (IORT) as monotherapy. The correlation between post-IORT recurrence and recurrence score (RS), which was used to guide recommendations for adjuvant medical therapy for trial patients with estrogen receptor–positive (ER+) disease, was evaluated.

Methods
The outcomes of patients completing both monotherapy IORT per protocol using disposable balloon technology and RS assessment were reviewed. Data collection included demographics, histopathology, prognostic factors, RS, adjuvant therapy, local recurrence (LR), and survival.

Results
From November 2011 to January 2016, 115 patients (aged 43-84 years; mean 63 years) completed both monotherapy IORT per protocol and RS assessment. All patients had ER+ invasive carcinomas (0.2-2.4 cm; mean size, 1.1 cm), and were chemotherapy candidates. Invasive ductal carcinoma was diagnosed in 110 patients (96%) and invasive lobular carcinoma in 5 (4%). Low RS (< 11) was observed in 25 patients (22%); RS of 11 to 15 in 20 (17%); RS of 16 to 25 in 53 (46%); RS of 26 to 30 in 9 (8%); and RS of 30 or greater in 8 (7%). At a median follow-up of 6.8 years, there were 3 instances of LR (RS of 0, 17, and 18) and 1 axillary recurrence (RS of 19). There have been no breast cancer-related deaths. Twenty-three patients (20%) received chemotherapy, including 12 (71%) in the high RS (RS > 25) groups. Chemotherapy was not administered to any patient with a RS less than 18. One patient with LR (RS 0, aged 65 years, 1.5 cm, Scarff-Bloom-Richardson [SBR] Grade [Gr] 3) declined endocrine therapy. Ten patients (19%) with RS of 16 to 25 received chemotherapy. One patient with LR (RS 17, aged 64 years, 1.5 cm, SBR Gr 3) and 1 with axillary recurrence (RS 19, aged 66 years, 1.3 cm, SBR Gr 3), neither of whom received chemotherapy, were compliant with endocrine therapy. One patient with LR (RS 18, aged 51 years, 0.6 cm, SBR Gr 3) was treated with cyclophosphamide and docetaxel. She later tested positive for a CHEK2 mutation. Seven patients (78%) with RS of 26 to 30, and 5 (63%) patients with an RS of 30 or more received chemotherapy. There were no recurrences in these 2 groups. Two patients with LR opted for lumpectomy and excision of the area treated with IORT, followed by whole-breast radiation therapy. One patient with LR and another with axillary recurrence chose mastectomy.

Conclusions
Patients (N = 115) treated with monotherapy IORT per protocol using disposable balloon technology and RS assessment at a single institution were found to have a 3.5% recurrence rate at a mean follow-up of 6.8 years. High RS results (RS > 25), which guided chemotherapy recommendations in appropriate use of IORT in patients, did not correlate with recurrence.

“This is a single-center, retrospective review of a small number of patients who had IORT and had an RS available. The rate of local recurrence was low (3.5%) with IORT. There were no local recurrences in patients with RS over 25, thus potentially indicating that RS should not be used to select for patients who would not be candidates for IORT. However, caution should be taken when drawing any conclusions as systemic treatment varied in these patients compared to those with a RS of less than 26, and other patient related factors may also be associated with outcome (for example, better treatment compliance in higher risk groups). Moreover, the number of patients in the higher risk category was small.” -Sara Hurvitz, MD
Concordance of Tumor Response with Eribulin Use in Real-World Clinical Practice

Bruce A. Feinberg, DO1; Jingchuan Zhang, PhD2; Jonathan K. Kish, PhD, MPH1; Shrividya Iyer, PhD2; Sarah S. Mougalian, MD3

1Cardinal Health Specialty Solutions, Dublin, OH
2Eisai Inc., Woodcliff Lake, NJ
3Yale Cancer Center, Yale School of Medicine, New Haven, CT

Background
Although clinical trials in advanced cancer routinely adopt criteria like the Response Evaluation Criteria in Solid Tumors (RECIST) v1.1, response assessment in clinical practice may be subjective; criteria utilized to assess response are not always reported in patient records. We report on the concordance of treatment response with eribulin use in clinical practice, as evaluated through 2 assessment approaches in patients with metastatic breast cancer (mBC).

Methods
Adult female patients with mBC, initiating eribulin between 2011 and 2017 consistent with the approved United States indication, underwent chart abstraction by medical oncologists invited to participate. The best response to eribulin (complete response [CR], partial response [PR], stable disease [SD], or progressive disease [PD]) was assessed via 2 methods: 1) provider-reported best response abstracted from the medical record; and 2) response retrospectively calculated per RECIST v1.1 using measurements of target lesions provided by the treating oncologist. The proportion of concordant/discordant responses was compared between the 2 methods.

Results
Data from 513 patients were provided by 46 medical oncologists from across the United States in practices of various sizes (from small community to hospital owned); provider-reported best responses were available for all patients, and lesion measurements were obtained for 499 (97%). Best response rates reported by providers were 8% CR, 46% PR, 17% SD, and 29% PD. Best response rates were 2% CR, 44% PR, 29% SD, and 22% PD by calculation based on lesion measurements and RECIST v1.1 criteria. Concordance of best response classification was 77% overall. Discordant cases observed were mainly due to the classification of provider-reported CR and PR/PD as PR and SD, respectively, using lesion assessments (Table).

Conclusion
Concordance of 77% was observed between the 2 methods used to classify best response in eribulin-treated mBC. Response calculated per established criteria like RECIST using available lesion measurements in addition to provider-reported assessments in real-world studies of mBC could help to optimize the validity of outcomes assessment in clinical practice.

<table>
<thead>
<tr>
<th>TABLE. Best Response in mBC Patients Treated With Eribulin</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Calculated based on lesion measurements, N (%)</strong></td>
</tr>
<tr>
<td>CR</td>
</tr>
<tr>
<td>10 (1.9)</td>
</tr>
<tr>
<td>25 (4.8)</td>
</tr>
<tr>
<td>5 (1.0)</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td>1 (0.2)</td>
</tr>
<tr>
<td>41</td>
</tr>
</tbody>
</table>

CR, complete response; PD, progressive disease; PR, partial response; SD, stable disease.
Real-world Treatment Patterns and Tumor Response of Palbociclib Plus an Aromatase Inhibitor for Metastatic Breast Cancer: Flatiron Database Analysis

Debra Patt, MD, PhD\textsuperscript{1}; Xianchen Liu, MD, PhD\textsuperscript{2}; Benjamin Li, PhD\textsuperscript{1}; Lynn McCray, MD\textsuperscript{3}; Rachel M Layman, MD\textsuperscript{1}; Adam Brufsky MD, PhD\textsuperscript{4}

\textsuperscript{1}Texas Oncology-Austin Central, Austin, TX
\textsuperscript{2}Pfizer, New York, NY
\textsuperscript{3}The University of Texas MD Anderson Cancer Center, Houston, TX
\textsuperscript{4}University of Pittsburgh School of Medicine, Pittsburgh, PA

Background
The use of a CDK4/6 inhibitor in combination with an aromatase inhibitor (AI) as initial endocrine therapy has become the standard of care for patients with hormone receptor-positive, HER2-negative (HR+/HER2–) advanced or metastatic breast cancer (mBC). This study described treatment patterns and real-world tumor response (rwTR) to first-line palbociclib (Ibrance; PA) plus AI therapy for HR+/HER2– mBC in a routine clinical setting in the United States.

Methods
This was a retrospective analysis of Flatiron Health's nationwide longitudinal electronic health records from over 280 cancer clinics, representing more than 2.2 million actively treated patients with cancer in the United States. There were 813 women with HR+/HER2– mBC, initiated with PA plus AI as first-line therapy between February 2015 and September 2018 with at least 3 months of potential follow-up. Patients were followed from the start of PA plus AI therapy to December 2018, death, or last visit, whichever came first. The rwTR that occurred at least 30 days after the date of therapy initiation was assessed based on the treating clinician's assessment of radiologic evidence for change in burden of disease over the course of treatment.

Results
Among 813 eligible patients, 68.3% were white, the median age was 65.0 years, 42.9% had visceral disease (lung and/or liver), 85.6% started PA at 125 mg/day, and the median

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>AI partner</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anastrozole</td>
<td>36</td>
<td>4.4</td>
</tr>
<tr>
<td>Exemestane</td>
<td>23</td>
<td>2.8</td>
</tr>
<tr>
<td>Letrozole</td>
<td>754</td>
<td>92.7</td>
</tr>
<tr>
<td>Palbociclib initial dose, mg/day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>125</td>
<td>696</td>
<td>85.6</td>
</tr>
<tr>
<td>100</td>
<td>80</td>
<td>9.8</td>
</tr>
<tr>
<td>75</td>
<td>29</td>
<td>3.6</td>
</tr>
<tr>
<td>Undocumented</td>
<td>8</td>
<td>0.9</td>
</tr>
<tr>
<td>Months of treatment duration, median, 95% CI</td>
<td>16.3 (14.4-20.5)</td>
<td></td>
</tr>
<tr>
<td>Reason for discontinuation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any reason</td>
<td>349</td>
<td>42.9</td>
</tr>
<tr>
<td>Disease progression</td>
<td>219</td>
<td>26.9</td>
</tr>
<tr>
<td>Toxicity</td>
<td>87</td>
<td>10.7</td>
</tr>
<tr>
<td>Patient request</td>
<td>22</td>
<td>2.7</td>
</tr>
<tr>
<td>Disease-related symptoms (not due to therapy)</td>
<td>13</td>
<td>1.6</td>
</tr>
<tr>
<td>Financial</td>
<td>4</td>
<td>0.5</td>
</tr>
<tr>
<td>Other</td>
<td>33</td>
<td>4.1</td>
</tr>
<tr>
<td>Undocumented</td>
<td>4</td>
<td>0.5</td>
</tr>
<tr>
<td>Months to next line of therapy, median, 95% CI</td>
<td>24.6 (22.0-26.4)</td>
<td></td>
</tr>
<tr>
<td>Months to chemotherapy, median, 95% CI</td>
<td>36.6 (32.8-NR)</td>
<td></td>
</tr>
<tr>
<td>Best tumor response\textsuperscript{a}</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete response (CR)</td>
<td>67</td>
<td>9.5</td>
</tr>
<tr>
<td>Partial response (PR)</td>
<td>355</td>
<td>50.5</td>
</tr>
<tr>
<td>Stable disease</td>
<td>166</td>
<td>23.6</td>
</tr>
<tr>
<td>Progressive disease</td>
<td>98</td>
<td>13.9</td>
</tr>
<tr>
<td>Indeterminate</td>
<td>17</td>
<td>2.4</td>
</tr>
<tr>
<td>Best overall response (CR + PR)</td>
<td>422</td>
<td>60.0</td>
</tr>
</tbody>
</table>

\textsuperscript{a}Tumor response data were missing for 100 patients.
duration of follow-up was 19.4 months. Median treatment duration and time to chemotherapy were 16.3 months (95% CI, 14.4-20.5 months) and 36.6 months (95% CI, 32.8-not reached), respectively. In total, 42.9% patients discontinued PA plus AI for any reason and 10.7% for toxicity. The rwTR rate was 60%. The Table presents the results in detail.

Conclusions
The real-world findings in heterogeneous patients with mBC in routine clinical practice in the United States support first-line PA plus AI as the standard care for HR+/HER2-mBC.

### Table

<table>
<thead>
<tr>
<th>Variable</th>
<th>Patients, % (N = 242)</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>81</td>
</tr>
<tr>
<td>PAL 125 mg dose initiation</td>
<td>90</td>
</tr>
<tr>
<td>ECOG score</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>24</td>
</tr>
<tr>
<td>1</td>
<td>24</td>
</tr>
<tr>
<td>2+</td>
<td>12</td>
</tr>
<tr>
<td>Unknown</td>
<td>40</td>
</tr>
<tr>
<td>Metastatic disease</td>
<td></td>
</tr>
<tr>
<td>Recurrent</td>
<td>43</td>
</tr>
<tr>
<td>De novo</td>
<td>55</td>
</tr>
<tr>
<td>Bone-only disease</td>
<td>51</td>
</tr>
<tr>
<td>Visceral disease</td>
<td>32</td>
</tr>
<tr>
<td>Number of metastatic sites</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>61</td>
</tr>
<tr>
<td>2</td>
<td>19</td>
</tr>
<tr>
<td>≥3</td>
<td>20</td>
</tr>
<tr>
<td>Disease-free interval, months*</td>
<td></td>
</tr>
<tr>
<td>≤12</td>
<td>13</td>
</tr>
<tr>
<td>13-24</td>
<td>11</td>
</tr>
<tr>
<td>25-36</td>
<td>10</td>
</tr>
<tr>
<td>&gt;36</td>
<td>66</td>
</tr>
<tr>
<td>rwPFS rate</td>
<td></td>
</tr>
<tr>
<td>6, 12, 18, 24 months</td>
<td>84, 74, 64, 59</td>
</tr>
<tr>
<td>OS rate</td>
<td></td>
</tr>
<tr>
<td>6, 12, 18, 24 months</td>
<td>97, 90, 84, 78</td>
</tr>
</tbody>
</table>

rwPFS, real-world progression-free survival; OS, overall survival; PAL, palbociclib.

*End of adjuvant treatment to recurrence in recurrent patients (n = 115).

α/mBC who initiated 1L PAL + AI were evaluated from February 2015 through July 2019, with 6 months or more of potential follow-up. Patients were followed from treatment initiation until data cutoff (February 2020), death, or loss of

### Background
With nearly 6 years of prescribing experience since the US approval of palbociclib (PAL), there is now adequate follow-up to evaluate real-world (RW) effectiveness of PAL and aromatase inhibitor (AI) treatment. This retrospective, single-arm study evaluated RW treatment patterns and clinical outcomes of patients with hormone receptor-positive/HER2-negative (HR+/HER2-) advanced/metastatic breast cancer (a/mBC), who received PAL plus AI as first-line (1L) therapy in US practices.

### Methods
The study used the Syapse Learning Health Network, a longitudinal database that collects cancer care data from the entirety of a patient’s journey from US health systems across 25 states, 457 hospitals, and among 1317 community oncologists. Death data were captured using multiple sources. Patients aged 18 years and older with HR+/HER2-
Results
The study included 242 patients (median age, 66 years; Table). Median duration of follow-up was 22.4 months. The most common reasons for treatment discontinuation were progressive disease (26%) and intolerance/toxicity (15%); 44% of patients remained on treatment at study cutoff. Among patients with a known dose adjustment (31%), mean time to adjustment was 167.4 days; median time was 55 days. Median time to treatment discontinuation and real-world progression-free survival (rwPFS) were 23.9 (95% CI, 17.6-28.5 months) and 31.7 months (95% CI, 26.5-50.3 months), respectively. Twelve- and 24-month overall survival (OS) rates were 90% (95% CI, 87%-94%) and 78% (95% CI, 72%-84%), respectively; 25.6% of patients died during the study.

Conclusions
RW effectiveness outcomes in patients with HR+/HER2− a/mBC receiving 1L PAL + AI from the Syapse network of community oncologists complement randomized clinical trial data and other US electronic health record studies. This study is limited by a small sample size and limited follow-up.

Disclosures
Law is a Syapse employee; Mitra is an employee and has stock ownership at Pfizer Inc; Kaplan is a consultant for Syapse; Alfred is an employee and has stock ownership at Pfizer Inc; Brufsky has consulting fees from Pfizer Inc; Emir is an employee and has stock ownership at Pfizer Inc; McCracken is a Syapse employee; Liu is an employee and has stock ownership at Pfizer Inc; Broome is a Syapse employee; DiCristo has no disclosures; Chen is an employee and has stock ownership at Pfizer Inc.

25 A Retrospective Cohort Study of Demographic, Clinical, and Treatment Characteristics of Patients With Metastatic Breast Cancer Who Have Received PARP Inhibitors

Jenna Collins, MPH1; Beth Nordstrom, PhD, MPH1; Stella Mokiou, PhD2; Brian Murphy, MS1; Melissa Pavilack, PharmD3

1Evidera, Waltham, MA
2AstraZeneca, Cambridge, United Kingdom
3AstraZeneca Pharmaceuticals, Gaithersburg, MD

Background
PARP inhibitors (PARPi) were approved in 2018 as treatment for metastatic breast cancer (mBC) and have demonstrated efficacy in patients with a germline BRCA mutation (gBRCAm). Limited real-world data exist on the characteristics of patients who are treated with PARPi, and at what point during their treatment they are receiving these agents.

Material and methods
This is a retrospective cohort study of patients receiving a PARPi for mBC in routine clinical practice, using data from the Flatiron Health electronic health record–derived database. The study population comprised adult patients in the United States, diagnosed between 2013 and 2019 with mBC, identifiable as hormone receptor-positive (HR+) or with triple-negative breast cancer (TNBC). Patients were treated with a PARPi (olaparib [Lynparza] or talazoparib [Talzenna]) between December 1, 2014, when the first PARPi approval for any indication occurred, and December 31, 2019. Patient demographic and clinical characteristics were examined. Treatment patterns prior to first PARPi use were described, both overall and by line of therapy. Results were stratified for patients with HR+ and TNBC.

Results
In total, 137 patients were included; 100 patients (73%) had HR+ mBC and 37 (27%) had TNBC, and the median age at PARPi initiation was 54 and 49 years, respectively. Stage at initial diagnosis was most commonly stage II (35.0% and 32.4% for HR+ and TNBC, respectively), or III (32.0% and 32.4%, respectively). The gBRCAm status was documented...
Primary Outcome Analysis of Invasive Disease-Free Survival for monarchE: Abemaciclib Plus Adjuvant Endocrine Therapy for High-Risk Early Breast Cancer

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Background

The open-label phase 3 monarchE trial (NCT03155997) evaluated abemaciclib (Verzenio) plus endocrine therapy (ET) versus ET alone in node-positive, hormone receptor-positive, HER2-negative (HR+/HER2-), high-risk early breast cancer that resulted in a statistically significant improvement in invasive disease-free survival (IDFS) at a preplanned interim analysis.

Materials and methods

Following the positive interim analysis, patients continued to be followed for IDFS, distant recurrence, and overall survival. Patients (n = 5637) were randomized (1:1) to standard-of-care adjuvant ET with/without abemaciclib (150 mg daily twice for 2 years). Patients with 4 or more positive nodes, or 1 to 3 nodes and either grade 3 disease, tumor size of 5 cm or more, or central Ki-67 of 20% or greater were eligible. We present results of the primary outcome IDFS analysis, which was planned after about 390 IDFS events.
Results
At the primary outcome analysis, median follow-up was about 19 months in both arms. With 395 IDFS events observed, abemaciclib plus ET continued to demonstrate superior IDFS versus ET alone (P = .0009; HR, 0.713; 95% CI, 0.583-0.871). Two-year IDFS rates were 92.3% (95% CI, 90.9%-93.5%; abemaciclib plus ET) and 89.3% (95% CI, 87.7%-90.7%; ET alone). With 324 distant relapse-free survival (DRFS) events observed, abemaciclib plus ET improved DRFS versus ET alone (HR, 0.687; 95% CI, 0.551-0.858; P = .0009). Two-year DRFS rates were 93.8% (95% CI, 92.6%-94.9%; abemaciclib plus ET) and 90.8% (95% CI, 89.3%-92.1%; ET alone).

A key secondary end point was efficacy in patients with centrally assessed high Ki-67 (≥ 20%; Ki-67H, n = 2498). Abemaciclib plus ET demonstrated superior IDFS versus ET alone (HR, 0.691; 95% CI, 0.519-0.920; P = .0111) and 2-year IDFS rates were 91.6% (95% CI, 89.4%-93.4%) and 87.1% (95% CI, 84.3%-89.5%), respectively. Abemaciclib plus ET demonstrated superior DRFS versus ET alone (HR, 0.609; 95% CI, 0.445-0.833; P = .0018) and 2-year DRFS rates were 93.6% (95% CI, 91.6%-95.1%) and 88.5% (95% CI, 85.7%-90.7%), respectively. An improvement in DRFS treatment effect was also observed in the Ki-67H population. Safety was consistent both with the results at the interim IDFS analysis and the known safety profile of abemaciclib.

Conclusions
Abemaciclib plus ET demonstrated a clinically meaningful improvement in IDFS in the study population with a statistically significant improvement in IDFS in patients with central Ki-67 of 20% or greater. Reused with permission SABCS® 2020.

Disclosures:
1. Joyce O’Shaughnessy: Received honoraria for consulting: AbbVie Inc, Agendia, Amgen Biotechnology, AstraZeneca, Bristol Myers Squibb, Celgene Corporation, Eisai, Genentech, Genomic Health, GRAL, Heron Therapeutics, Immunomedics, Ipsen Biopharmaceuticals, Jounce Therapeutics, Lilly, Merck, Myriad, Novartis, Odonate Therapeutics, Pfizer, Prime Oncology, Puma Biotechnology, Roche, Seattle Genetics, Syndax Pharmaceuticals, Takeda; Received honoraria for advisory boards: AbbVie, Agendia, Amgen, AstraZeneca, Bristol Myers Squibb, Celgene, Eisai, Genentech, Genomic Health, GRAL, Heron, Immunomedics, Ipsi, Jounce, Lilly, Merck, Myriad, Novartis, Odonate, Pfizer, Puma, Prime Oncology, Roche.

2. Mattea Reinisch: Received honoraria and travel support from: AstraZeneca, Celgene, Lilly, MSD, Novartis, Pfizer, Roche, Somatex.

3. Laura Testa: Speaker at scientific events supported by: Amgen, Libbs, Lilly, Novartis, Pfizer Roche; Advisory Boards: Amgen, Lilly, MSD, Novartis; Educational support for meetings: Libbs, Pfizer, United Medical.

4. Miguel Martin: Received research grants from Novartis, Puma, Roche; Consulting/advisory fees from Amgen, AstraZeneca, Daiichi Sankyo, Eli Lilly, Novartis, Pfizer, PharmaMar, Puma, Roche/Genentech, Taiho Oncology; Speakers’ honoraria from Amgen, AstraZeneca, Lilly, Novartis, Pfizer, Roche/Genentech.

5. Elzbieta Senkus-Konefka: Honoraria: Amgen, AstraZeneca, Clinigen, Egis, Eli Lilly, Genomic Health, Novartis, Oncompass Medicine, Pfizer, Pierre Fabre, Roche, Sandoz, TLC Biopharmaceuticals; Travel support: Amgen, AstraZeneca, Egis, Novartis, Pfizer, Roche; Clinical research: Amgen, AstraZeneca, Eli Lilly, Novartis, Pfizer, Roche, Samsung, Stock: Eli Lilly, Pfizer.

6. Pirkko-Liisa Kellokumpu-Lehtinen: Consulting or advisory role: BMS, Merck; Research Funding: Lilly.

7. Lucia Del Mastro: Honoraria: Lilly, MSD Oncology, Novartis, Roche; Consulting or advisory role: AstraZeneca, Daiichi Sankyo, Eisai, Genomic Health, Ipsen, Lilly, MSD, Novartis, Pfizer, Pierre Fabre, Roche, Seattle Genetics; Travel, accommodations, expenses: Celgene, Pfizer, Roche.


9. Tammy Forrester, Sarah Sherwood, Xuelin Li, Ran Wei: Lilly employees with Lilly stock.

Open-Label, Phase 1 Study to Evaluate Duration of Severe Neutropenia After Same-Day Dosing of Eflapegrastim in Patients With Early-Stage Breast Cancer (ESBC) Receiving Docetaxel and Cyclophosphamide

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5Bond & Steele Clinic, PA, Winter Haven, FL.
6Arizona Clinical Research Center, Tucson, AZ.

Background
Eflapegrastim (Efla) is a long-acting granulocyte colony-stimulating factor (G-CSF), produced by covalent conjugation of a human GCSF analogue and a human immunoglobulin G4 Fc fragment, linked via a short polyethylene glycol linker. Currently available G-CSFs are administered 24 hours after chemotherapy. In docetaxel and cyclophosphamide (TC)-induced neutropenia in rats, the longer marrow residence time of Efla compared with pegfilgrastim translated into shorter duration of neutropenia when administered on the same day as TC. Data from the interim safety analysis in patients receiving Efla on the same day as chemotherapy are presented.

Materials and Methods
This is a randomized, schedule-finding, multicenter study (NCT04187898) evaluating same-day administration of 13.2 mg/0.6 mL Efla following intravenous infusion of docetaxel (75 mg/m²) and cyclophosphamide (600 mg/m²) in patients with ESBC. Patients were randomized to receive Efla 0.5 hours (Arm 1), 3 hours (Arm 2), and 5 hours (Arm 3) after TC. The primary end point is duration of grade 4 neutropenia (DSN) in cycle 1. The secondary end points include incidence of grade 3 febrile neutropenia (FN), pharmacokinetics, and safety in cycle 1. At the interim safety evaluation, an arm would be stopped if 1 or more patients experienced grade 4 DSN for more than 1 day.

Results
The interim evaluation, per protocol, included 9 patients (3 in each arm). In Arm 1, 1 of 3 patients had grade 4 neutropenia for 1 day without FN. In Arm 2, 1 of 3 patients had grade 4 neutropenia for 2 days and FN for 1 day with sepsis. In Arm 3, 1 of 3 patients had grade 4 neutropenia for 2 days and FN for 1 day, and another patient had grade 4 neutropenia for 1 day without FN. All 9 patients reported at least 1 adverse event (AE). Related grade 3 AEs included bone pain in 1 patient (arm 2) and lymphocyte count decreased in 1 patient (arm 3). There were no serious AEs related to Efla.

Conclusions
Efla may provide similar efficacy when administered on the same day, rather than next day, following TC. At interim evaluation, Arm 1 had no grade 4 neutropenia lasting more than 1 day. Enrollment in Arms 2 and 3 was discontinued because of the presence of grade 4 neutropenia that lasted more than 1 day and the overall safety profile. Enrollment is ongoing in Arm 1.

Decreased Epithelial Mesenchymal Transition Process After AGTR-1 Gene Edition By Crispr/Cas9, Losartan, and PARP Inhibitor Treatment In Breast Cancer Cell Line

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Background
Tumor progression after chemotherapy remains a major obstacle to successful treatment of cancer. Among the mechanisms of chemoresistance of tumors, we highlight...
the ability of cells to repair DNA after chemotherapy, leading to the epithelial-mesenchymal transition (EMT) process, resulting in metastases. Olaparib (Lynparza) is a PARP inhibitor (PARPi) able to block DNA repair and has been studied as an alternative to prevent the chemoresistance of tumor cells. Losartan, in turn, binds to the receptor AGTR-1, inhibiting the process of angiogenesis in breast cancer, consequently decreasing the formation of metastases. In this context, the objectives of this work were to evaluate the efficacy of olaparib and losartan as a therapeutic strategy in breast tumors as well as to analyze EMT markers after the process of AGTR-1 gene editing by CRISPR/Cas9.

**Materials and Methods**

Breast cancer cell line (MCF-7) was cultured in a high-glucose culture, Dulbecco’s Modified Eagle’s Medium, at 37°C in 5% CO₂. The cells were then treated with PARPi and losartan or submitted to the CRISPR/Cas9 technique for inhibition of the AGTR-1 receptor. After 24 hours, we used the immunofluorescence technique to analyze protein expression and real-time polymerase chain reaction for gene expression of EMT markers. In addition, the cells’ invasion capacity was also verified after AGTR-1 inhibition by CRISPR/Cas9 technique.

**Results**

The N-cadherin, vimentin, and PARP-1 protein and gene expression significantly decreased after treatment with PARPi or losartan ($P<.05$) compared with the control group (without treatment). There was still a decrease of cell migration ability after PARPi or losartan treatment ($P<.05$) and the same was observed after AGTR-1 gene edition by CRISPR/Cas9 technique ($P<.05$).

**Conclusions**

The results showed that PARPi and losartan act in the regulation of EMT process in breast cancer cells.

**Financial Support:** FAPESP

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**37 Treatment Outcomes Using Neoadjuvant Chemotherapy for HER2-Positive Breast Cancer in African American and Hispanic Women**

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**Background**

In the United States, African American (AA) and Hispanic (H) women have a 20% lower incidence of breast cancer than White women. Despite this lower incidence, breast cancer continues to be the leading cancer diagnosis and cause for mortality in this population. Factors such as socioeconomic status, lack of access to health care, and genetics may be risk factors for this select group. HER2-positive disease in the minority population has not been well described. The aim of this study is to further characterize this disease and to determine the effects of neoadjuvant treatment within this population.

**Materials and Methods**

This study reports on 37 women with HER2-positive, nonmetastatic disease diagnosed from 2015 to 2019 in a single-institution, community program serving a minority-dense population. Our data were compiled using our facility’s cancer registry in Excel format. The patient (pt) sample included 55% H, 33% AA, and 10% Caucasian women; 2% of women identified with other racial groups. AA and H pts made up 88% of our HER2-positive pts. Of the total pts, 55% ($n=20$) met criteria to receive neoadjuvant chemotherapy (NAC), which included trastuzumab (Herceptin) alone or with pertuzumab (Perjeta).

**Results**

In our study, we noted that all NAC pts had an overall complete response rate (CRR) of 48% and a partial response rate (PRR) of 52%. H pts had a 55% PRR and a 45% CRR while AA pts had a 71% PRR and a 29% CRR. H pts were found to have significantly more sentinel lymph node dissections (88%) performed vs axillary lymph node dissections (16%) following NAC, suggesting improved axillary response. AA women were found to have a greater reduction in breast tumor size, which led to 71% partial mastectomies compared with 29% modified radical mastectomies.

**Conclusions**

NAC therapy has become the standard of care for those
with HER2-positive disease. Most studies using NAC have noted responses in predominantly White women. Very few studies have delineated responses in H and AA women. Here we see a possible benefit of NAC in improving axillary disease in H women and breast disease in AA women. This is an interesting phenomenon, and a larger sample size from a multi-institutional trial that focuses on this population could confirm these findings. We should further characterize response in minority populations so we can improve treatment strategies, reduce breast cancer mortality, and ultimately improve their health outcomes.

42 The United States Retrospective Claims Database Analysis of Demographic, Clinical, and Treatment Characteristics of Metastatic Breast Cancer Patients receiving Olaparib

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Background
Olaparib (Lynparza) is a PARP inhibitor approved for treatment in patients with germline BRCA (gBRCA)-mutated, HER2-negative metastatic breast cancer (mBC), since January 2018 in the US. Currently, real-world evidence for demographic, clinical, and treatment characteristics of patients with mBC receiving olaparib is limited.

Materials and methods
This retrospective US claims database analysis using the MarketScan Commercial Claims and Encounters database included patients with mBC receiving olaparib from January 1, 2015 to September 30, 2019. Demographic and clinical characteristics, including hormone receptor (HR) status (HR+ vs non–HR+), were described for the entire study population. Treatment history was described for patients with incident mBC overall and according to HR+ status.

Results
A total of 125 patients with mBC (HR+, n = 64; non–HR+, n = 61) receiving olaparib were identified. Mean age at time of olaparib administration was 52 years (SD, 11.53 years). Patients had a mean (SD) of 2 (1.14) secondary metastatic sites, the majority of which showed bone metastasis (57%). Mean (SD) Charlson Comorbidity Index calculated during the 12-month period before olaparib administration was 792 (2.09). A steady increase in olaparib uptake was observed over the study period (16 in 2017, 63 in 2018; 46 up through 9 of 30 in 2019). Among patients with incident mBC (N = 98), 16%, 24%, 26%, and 44% patients received olaparib at first- (1L), second- (2L), third- (3L), and fourth- or greater (4L+) lines, respectively, with the majority (80%) receiving it as monotherapy (HR+ = 78%; non–HR+ = 91%). Most patients with incident HR+ disease (N = 54) received olaparib at a later line (3L = 22%; 4L+ = 63%), whereas most patients with incident non–HR+ disease (N = 44) received olaparib at initial lines (1L = 23%; 2L = 34%). Of the 16 patients with incident mBC on 1L olaparib, 9 received subsequent lines of therapies. Of the patients receiving olaparib as 2L therapy, all patients with HR+ disease (N = 9) received hormonal therapy as monotherapy (N = 5) or in combination with chemotherapeutic/CDK4/6 inhibitors (N = 4) at 1L, whereas patients with non–HR+ disease (N = 15) mostly received platinum/paclitaxel-based therapy (N = 10) at 1L.

Conclusion
This study provides descriptive information on clinical, demographic, and treatment patterns of olaparib use in real-world settings since its approval. The results show that olaparib was mostly administered as monotherapy and was received mostly at later lines by patients with HR+ disease and earlier lines by patients with non–HR+ disease. Further examination of real-world effectiveness of olaparib in mBC is needed.
**43** Lobular Cancer Responsiveness to Chemotherapy Is Equivalent to That of Ductal Cancer With Similar Genomic Profiles: An NCDB Analysis

Roi Weiser, MD1; Efstatia Polychronopoulou, PhD, MPH2; Sandra S. Hatch, MD2,3; Yong-fang Kuo, PhD2; V. Suzanne Klimberg, MD, PhD, MSHC2,3

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3The University of Texas MD Anderson Cancer Center, Houston, TX.

**Background**

Invasive lobular carcinoma (ILC) is traditionally considered less responsive to chemotherapy. While Oncotype recurrence score (RS) has been validated to identify high-risk patients who benefit from chemotherapy, some studies have questioned its relevance in patients with ILC. We sought to better characterize the potential use of RS in patients with ILC.

**Materials and Methods:**

The National Cancer Database (NCDB) was used to identify 3505 women with stage I to III, T1-T3, N1, hormone receptor–positive, HER2-negative ILC between 2010 and 2016, with an available RS. A similar cohort of 20,928 patients with invasive ductal carcinoma (IDC) was identified for comparison. Univariate analyses were used to identify variables correlating with chemotherapy use and 5-year survival. The Kaplan-Meier method was used to calculate 5-year survival. Subgroup analysis according to RS was performed.

**Results**

The mean age of ILC and IDC patients was 60.9 (±10.4) and 59.5 (±11.0) years, respectively. Patients with ILC had larger tumors, lower-grade disease, and a greater quantity of involved lymph nodes, and they received more mastectomies compared with patients with IDC. Fewer patients with ILC received chemotherapy compared with those with IDC (28.5% vs 34.9%; P < .0001). Patients with ILC had a lower mean (SD) RS (15.3 [±6.7] vs 17.1 [±10.1]; P < .0001), as well as a lower percentage of patients with high RS, defined as >25 (5.9% vs 14.7%; P < .0001). Among patients with high RS with ILC, 66.7% received chemotherapy compared with 79.4% of similar patients with IDC. A statistically significant absolute 5-year survival advantage was found in association with chemotherapy use in high-RS patients with ILC (11.8%), comparable with that in similar patients with IDC (16.2%). Intermediate-RS patients (RS, 12-25) with ILC and IDC demonstrated a more modest, but still statistically significant, survival advantage with chemotherapy: 4.9% and 3.0%, respectively (Table).

**Conclusions**

Patients with high-RS ILC are treated less often with chemotherapy compared with similar patients with IDC. Nevertheless, our data show an association between survival benefit and chemotherapy use in patients with high-RS ILC, and even intermediate-RS ILC. Such benefit should be taken into account when considering adjuvant chemotherapy in these patients.

<table>
<thead>
<tr>
<th>TABLE. Five-Year Survival (%) by Chemotherapy Use, Histology, and RS</th>
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<tr>
<td>&lt;11</td>
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<tr>
<td>11-25</td>
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<tr>
<td>&gt;25</td>
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</table>

“National cancer database analysis indicates that while invasive lobular carcinoma is less frequently found to be high risk by the 21-gene recurrence score than invasive ductal carcinoma, fewer patients in that category receive chemotherapy in spite of the survival advantage imparted by use of chemotherapy. These data support the use of the recurrence score to select patients with lobular cancer for chemotherapy.” –Sara Hurvitz, MD
44 Drivers of Oncologist Treatment Selection in HR+/HER2-Metastatic Breast Cancer

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1Kantar, New York, NY
2Pfizer Inc, New York, NY

**Background**

Cyclin-dependent kinase 4/6 inhibitors (CDK4/6i) in combination with endocrine therapy (ET) are a recommended standard of care for many first-line (1L) hormone receptor–positive, HER2-negative (HR+/HER2-) advanced/metastatic breast cancers (mBC). Yet, substantial use of 1L ET monotherapy and chemotherapy (CT) regimens have been observed. This study sought to understand United States (US) physician perspectives on clinical, economic, and institutional factors that inform 1L mBC regimen selection.

**Methods**

We recruited 23 US oncologists treating patients with HR+/HER2- mBC for 45-minute, qualitative, one-on-one telephone interviews. Physicians were selected based on self-reported 1L patient volume and prescribing behaviors. Self-reported 1L prescribing behavior was used to sort physicians into 1 of 3 cohorts: “high CDK4/6i cohort,” “high ET-monotherapy cohort,” or “high CT cohort.” Physicians were not aware of their cohort, and all interviews were conducted based on the same discussion guide. Discussions were coded and analyzed using a thematic approach with the MAXQDA (v12.0) software.

**Results**

All cohorts reported high use of 1L CDK4/6i plus ET regimens and ranked clinical data as the primary driver of regimen selection. However, each cohort identified unique treatment-level, patient-level, and nonclinical factors that influenced 1L regimen choice. The high CDK4/6i cohort (n = 5) considered CDK4/6i plus ET regimens to be appropriate for nearly all 1L patients, seldom relying on nonclinical factors to guide treatment. The high ET-monotherapy cohort (n = 10) valued a perceived balance of efficacy and tolerability achieved with ET-monotherapy regimens, particularly for elderly patients. This cohort reported their patients faced affordability challenges with CDK4/6i, describing greater difficulties resolving cost issues. High CT prescribers (n = 8) valued a perceived fast response and high compliance rate with CT. High CT prescribers also indicated patient comorbidities influenced regimen selection.

**Conclusions**

All cohorts recognized CDK4/6i plus ET regimens as the preferred standard of care for most patients, but perceptions of the appropriateness of 1L regimens varied across cohorts. Continued demonstration of CDK4/6i plus ET safety and effectiveness across broader patient populations in real-world settings may provide the additional evidence needed to support appropriate 1L treatment selection.

45 Neoadjuvant Chemotherapy Use in Elderly Patients

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1Mayo Clinic Alix School of Medicine, Scottsdale, AZ.
2Department of Health Sciences Research, Mayo Clinic, Scottsdale, AZ.
3Department of Surgery, Mayo Clinic, Phoenix, AZ.

“[This abstract was an] important analysis of older patients treated with neoadjuvant therapy and trends over time. Comparisons to other ages would have been instructive as would have been complete pathological response rates and other outcomes such as adverse events or surgical healing, etc.”

-Debu Tripathy, MD

**ONC0421_Miami Breast_MBCC_Supplement.indd 24**

4/13/21 3:19 PM
Background
Neoadjuvant chemotherapy (NAC) is the standard of care for locally advanced breast cancer and has been shown to be most effective in the treatment of triple-negative breast cancer (TNBC) and HER2-positive breast cancer. This study characterizes the use of neoadjuvant chemotherapy in elderly patients 65 years (y) and older with early-stage breast cancer from 2005 to 2020.

Materials and Methods
Elderly patients (65 y and older) with TNBC or HER2-positive breast cancer from 2005 to 2020 at a single institution were reviewed. Univariate and multivariate analysis evaluated rates and predictive factors of neoadjuvant chemotherapy treatment use.

Results
Among the 215 patients, approximately a quarter (58; 30.0%) received NAC. The mean age of those who received NAC was significantly lower (70.6 y) than of those who received only adjuvant chemotherapy (72.1 y) or no chemotherapy (76.7 y; \( P < .001 \)). Those treated with NAC had a significantly larger tumor size (4.3 cm; \( P < .001 \)) and a higher proportion of locally advanced and advanced stage disease (86.3%; \( P < .001 \)) than those who received only adjuvant or no chemotherapy. From 2005 through 2020, the proportion of elderly patients receiving neoadjuvant chemotherapy significantly increased, from only 6% receiving NAC in 2005 through 2010, to 50.7% of patients in 2016 through 2020 (Table; \( P < .0001 \)). This increase was independent of patient age and tumor stage (odds ratio [OR], 11.1; 95% CI, 3.1-39.4; \( P < .001 \) for 2011-2015 vs 2005-2010, and OR, 27.7; 95% CI, 8.1-95.3; \( P < .001 \) for 2016-2020 vs 2005-2010 reference group). Changes in the chemotherapeutic agents used also occurred over this period, with a significant decrease in the usage of anthracycline from 2005 through 2010 (18.6%) compared with 2016 through 2020 (0.0%; \( P < .0001 \)). There was no significant difference in hospitalization or chemotherapy dose reduction rates in patients receiving NAC compared with those who received only adjuvant chemotherapy.

Conclusions
NAC is becoming more widely used in elderly patients with HER2-positive and triple-negative tumors, independent of age and tumor stage, with no increased risk of chemotherapy complications.

<table>
<thead>
<tr>
<th>Surgery year group, n (%)</th>
<th>Neoadjuvant chemotherapy (N=58)</th>
<th>Adjuvant chemotherapy only (N=67)</th>
<th>No chemotherapy (N=90)</th>
<th>Total (N = 215)</th>
<th>P</th>
</tr>
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<tbody>
<tr>
<td>2005-2010</td>
<td>5 (6.0%)</td>
<td>38 (46.4%)</td>
<td>40 (47.6%)</td>
<td>83 (100%)</td>
<td>&lt;.0001*</td>
</tr>
<tr>
<td>2011-2015</td>
<td>18 (27.4%)</td>
<td>14 (22.6%)</td>
<td>31 (49.2%)</td>
<td>63 (100%)</td>
<td></td>
</tr>
<tr>
<td>2016-2020</td>
<td>35 (50.7%)</td>
<td>15 (31.2%)</td>
<td>19 (41.9%)</td>
<td>69 (100%)</td>
<td></td>
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A Phase 2 Exploratory Study of Intravenous Cetirizine Versus Intravenous Diphenhydramine in the Prevention of Hypersensitivity Infusion Reactions in Patients With Breast Cancer and Other Malignancies

Jarrod P. Holmes, MD, FACP; Constantin A. Dosanu, MD, PhD; Julio Peguero, MD; Ahmed Ayad, MD; R. Campbell Garland, DO; Anne O’Shea, MD; G. Travis Clifton, MD; George Peoples, MD, FACS; Stacia Young, PharmD, BCOP, MBA; Teresa Yang, BSN, MBA; Janine North, BS; Nancy Joseph-Ridge, MD
Background
Antihistamine pretreatment for drug-induced hypersensitivity infusion reactions (IRs) is recommended with certain breast cancer treatments, including paclitaxel. The only second-generation intravenous (IV) antihistamine currently available is IV cetirizine. Intravenous cetirizine was shown to treat acute urticaria comparably to IV diphenhydramine, with fewer adverse effects (AEs), and may be effective for pretreatment of IRs.

Materials and Methods
This randomized, double-blind, phase 2 study evaluated pretreatment with single-dose IV cetirizine 10 mg versus IV diphenhydramine 50 mg in 34 patients receiving paclitaxel, rituximab (Rituxan), its biosimilar, or obinutuzumab (Gazyva). The primary objective of the study was to compare the incidence of IRs after pretreatment with the 2 medications. The key secondary end point was sedation score due to IV antihistamines. The study also evaluated the need for rescue medication and the time to readiness for discharge. During and following infusion, IR symptoms, such as flushing, urticaria, and dyspnea, were assessed. Sedation was measured by health care providers on a scale of 0 to 4 (where 0 = no sedation and 4 = extreme sedation). Due to the exploratory nature of the study, no formal statistical analyses were planned.

Results
Adult patients primarily with hematologic and solid tumor malignancies, including breast cancer, were enrolled between March 26, 2020 and November 23, 2020. The median age was 65 years for the IV cetirizine group and 67 years for the IV diphenhydramine group. The number of patients who experienced an IR was 2 out of 17 (11.8%) with IV cetirizine versus 4 out of 17 (23.5%) with IV diphenhydramine. Mean sedation scores (standard deviation [SD]) in the IV cetirizine group were 0.47 (0.80), 0.63 (0.89), and 0.18 (0.39), compared with 1.00 (1.46), 0.35 (1.00) in the IV diphenhydramine group at 1 hour, 2 hours, and discharge, respectively. Results were similar with patient-rated sedation scores. Mean time for readiness for discharge was 25 minutes shorter with IV cetirizine versus IV diphenhydramine. There were fewer treatment-related AEs with IV cetirizine (1 event) than with IV diphenhydramine (3 events).

Conclusion
This was the first prospective, randomized, controlled trial evaluating IV antihistamine pretreatment for the prevention of IRs. The results of this study demonstrated that IV cetirizine was as effective as IV diphenhydramine for the prevention of IRs due to paclitaxel or an anti-CD20 agent, with less sedation and fewer treatment-related AEs.

References:
A Prospective, Double-Blinded, Randomized Controlled Trial Comparing the Intraoperative Injection of Technetium Tc 99m Tilmanocept With Technetium Tc 99m Sulfur Colloid in Breast Cancer Lymphatic Mapping

Anyul Ferez-Pinzon, MD1; Samuel Corey, MD1; Haresh Rochani, DrPh, MPH, MBBS2; Elena Rehl, MD3; William Burak, MD1

1Memorial Health University Medical Center, Savannah, GA. 2Georgia Southern University, Statesboro, GA. 3Good Samaritan Medical Center, West Palm Beach, FL.

Background
Technetium-labeled sulfur colloid (TSC) is the radiolabeled agent most commonly used for sentinel lymph node (SLN) biopsy. Tilmanocept (Lymphoseek; Navidea), a CD-206 receptor-targeted mapping agent, has also gained popularity due to potential advantages of rapid and tight binding to the SLNs. These attributes may be beneficial when using an intraoperative injection protocol. The performance of these 2 mapping agents was compared in this setting. Study objectives were to assess (1) the difference in the number of SLNs harvested and (2) the difference in time to transcutaneous SLN localization.

Materials and Methods
Patients undergoing breast conservation and SLN biopsy were consented then randomized to receive the same volume of either 0.5 mCi of filtered TSC or 0.5 mCi of tilmanocept injected intradermally after induction of general anesthesia. Axillary transcutaneous γ-detector probe counts were taken at 1-minute intervals until a hot spot was identified. Nodes were excised if their counts per second (cps) were greater than 10% of the cps of the hottest SLN. The number of SLNs was based both on the number of nodes collected intraoperatively and the number recorded in the final pathology report.

Results
The study population consisted of 86 patients, 48 randomized to tilmanocept and 38 to TSC. There were no significant differences in patient or tumor characteristics between the 2 groups. Localization rates were 100% for both cohorts. The mean numbers of SLNs identified and removed were not significantly different (Table). The mean (SD) time to transcutaneous localization was 3.3 (±2.0) minutes for tilmanocept and 3.9 (±2.3) minutes for TSC (P = .19). The average (SD) cps for the hottest node was 2180 (±2461) in the tilmanocept group compared with 2679 (±2687) in the TSC group (P = .94).

Conclusions
There were no significant differences in the number of SLNs harvested or in the time to transcutaneous localization between tilmanocept and TSC when using an intraoperative injection protocol. Either agent can be used without any significant difference in performance.

<table>
<thead>
<tr>
<th>TABLE. Number of SLNs Identified</th>
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<tbody>
<tr>
<td>Arm</td>
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<tr>
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<td>Mean (SD)</td>
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SLN, sentinel lymph node; TSC, technetium-labeled sulfur colloid.
**9 Comparison of Immediate Breast Reconstruction Outcomes in Patients With and Without Prior Breast Cosmetic Surgical Procedures**

Caroline Fiser, MD; Sophia Liu, MD; Neha Goel, MD; Joshua Kronenfeld, MD; Wrood Kassira, MD; John Oeltjen, MD; Susan Kesmodel, MD

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2DeWitt Daughtry Family Department of Surgery, Division of Surgical Oncology, University of Miami School of Medicine, Miami, FL
3DeWitt Daughtry Family Department of Surgery, Division of Plastic and Reconstructive Surgery, University of Miami School of Medicine, Miami, FL

**Background**

The use of skin-sparing mastectomy (SSM) and nipple-sparing mastectomy (NSM) with immediate breast reconstruction (IBR) has increased considerably. There is limited information on the complications of IBR in patients with prior breast cosmetic surgical procedures. We compare IBR outcomes in patients undergoing SSM/NSM with and without prior breast cosmetic surgery.

**Methods**

Patients undergoing mastectomy from January 1, 2017 to December 31, 2019 were selected. Patient characteristics, surgical approach, and complication rates were compared between mastectomy and IBR cases on breasts with and without prior breast cosmetic surgery. Binary logistic regression analysis was performed to identify factors associated with complications and reconstruction loss.

**Results**

A total of 956 mastectomies were performed in 697 patients, with IBR performed for 546 mastectomies in 352 patients. There were 189 patients who had bilateral mastectomy, 158 had unilateral mastectomy, and 5 had 2 unilateral mastectomies at different times (10 total mastectomies). The median age was 51 years (range, 19-83 years); 45.7% of patients were younger than 50 years; 28.9% received neoadjuvant systemic therapy; and 62.6% of mastectomies were performed for breast cancer. There were 95 mastectomies (17.4%) performed on breasts with prior cosmetic surgical procedures and 451 (82.6%) without. The NSM procedures were more commonly performed for breasts with prior cosmetic surgery ($P < .001$).

Complications occurred after 75 mastectomies (13.7%) and reconstruction loss in 31 (5.7%). On multivariable analysis, NSM (HR, 2.16; 95% CI, 1.19-3.94) was associated with an increased risk of any complication, while NSM (HR, 2.70; 95% CI, 1.13-6.43) and direct to implant reconstruction (HR, 2.62; 95% CI, 1.14-6.02) were associated with reconstruction loss. Prior breast cosmetic surgical procedures were not associated with an increased risk of complications (HR, 1.05; 95% CI, 0.53-2.06) or reconstruction loss (HR, 1.24; 95% CI, 0.48-3.17).

**Conclusion**

In this analysis of mastectomy and IBR, prior breast cosmetic surgical procedures were not associated with an increased risk of complications or reconstruction loss. In patients with prior breast cosmetic surgical procedures undergoing mastectomy, IBR may be safely performed.

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**11 Do Breast Surgeons Play an Important Role in a Clinic for Benign Breast Disease?**

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1Northern Hospital, Melbourne, Australia.

“Benign breast disease” is an umbrella term encompassing all breast symptoms, imaging, and pathology that are unrelated to breast cancer. Breast symptoms that lead patients to present to health care services include breast tenderness, mastalgia, self-detected lumps, nipple discharge, and skin changes. Most women will experience benign breast disease at some point in their lives. The majority of breast-related presentations to primary care and breast clinics are ultimately diagnosed as benign.
breast disease, rather than breast cancer.\textsuperscript{1,4} It is inefficient and expensive for surgeons to deliver breast care in nonoperative, benign patients,\textsuperscript{3} and it negatively affects available time and resources for patients with cancer.

Benign breast disease can often be managed by general practitioners (GPs). One study determined that 47% of patients referred to a breast clinic did not need surgical management and could have been managed by a GP.\textsuperscript{6} Several guidelines have been developed for the primary care management of benign breast disease, which contain helpful algorithms for the management of various breast presentations to aid GPs in the diagnosis and management of benign breast disease.\textsuperscript{7} However, a retrospective review of GP referrals to a breast clinic found that 29% of patients with benign breast disease would not have been referred to a breast surgeon if the GP had followed the relevant guidelines.\textsuperscript{6} GPs report reluctance to use the guidelines, believing that there is a lack of consideration for patient anxiety and psychosocial factors in referral criteria.\textsuperscript{9}

Patients referred to breast clinics often do not require specialist input from breast surgeons, with only 16% requiring admission for surgery\textsuperscript{10} and only 9% receiving a diagnosis of cancer.\textsuperscript{4} This study aimed to determine the role of surgeons in the outpatient management of benign breast disease, with a view to developing an optimized triage pathway to reduce the burden of these patients on the clinic.

Materials and Methods
A retrospective audit was conducted of female patients without known cancer referred from GPs to the clinic from January 1, 2016, through June 30, 2020. The Northern Hospital is a secondary health service in Epping, a district in north Melbourne. The breast clinic is staffed by 6 specialist breast surgeons, as well as a surgical fellow, registrar, and 2 surgical interns. Patients were included in the study if they were new referrals to the breast clinic from GPs. Patients were excluded from the study if they were male, had a past history of or current known breast cancer, were referred internally, were being treated for skin lesions of the breast (ie, sebaceous or epidermoid cysts), or were being treated in another breast clinic.

Data were collected from electronic and scanned medical records; they included patient demographics, reported family history of breast cancer, reasons for referral, and management in the outpatient setting. A descriptive analysis of categorical and continuous data was conducted (SPSS; IBM).

Results
The study included 300 patients, representing 73% of the total number of referrals. Twelve percent of patients were excluded due to past or current breast cancer.

The most common reasons for referral were abnormal imaging findings (78%), breast lump (63%), and mastalgia (51%). Forty-nine percent of patients had an abnormal clinical breast examination at the first appointment. Eighty-five percent of patients required a follow-up appointment.

In terms of further imaging completed, 69% of patients had an ultrasound and 24% of patients had a mammogram. Forty-four percent of patients underwent biopsy. Ten percent of patients were admitted for surgery. Patients waited a median of 52 days for their first appointment from date of referral, a median of 39 days from first appointment to diagnostic biopsy, and a median of 101 days from first appointment to surgery.

 Patients who were referred because of mastalgia were less likely to have an abnormal clinical breast examination ($P = .014$) than those who were referred because of a condition other than mastalgia. Patients who were referred because of a lump were more likely to undergo core needle biopsy ($P = .015$) than those who were referred because of a condition other than a lump. Patients who were referred because of mastalgia were 2.9 times (1.2-6.7) less likely to undergo surgery ($P = .016$). Patients who had examinations by the surgeon that revealed abnormalities were 3.5 times (1.5-8.7) more likely to undergo surgery ($P = .005$).

Conclusions
A large proportion of the workload at The Northern Hospital Breast Clinic was patients with benign disease. These patients experience long wait times before being seen in the clinic and are often booked for follow-up appointments after the first consultation. We found that only 44% of patients underwent a biopsy, which is low considering that 63% of patients were referred for a lump and 78% were referred for abnormal imaging. Only 10% of the cohort underwent surgery. As expected, abnormal clinical breast examination at the first appointment was predictive of the need for surgery. Patients with mastalgia were significantly less likely to have an abnormal clinical breast examination and significantly less likely to undergo surgery.

Surgeons are needed for the management of some patients with benign breast disease but the triage pathway could be optimized. We propose that patients are seen by specialist breast surgeons at their first
appointment to undergo a clinical breast examination. Patients with a normal examination can be seen by breast care nurses or breast physicians for any subsequent follow-up management. This would free surgeons to more quickly see patients requiring their expertise and ongoing care, such as patients with an abnormal clinical breast examination and patients with breast cancer. Future studies are required to determine the feasibility, acceptability, and efficiency of this new model of care.

References:
5. Blackmore et al. 2014

12 Caseload of Rural General Surgeons: A Focus on Breast Surgery

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Background
The delivery of surgical services in rural and regional areas remains a challenge with the increasing trend toward urban centralization of surgical specialities. In Australia, much like in the United States, significant barriers remain to access to health care for patients who reside in rural areas and require breast surgery. While up to 33% of Australians live in rural or regional areas, only 14.8% of surgeons work in these areas. Data regarding the caseload distribution of general surgeons working in a regional setting in Australia and who perform breast surgery remain scarce. In order to better examine the challenges faced by rural general surgeons, this study aims to examine the breast surgery caseload of general surgeons working in regional Australia.

Materials and Methods
A retrospective review of surgical procedures carried out by general surgeons at Albury Base Hospital between January 2007 and December 2014 was undertaken. Surgical procedures were grouped according to the classifications of the Royal Australasian College of Surgeons Morbidity and Audit Logbook Tool and were subsequently analysed.

Results
During the study period, 13,415 surgical procedures were carried out by 9 general surgeons. Of these, 543 (4.05%) were breast surgery cases. There were 99 mastectomies, 214 wide local excisions, 35 re-excisions, and 62 axillary dissections performed during the study period, as well as 111 minor breast surgeries. Simple mastectomies far outnumbered subcutaneous mastectomies (95 vs 4;
All general surgeons performed operations in surgical specialties outside of general surgery, including cardiothoracic, orthopaedic, otolaryngologic, neurosurgical, vascular, and urological procedures. Albury Base Hospital holds monthly multidisciplinary meetings for breast, colorectal, and endocrine surgery disciplines.

Conclusions
This study adds weight to the value of a broad skill set in the provision of surgical services in a rural setting, with breast surgery representing a relatively small proportion of the caseload of rural general surgeons. Patients were more likely to undergo simple mastectomy than subcutaneous mastectomy with reconstruction. Access to a multidisciplinary meeting remains crucial in the provision of breast surgery services in a rural setting.

17 TiP The Treatment of Breast Cancer With Percutaneous Thermal Ablation: A Phase 2 Screening Trial
Elles van de Voort, MSc
Franciscus Gasthuis & Vlietland Hospital, Rotterdam, the Netherlands.

Background
Breast cancer is the most common type of cancer among women worldwide. Almost half of the tumors measure ≤ 2 cm. Patients with such tumors have an excellent prognosis with current surgical therapy, with a 5-year survival rate of 98% to 99%. Percutaneous thermal ablation has the potential to replace surgical treatment and improve the health-related quality of life of these patients. Radiofrequency ablation (RFA), microwave ablation (MWA), and cryoablation are especially promising techniques as alternatives to surgical resection, without jeopardizing current treatment effectiveness or safety. Success rates of RFA, MWA, and cryoablation are 82% to 87%, 83% to 90% and 74% to 75%, respectively. Due to great heterogeneity among studies and a large variation in complete ablation rates, a formal recommendation on the best technique for a phase 3 study is not possible based on current literature. Additionally, too little is known about patient satisfaction and cosmetic outcome, immune response after thermal ablation, follow-up imaging, long-term benefits, and complications.

Therefore, the objective of this study is to determine the efficacy rate in terms of complete ablation for the most promising method of thermal ablation—RFA, MWA, or cryoablation—for patients with early-stage breast cancer to warrant its inclusion in a randomized phase 3 trial comparing thermal ablation with surgery.

Methods
This is an open-label, randomized phase 2 screening trial. Postmenopausal women diagnosed with unilateral invasive cT1N0M0 breast cancer with a DCIS component ≤ 25% of the total tumor will be included. These patients will be randomized to RFA, MWA, or cryoablation. To evaluate whether the tumor was completely ablated, surgical resection will be performed 3 months after thermal ablation. The primary end point is the percentage of tumors with complete ablation at pathologic evaluation with a staining. Secondary end points are feasibility in an outpatient setting, degree of immune response, adverse events, patient satisfaction, cosmetic outcome, and the predictive value of MRI.

Trial Status
The trial has been approved by the ethical review board and is currently open to enrollment.
18 The Impact on Management and Outcomes of Benign and High-Risk Breast Lesions After the Introduction of Vacuum-Assisted Excision

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Background
The aim of this study is to describe the impact of introducing vacuum-assisted excision (VAE) as a treatment for benign and high-risk lesions on the management and outcomes of these lesions.

Methods
This was a single-center, retrospective cohort study with 2 groups. Included were all women (≥ 16 years) treated for a benign or high-risk lesion. VAE was introduced as a treatment for these lesions in July 2017. The "before" group (BG) included all surgically excised (SE) lesions from January 2016 through June 2017. The "after" group (AG) included all lesions excised utilizing SE or VAE from July 2017 through December 2019. VAE was contraindicated when the tumor was located in proximity to the skin or nipple. Relative contraindications were poor visibility on ultrasound, tumor size > 5 cm, and mobility of the lesion. To evaluate the impact of the introduction of VAE, the proportion of excised lesions and the rates of incomplete excision, recurrence, re-excision, and complications were compared between the 2 groups.

Results
Included were 330 excised lesions in 282 patients. The proportion of excised lesions of all biopsies was higher in the AG (227/1258; 18%) than the BG (103/765; 13%) (P = .007). However, the absolute number of surgical excisions in the operating room decreased after introduction of VAE (65 vs 45 per year, for the BG and AG, respectively).

Incomplete excision occurred significantly more in the BG (n = 18; 19%), compared with the AG (n = 15; 7.1%; P = .002), but the number of recurrent lesions was comparable in both groups (BG, 2.9% at a median follow-up of 46 months, vs AG, 0.9% at a median follow-up of 23 months; P = .162). Nine re-excisions were performed, which were evenly distributed over the BG and AG (3.9% vs 2.2%, respectively; P = .385). The proportion of complications was comparable in the BG and AG (4/89 [4.5%] vs 13/205 [6.3%], respectively; P = .805).

Discussion
The introduction of VAE led to an absolute decrease of benign excisions in the operating room, leaving more time for patients with malignant disease. Although no margin assessment was possible at histologic evaluation after VAE, this did not lead to an increased recurrence rate. With the current shift toward treatment of a less-invasive nature, and ongoing studies on reducing overtreatment of lesions with a low risk of developing into carcinoma, we expect that even more lesions can be excised with VAE in the future.


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1Memorial Healthcare System, Hollywood, FL

Background
Textbook oncologic outcome (TOO) is a composite outcome measure attained when all desired short-term quality metrics are met, following an oncologic operation. The objective of this study was to determine
the incidence of TOO and its impact on overall survival (OS) among patients with a diagnosis of invasive ductal carcinoma (IDC) following modified radical mastectomy (MRM).

**Design and Methods**

The 2004 to 2017 National Cancer Database was queried for patients with nonmetastatic IDC who underwent MRM. The TOO was defined as having attained 5 metrics: resection with negative microscopic margins; American Joint Committee on Cancer compliant lymph node evaluation (n ≥ 10); no prolonged length of stay (50th percentile by year); no 30-day readmission; and no 30-day mortality. Categorical variables were analyzed using Pearson's χ² test or Fisher's exact test where appropriate. Continuous variables were analyzed using independent t-tests. The OS was defined as the time in months between the date of diagnosis and date of death or last contact. The Kaplan-Meier method with log-rank test was used to compare and estimate OS rates between patients with TOO and patients without TOO (non-TOO).

**Results**

A total of 75,063 patients were identified, of which 40.8% achieved TOO. The patients with TOO had a lower median age and were more likely to be White, privately insured, and without comorbidities. In terms of facility characteristics, patients with TOO were more likely to be seen in comprehensive community cancer programs with a high case volume per year. Patients with T2, N1, pathologic stage 2, poorly differentiated pathology, and estrogen receptor-positive, progesterone receptor-positive, HER2-negative hormone receptor status were also more likely to have achieved TOO. The TOO group had a higher lymph node yield (TOO, 17.0 ± 6.2 vs non-TOO, 10.6 ± 7.3; P = .000) and higher average number of positive lymph nodes (TOO, 4.1 ± 5.4 vs non-TOO, 2.7 ± 4.5; P = .000). The TOO group had a statistically significant higher median OS compared with the non-TOO group (165.6 vs 142.2 months; P = .000).

**Conclusions**

The TOO was achieved in approximately 41% of patients undergoing MRM for IDC. Achieving TOO is associated with improved median OS, and therefore, merits further attention in efforts to improve surgical outcomes.

### Radar Reflector Localization of Peripheral Nonpalpable Lesions During Skin-Sparing and Nipple-Sparing Mastectomy: A Novel Application Using the IDEAL Framework

**Background**

Skin-sparing mastectomy (SSM) and nipple-sparing mastectomy (NSM) utilize smaller incisions that may pose a challenge for the surgeon in an effort to completely extirpate the breast tissue, including peripherally located breast lesions, with clear margins. Positive margins following mastectomy are associated with increased rates of local recurrence and necessitate postmastectomy radiation therapy (PMRT). Utilization of radar reflectors to

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Tumor location</th>
<th>Tumor to nipple distance (cm)</th>
<th>Depth</th>
<th>Tumor size (mm)</th>
<th>Histology</th>
<th>Type of surgery</th>
<th>Margin status</th>
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<tr>
<td>44</td>
<td>4:30 (LOQ)</td>
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<td>NSM with implant reconstruction</td>
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<td>5</td>
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<td>10</td>
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<td>NSM with autologous reconstruction</td>
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<td>Posterior</td>
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<td>&gt;5 mm</td>
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<tr>
<td>53</td>
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<td>Anterior</td>
<td>6</td>
<td>IDC</td>
<td>SSM with implant reconstruction</td>
<td>&gt;5 mm</td>
</tr>
</tbody>
</table>

IDC, invasive ductal carcinoma; ILC, invasive lobular carcinoma; LIQ, lower inner quadrant; LOQ, lower outer quadrant; NSM, nipple-sparing mastectomy; SSM, skin-sparing mastectomy; UIQ, upper inner quadrant; UOQ, upper outer quadrant.
As early detection has progressed, the potential for missed peripheral lesions has increased. This challenge is amplified in the case of NSM. Along with ultrasound guidance, the technique described in this series is a common sense solution for these potentially fraught cases.”

- Pat W. Whitworth

localize nonpalpable lesions during partial mastectomy is well documented. However, this technique has not been applied to patients undergoing SSM or NSM. This IDEAL stage 1 study is intended to evaluate the feasibility and effectiveness of reflector radar localization during SSM and NSM.

**Materials and Methods**

Our institutional review board–approved breast cancer database was queried for patients who underwent preoperative placement of a radar reflector prior to undergoing mastectomy between October 2016 and September 2020. In accordance with the IDEAL Framework for Stage 1 studies, we sought to evaluate proof of concept and technical achievement.

**Results**

Five patients were identified who underwent preoperative placement of a radar reflector; 3 patients underwent NSM while 2 patients underwent SSM. Clinopathologic data are displayed in the Table. In all 5 patients, localized lesions were nonpalpable and located peripherally. Radar reflectors were successfully removed in all patients. There were no adverse events. Final margins were greater than 5 mm in 4 patients. In 1 patient, there was a focally positive margin for ductal carcinoma in situ at a site separate from the radar localized index lesion. No patient required PMRT.

**Conclusions**

Placement of a radar reflector into peripheral nonpalpable lesions prior to SSM and NSM appears to be a safe and technically feasible procedure that helps ensure complete excision. To the best of our knowledge, this is the first application of this technique during SSM and NSM. Further evaluation should proceed with larger sample sizes in an IDEAL stage 2a study.

**40 Objective Comparison of Postoperative Activity After Sentinel Lymph Node Biopsy vs Axillary Node Clearance Using Wearable Activity Monitors**

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**Background**

Anecdotal evidence shows that patients who have axillary node clearance (ANC) are more likely to experience shoulder morbidities such as reduced range of motion, pain, and lymphedema compared with those who undergo sentinel lymph node biopsy (SLNB). However, the evidence is largely subjective and based on patient surveys. Wearable activity monitors (WAMs) are increasingly used in oncology trials to monitor patients’ daily activities. We aimed to use WAMs in order to capture a more reliable and objective measure of physical function; this could help define the recovery process across different treatments, specifically looking at the impact of ANC vs SLNB on patient recovery.

**Materials and Methods**

A single-center, prospective, observational study was conducted involving 41 patients. Consecutive patients undergoing breast and axillary surgery were identified from theater lists. Patients with movement disorders (eg, Parkinson disease), those using mobility devices or aids, and those who were unable to provide informed consent were excluded from the study. Eligible consented patients wore WAMs (triaxial accelerometer [AX3]; Axivity, UK) on both wrists at least 1 day pre- and up to 2 weeks postoperatively, and completed Disability of the Arm, Shoulder and Hand (DASH) and quality-of-life (EQ-5D) questionnaires. Analysis was focused on patients who had SLNB and ANC. Statistical analysis was performed to determine the recovery plateau and differences in activity between arms (operated vs control) and surgeries.

**Results**

Regain of function was seen through the increase of
activity during the postoperative period, with the greatest increase between day 1 (mean, 41.5+/–19.6; \( P < .05 \)) and 2 (mean, 51.5+/–22.1; \( P < .05 \)), with recovery plateau at day 5. Greater activity was observed in the control arm compared with the operated arm, with a significant difference (\( P < .05 \)) in week 1. Greater reduction of activity from preoperative level was observed in ANC patients compared with SLNB cohort throughout the 2-week period, with significant differences of 14.5% (\( P < .05 \)) in week 1 and 18.8% in week 2 (\( P < .005 \)). Moderate negative correlation was found between the postoperative activity levels and postoperative DASH questionnaires (Spearman \( \rho = -0.512; P < .05 \)).

**Conclusions**

ANC patients took longer to reach preoperative activity levels compared with SLNB patients, in concordance with anecdotal evidence in the literature. Monitoring recovery objectively after breast cancer treatment may help patients and clinicians to choose the best option, particularly where oncological outcomes are equivocal. This information can also be used to ensure optimization of patient outcomes by encouraging physical activity and keeping track of personalized activity goals, which could be integrated into the feedback-enabled and personalized prehabilitation and rehabilitation care plan.

### 41 Pathologic Complete Response (pCR) Rates According to MammaPrint and BluePrint Test Results Are Consistent Among Pre- and Postmenopausal Patients

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1Ascension Saint Thomas Hospital Midtown, Nashville, TN.

**Background**
Increased use of multigene expression profiling has enabled refinement of early-stage breast cancer management. Clinical trials have demonstrated that risk-of-recurrence testing identifies those patients with breast cancer who will derive benefit from adjuvant chemotherapy and those who can avoid it without affecting long-term clinical outcomes. Recent subanalyses of premenopausal patients suggest a significant clinical benefit to adjuvant chemotherapy in this patient group; however, it has yet to be demonstrated whether this is due to a direct cytotoxic effect or secondary ovarian suppression. Here, we report the first age-based analysis of the 70-gene (MammaPrint; MP) and 80-gene (BluePrint; BP) assays in the preoperative setting.

**Materials and Methods**
The prospective NBRST trial (NCT0147910) evaluated the utility of MP and BP in the preoperative treatment setting. From 2011 to 2014, the study enrolled 1072 patients from 67 institutions and included women with invasive breast cancer of any pathology-defined subtype, regardless of hormone or HER2 receptor status. Patients received neoadjuvant chemotherapy or neoadjuvant endocrine therapy, according to National Comprehensive Cancer Network guideline recommendations. Median follow-up for distant metastasis-free survival was 5.0 years.

**Results**
In the study, 41.8% of patients were 50 years or younger and

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<tr>
<td></td>
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<td>(&gt;50 \text{ yrs})</td>
<td>(P) value</td>
<td>(&lt;50 \text{ yrs})</td>
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<tr>
<td><strong>pCR</strong></td>
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<td>6 (5.4%)</td>
<td></td>
<td>13 (9.5%)</td>
</tr>
<tr>
<td><strong>No pCR</strong></td>
<td>58 (95.1%)</td>
<td>105 (94.6%)</td>
<td>(P = .89)</td>
<td>124 (90.5%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th><strong>HER2</strong></th>
<th></th>
<th><strong>Basal</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(&lt;50 \text{ yrs})</td>
<td>(&gt;50 \text{ yrs})</td>
<td>(P) value</td>
<td>(&lt;50 \text{ yrs})</td>
</tr>
<tr>
<td><strong>pCR</strong></td>
<td>50 (60.2%)</td>
<td>52 (57.1%)</td>
<td></td>
<td>64 (38.3%)</td>
</tr>
<tr>
<td><strong>No pCR</strong></td>
<td>33 (39.8%)</td>
<td>39 (42.9%)</td>
<td>(P = .68)</td>
<td>103 (61.7%)</td>
</tr>
</tbody>
</table>

pCR, pathologic complete response; yrs, age in years.
58.2% were aged >50 years. MP classified 16% of patients as low risk and 84% of patients as high risk. BP classified 49.2% of tumors as luminal, 16.2% as HER2 positive, and 34.6% as basal subtype. MP further stratified luminal tumors into A (32.6%) and B (67.4%) subtypes. MP classified 13.8% of patients <50 years and 18.1% of patients aged >50 years as low risk. Among the 4 molecular subtypes, there was no significant difference in pathologic complete response rate based on an age-50 cutoff (Table).

Conclusions
As expected, pCR rates varied according to molecular subtype. MP and BP accurately predicted pCR in patients with tumors of all subtypes, regardless of age, supporting their use to better tailor preoperative treatment and timing for surgery.

49 Registry Study of a Nonpalpable Verifiable Filament Marker of the Breast Tumor Bed
Sunny D. Mitchell, MD1; Brie Fantini, PA-C1; Rathbun C, Lee H
1Montefiore Nyack Hospital, Nyack, NY.

Background
To facilitate postoperative radiation therapy and radiographic follow-up of their patients, surgeons are challenged in achieving the conceptually simple task of adequately marking the tumor bed during breast conservation surgery (BCS). The ideal marker safely features the trinity of accuracy, comfort, and speed. Such a marker is nonpalpable, deployed easily and quickly independent of the type of BCS or breast characteristics, permits unimpeded reapproximation of tissue, and preserves the exact location of the true tumor bed.

Materials and Methods
VFILM-A (Verifiable Filament Marker) is an institutional review board–approved, observational retrospective registry of a radiographically verifiable filament marker, VeraForm®. During BCS, the marker was deployed to delineate only the tumor bed. This analysis evaluates patient, breast, and surgical characteristics. The cases include oncoplastic (OP) and nononcoplastic (non-OP) BCS. Breast size and tumor location were not factors in case selection. All patients received routine care and follow-up in accordance with national guidelines (National Comprehensive Cancer Network, American Society for Radiation Oncology, American Society of Breast Surgeons, American Society for Clinical Oncology).

<table>
<thead>
<tr>
<th>Tumor Characteristics</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>50</td>
</tr>
<tr>
<td>Surgeries</td>
<td>51</td>
</tr>
<tr>
<td>Past medical history</td>
<td></td>
</tr>
<tr>
<td>Premenopausal</td>
<td>16</td>
</tr>
<tr>
<td>Postmenopausal</td>
<td>34</td>
</tr>
<tr>
<td>Prior IL breast surgery</td>
<td>15</td>
</tr>
<tr>
<td>Prior breast cancer</td>
<td>5</td>
</tr>
<tr>
<td>Prior IL radiation therapy</td>
<td>4</td>
</tr>
<tr>
<td>CAD</td>
<td>12</td>
</tr>
<tr>
<td>DM</td>
<td>15</td>
</tr>
<tr>
<td>Indication</td>
<td></td>
</tr>
<tr>
<td>DCIS</td>
<td>17</td>
</tr>
<tr>
<td>Invasive carcinoma</td>
<td>34</td>
</tr>
<tr>
<td>Procedure</td>
<td></td>
</tr>
<tr>
<td>Lumpectomy: simple (tissue reapproximation)</td>
<td>9</td>
</tr>
<tr>
<td>Lumpectomy: tissue transfer rearrangement</td>
<td>23</td>
</tr>
<tr>
<td>Lumpectomy: skin sparing mastopexy</td>
<td>14</td>
</tr>
<tr>
<td>Modified Benelli mastopexy</td>
<td>5</td>
</tr>
<tr>
<td>Superior pedicle mastopexy</td>
<td>1</td>
</tr>
</tbody>
</table>
Results
Fifty consecutive patients had 51 BC surgeries for ductal carcinoma in situ or invasive cancer (Table).

Conclusions
Tumor bed marking was performed in 2 minutes or less under direct visualization while utilizing a variety of OP and non-OP surgical techniques via a wide range of incisions on a wide range of breast characteristics. No pain, palpability, or infections were noted. No effect on cosmesis was noted by patients or surgeons.

**50 Breast Tissue Differentiation With High Wavenumber Raman Spectroscopy for Future Intraoperative Margin Analysis**

Thomas J.E. Hubbard, PhD1,2; Alexander P. Dudgeon, PhD2; C Murray; Douglas J. Ferguson1,2; Angela C. Shore1,2; Nicholas Stone1,2

1Royal Devon and Exeter Hospital, Exeter, UK
2University of Exeter Medical School, Exeter, UK

**Background**
Accurate intraoperative margin analysis (IMA) would reduce the need for surgical re-excision in breast conserving surgery (BCS). High wavenumber Raman spectroscopy (HWN RS) is a vibrational spectroscopy highly sensitive to changes in the protein and lipid environment and water content–biochemical differences found between tumor and normal breast tissue. We determined the diagnostic accuracy of a HWN RS system to differentiate between tumor and nontumor breast tissue for future IMA.

**Materials and Methods**
Thawed fresh frozen human breast specimens were obtained with ethical approval from the Exeter Clinical Research Facility Tissue Bank (CRF Ref: CRF320; Tissue bank ethics number 16/SC/0162). Paired biopsy specimens of tumor and nontumor tissue were measured with a handheld probe with a 785 nm laser excitation and a spectrometer with an indium-gallium-arsenide, or InGaAs, camera. Sections from specimens underwent histopathological diagnosis and Raman microspectrometry measurement with a Renishaw inVia system. Spectra were analyzed with a principal component analysis (PCA)-fed linear discriminant analysis (LDA) model, with leave-one-out-cross-validation (LOOCV) and calculation of the water/total HWN area ratio (W/TAR); a diagnostic threshold was determined.
by receiver operating characteristic curve analysis from a binomial logistic regression with k-fold 5 cross validation.

**Results**

Ninety-six patients were included (invasive ductal carcinoma, \( n = 64 \); invasive lobular carcinoma, \( n = 21 \); ductal carcinoma in situ, \( n = 3 \); other carcinoma, \( n = 8 \)). Matching of histopathology to HWN microspectrometry Raman spectra confirmed the spectral differences between tumor (protein, water rich) and nontumor (lipid rich, water poor) tissue. Handheld probe spectra PCA analysis revealed the changes in protein, lipid, and water content were predominant spectral features, accounting for greater than 95% variance. The LDA analysis demonstrated an accuracy of 93.2% (sensitivity 93.8%; specificity 92.7%), and W/TAR analysis with a diagnostic threshold of 0.66 gave an overall accuracy of 92.2% (sensitivity 94.8%; specificity 89.6%) for differentiating between tumor and nontumor tissue. Diagnostic accuracy was unaffected by tissue staining with patent blue dye for concurrent sentinel lymph node biopsy, indicating its potential for intraoperative analysis.

**Conclusions**

We present an emerging technology that can differentiate between tumor and nontumor breast tissue with 93.2% accuracy. This system has the potential to provide IMA in BCS and reduce re-excision rates.

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**51 Institution Case Study Series With Tc-99m Tilmanocept for Efficiencies in Sentinel Lymph Node Biopsy**

Vincent Reid, MD<sup>1</sup>; Sarah Pauley, MD, PhD<sup>2</sup>

<sup>1</sup>Hall-Perrine Cancer Center, Mercy Medical Center, Cedar Rapids, IA; vreid@mercycare.org

<sup>2</sup>Radiology Consultants of Iowa, Cedar Rapids, IA

**Background**

Our institution performed a series of case studies over 30 days of breast cancer (BC) patients undergoing preoperative lymphoscintigraphy and sentinel lymph node biopsy (SLNB) with receptor-targeted radiotracer, Tc-99m tilmanocept (Lymphoseek; Cardinal Health). Our protocol was a 2- to 2.5-hour window from injection to node detection for lumpectomy with SLNB, with 2 to 3 cases per surgical day. We wanted to evaluate if a change in radiotracer would change efficiency metrics.

**Materials and Methods**

Tc-99m tilmanocept injections were performed by one of several radiologists in nuclear medicine. The team tracked time on a card that traveled with the patient. A nuclear medicine technologist recorded the patient’s self-reported pain level immediately after injection on a scale of 1 (no pain) to 10 (maximum pain). In the first week, the trial duplicated existing time protocols (2 hours from injection to operating room [OR] node detection). The next phase determined how quickly the team could detect a signal. In week 2, the time between injection of the tracer and node detection was 1 hour. In week 3, that time was reduced to 30 minutes and results were evaluated.

**Results**

Across subjects with BC evaluated in the series (\( n = 8 \)), the mean time between injection and visualization of nodes was less than 20 minutes. The total time in the OR was reduced by 68.4 ± 8.6 minutes relative to previous experience with filtered Tc-99m sulfur colloid (FSC). The

**TABLE. Tc-99m Tilmanocept Imaging and SLNB Summary Results**

<table>
<thead>
<tr>
<th></th>
<th>Total OR time for SLNB with Tc99m tilmanocept (min)</th>
<th>Total OR time savings vs institution time block with FSC of 120 min (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N</strong></td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td><strong>mean</strong></td>
<td>51.6</td>
<td>68.4</td>
</tr>
<tr>
<td><strong>SD</strong></td>
<td>8.6</td>
<td>8.6</td>
</tr>
<tr>
<td><strong>min</strong></td>
<td>40</td>
<td>55</td>
</tr>
<tr>
<td><strong>max</strong></td>
<td>65</td>
<td>80</td>
</tr>
<tr>
<td><strong>median</strong></td>
<td>54.5</td>
<td>65.5</td>
</tr>
</tbody>
</table>

FSC, sulfur colloid; OR, operating room; SLNB, sentinel lymph node biopsy.
authors were able to detect the node(s) in each timeframe and with no change in signal intensity. In addition, patients consistently scored their pain levels between 1 and 2 out of 10.

**Conclusions**

These case studies with Tc-99m tilmanocept displayed short wait in nuclear medicine, short procedure times, and low patient-reported injection pain. We also noted specific signal intensity and high accuracy in detecting nodes with rapid injection site clearance and high patient satisfaction. As a result, Mercy Medical Center adopted Tc-99m tilmanocept using a 30-minute injection protocol for SLNB procedures. Morning surgeries start 2 hours earlier, allowing us to add 3 surgical cases per week.

“**This genuine advance in lymphatic mapping material has changed the management pathway for the institution, the radiologist, the surgeon, and the patient. At our institution, we successfully implemented injection after induction of anesthesia. This technique includes raising a superficial skin wheal or blister in the areolar dermis. Labeling occurs in the time it takes to prep and drape and begin the operation.”** -Pat W. Whitworth

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**4 Incidental Breast Cancer on Chest CT: Is the Radiology Report Enough?**

Joley Beeler, MD; Onalisa Winblad, MD; Carissa Walter, MPH; Lauren Clark, MS; Marc Inciardi, MD; Ashley Huppe, MD; Jason Gatewood, MD; Allison Aripoli, MD

1Department of Radiology, University of Kansas Medical and Cancer Centers, Kansas City, KS.

2Department of Biostatistics & Data Science, University of Kansas Medical, Kansas City, KS.

**Background**

The purpose of this study was to determine the frequency of incidental breast lesions reported on chest CT for which breast imaging follow-up was recommended, the follow-up adherence rate, and the subsequent breast malignancy rate. In addition, the relationship between the strength of follow-up recommendation verbiage and follow-up rate was also explored.

**Material and Methods**

A retrospective review was conducted of 30,224 chest CT reports at a single academic institution from July 1, 2018, through June 30, 2019, to identify reports containing the word(s) “breast” and/or “mammogram.” Patients with recently diagnosed or known prior history of breast malignancy were excluded. The reports were reviewed to identify those with a recommendation for breast imaging follow-up, patient adherence to the recommendation, the subsequent Breast Imaging Reporting and Data System (BI-RADS) assessment, and diagnosis if tissue sampling was performed. Adherence was defined as follow-up diagnostic breast imaging performed within 6 months of initial CT recommendation.

**Results**

A follow-up recommendation for breast imaging was included in chest CT reports of 210 patients without prior history or recent diagnosis of breast cancer. Forty-eight patients (23%) received follow-up dedicated breast imaging within 6 months. For these 48 patients, recommendation verbiage in the CT report was absolute in 69% and optional in 31%. The breakdown of BI-RADS assessments following subsequent diagnostic breast imaging was: 5 BI-RADS 1 (10%), 29 BI-RADS 2 (60%), 5 BI-RADS 3 (10%), 6 BI-RADS 4 (13%), and 3 BI-RADS 5 (6%) assessments. All of the patients assessed as BI-RADS 4 or 5 underwent image-guided biopsy with 7 cases of malignancy diagnosed. There was no significant difference in follow-up adherence when comparing report verbiage characteristics ($P = .4624$; $χ^2$ test).

“CT scans of the chest on occasion incidentally discover an abnormality of the breast. In this single institution retrospective analysis of 210 CT scans showing incidental suspicious findings in the breasts, only 23% of patients returned for workup [and] 15% of those were diagnosed with breast cancer. This represents an opportunity to improve patient outcomes. Though the incidental findings in the breasts on chest CT is relatively rare, it raises an important area where communication between clinicians and patients might be improved.” -Sara Hurvitz, MD
Conclusions
Only 23% of patients with an incidental breast finding on chest CT actually returned for recommended breast imaging indicating a significant opportunity to improve patient outcomes. Incidental breast cancer was diagnosed in 15% (7/48) of patients who underwent follow-up breast imaging as a result of a chest CT report recommendation.

Using a 3D Fiducial Marker System to Advance the Use of 3D Accelerated Partial Breast Irradiation
Lori Anthony, PA1

1JFK Medical Center, Lake Worth, FL.

Background
Currently, no reliable techniques are available to accurately identify a lumpectomy cavity volume, creating difficulty for radiation oncologists in targeting the cavity volume as part of a treatment regimen. As such, oncologists must expand the planned target volume using a larger area or volume of radiation, which exposes a greater volume of normal tissue and makes it unclear if the postoperative tumor bed cavity has been treated with the intended goal.

Materials and Methods
- A metallic marker woven inside a dissolvable suture was positioned in the lumpectomy cavity at time of surgery by the operating surgeon for pinpoint accuracy. After removal of the tumor, 4 to 6 sutures were placed in the wall of the cavity (superior, inferior, medial, lateral, anterior, and posterior).
- During the 6- to 8-week period following surgery, weekly orthogonal kilovoltage images were acquired using the Varian Onboard Imager system and compared with orthogonal digitally reconstructed radiographs generated from the simulation CT. The matched image sets were then overlaid for verification of fiducial position relative to the surgical cavity by the radiation oncologist.

Results
During clinical trials, all safety and performance end points of the human study were met as intended, as follows:
- No study subjects reported any adverse effects: pain, inflammation, infection, or tissue reaction with implantation of the markers.
- The Accusyte 3D Fiducial Marker system demonstrated ability to stay on site and to produce accurate localization and excellent visualization as provided by the 3D approach.
- All 98 radiographic images obtained during the study were clear, allowing for optimal localization and easy visualization of markers without any significant migration from initial target site.
- Images taken 1 year post implantation showed that markers hadn’t moved and were clearly visible in radiography.
- Surgical Radiation Products is continuing third year of follow-up with mammographic images, and again visualization of the markers without significant migration from initial site has been confirmed.
- The Accusyte suture will eventually dissolve, leaving the markers for a lifetime of follow-up.

Conclusions
Use of a 3D Fiducial Marker will allow accurate visualization and delineation of the cavity volume with high degree of consistency and reliability. The Accusyte 3D Fiducial Marker system has eliminated the localization problem. The markers offer a precise, stable target for postoperative radiation. They are more effective than loose markers, clips, or other competitive products.

“The abstract details an elegant yet simple way to identify and optimally treat within the boundaries of the lumpectomy cavity. It is a descriptive analysis with no comparisons to cases done without the fiducial marker system. The statement that this is ‘much more effective than other marker’ sounds promotional since there were not objective comparisons made. Also, [there was] no mention of possible interference with subsequent breast imaging for screening.” -Debu Tripathy, MD
38 Use of MRI as an Additional Breast Imaging Tool in Patients With Pathological Nipple Discharge and Comparative Sensitivity With Ultrasound (5-year retrospective study)

Muhammad Adeel Butt, MD1
1Royal Blackburn Hospital, Blackburn, Lancashire, UK.

Background
Nipple discharge is a presentation commonly seen at breast clinics. It is conventionally evaluated with physical examination and sonography (or mammography).

Aim: To investigate the diagnostic value of MRI as an additional imaging tool in the evaluation of potential malignancy in patients presenting with nipple discharge, and to calculate its comparative sensitivity with ultrasound.

Materials and Methods
We conducted a 5-year retrospective evaluation of 949 patients, 85 of whom had nipple discharge, who underwent breast MRI and breast ultrasound (USS) between January 1, 2015, and March 12, 2019. Clinical notes, radiographic reports, and biopsy results were reviewed. Sensitivity, specificity, positive predictive value, and negative predictive value of USS and MRI were calculated.

Results
Of the 85 patients (all female; mean age, 45.33 +/- 12.93 years) with nipple discharge, 11 were found to have biopsy-proven malignancy (invasive ductal carcinoma/ductal carcinoma in situ; 12.94% risk). USS failed to identify 7 malignancies (27.27% sensitivity) while MRI missed 3 malignancies (72.72% sensitivity). USS falsely identified 4 malignancies in 74 patients who had no malignancy (94.59% specificity) while MRI falsely identified only 1 case (98.65% specificity). For patients with negative USS results (U1/U2/U3) or negative MRI results (BI-RADS category 1, 2, or 3), the negative predictive value of USS was 89.74% while that of MRI was 96.05%. The positive predictive values of USS and MRI were 42.86% and 88.88%, respectively.

Conclusions
Compared with USS, MRI has a higher sensitivity, specificity, positive predictive value and predictive value. It will be a valuable addition to the standard nipple discharge evaluation workup to help rule out malignancy.

2 Landscape of Germline Mutations in DNA Repair Genes for Breast Cancer in a Multinational Region Located in the Southeast of the European Part of Russia

Pushkarev Vasili Alexandrovich, DMSc1; Musin Shamil Ismagilovich1; Sultanbaev Alexander Valerievich1; Nasretdinov Ainur Fanutovich1; Menshikov Konstantin Viktorovich1; Pushkarev Aleksey Vasilievich1
1State Autonomous Institution of Healthcare Republican Clinical Oncology Dispensary of Ministry of Healthcare of Republic Bashkortostan, Ufa, Russia.

Background
Hereditary breast cancer is among the most common genetic pathologies, accounting for 15% to 20% of all breast cancer cases; it is mainly due to mutations in BRCA1/2 genes. In a small number of patients, this disease is connected with mutations in genes CHEK2, TP53, MSH2, ATM, PTEN, NBS1, BRIP1, PALB2, BARD1, STK11, MLH1, BLM, CDH1, and RAD50, accounting for 5% to 10% of all cases.

Materials and Methods
We analyzed blood from 100 unrelated patients who had a histologically confirmed diagnosis of breast cancer. The study was carried out using next-generation sequencing (NGS).

Results
By using an NGS method, highly penetrant mutations in BRCA1, BRCA2, CHEK2, PALB2, and RAD50 were revealed in 16 patients. This method detected mutations in a total of 28 patients. Of a total of xx probands in the BRCA1 gene, mutations were detected in 13 patients: 12 patients with the 5382insC mutation and 1 patient with c.3143delG. In the BRCA2 gene, mutations were revealed in 3 patients: 2 patients with c.6621_6622del and 1 patient with c.-39-1_-39delGA. Mutations in CHEK2 were detected in 5 patients: c.470T>C in 3 patients and c.444+1G>A in 2 patients. The 1592delT mutation in PALB2 was found in 4 patients. The c.2157delA mutation in RAD50 was
3 Analysis of Exhaled Volatile Organic Compounds: A New Frontier in Breast Cancer Screening and Surveillance

Alexandra Allard-Coutu BSc, MDCM, FRCSC; Kevin Singh BSc, MDCM, FRCPC; André Lamontagne; Yves Gamache; Nicole Hodgson MD, FRCSC; Peter Lovrics MD, FRCSC; Susan Reid MD, FRCSC; Barbara Heller MD, FRCSC

1McMaster University, Hamilton, Ontario, Canada
2University of Toronto, Ontario, Canada
3eTrace Medical, Montreal, Quebec, Canada

Background
Neoplastic processes cause distinct and immediate changes to the body’s metabolism, creating unique patterns in the volatile organic compounds (VOCs) being produced and released. Unique VOC profiles have been shown to be diagnostic for certain cancers. Exhaled breath VOC analysis has potential as a point-of-care tool for screening a wide range of cancers in a single sample. This technology can also be used to monitor response to treatment and can be applied to posttreatment cancer surveillance protocols.

Methods
An exhaled breath VOC analyzer was developed based on ASDevices and eTrace Medical patented technology. Proof-of-principle experiments established a detection limit and sensitivity/specificity of the Epd sensing technology. A case-control trial is underway to validate the device using 25 exhaled VOCs previously shown to be diagnostic for breast cancer, and assess whether eTrace Medical’s AeolCare point-of-care exhaled breath analyzer accurately predicts a diagnosis of breast cancer in female patients referred for breast biopsy, following abnormal imaging (BI-RADS 3-5) or detection of a palpable breast mass. The ability of the VOC profile to reliably detect breast cancer will be evaluated by receiver operating characteristic curve analysis, followed by cross validation by the leave-one-out method and stepwise logistic regression analysis.

Preliminary Results
Using representative biomarkers in exhaled breath, proof-of-principle testing confirmed the sensitivity and selectivity detected in 3 patients. A pedigree was compiled for each patient to define relatives who are likely carriers of mutations. A total of 237 blood relatives of probands, who are potential carriers of pathogenic mutations, were identified. At the initial stage of the study, 24 of 50 relatives of patients had pathogenic mutations: 4153delA and 5382insC in the BRCA1 gene, and mutation 6174delT in the BRCA2 gene. When pathogenic mutations were identified, measures were taken to prevent and/or provide early diagnosis of malignant neoplasms.

Conclusions
Pathogenic mutations in BRCA1/2, CHEK2, PALB2 and RAD50 were found in 28 patients with a hereditary feature of the disease. The identification of highly penetrant mutations in probands allowed us to determine their relatives, probable carriers of mutations, who were referred for genetic counseling. Early detection of pathogenic mutations, combined with identifying blood relatives of cancer patients, can help prevent the development of malignant neoplasms in a healthy population.
of the sensing technology based on a proprietary gas chromatography (GC) method from eTrace Medical (patent pending). Protocol validation included testing of ASDevices technologies (pretreatment and concentrator, iMov GC platform, ulnProve GC valve, and Epd sensing technologies) (Figure A). Targeted molecules (sulfur, benzene, toluene, and xylene) were contained in an air matrix to simulate exhaled breath. This validation system demonstrated that the device can reliably measure targeted molecules at levels within 10 ppb of their nominal value (Figure B). The detection limit, based on 3× signal:noise ratio, was between 200 and 700 ppt. The sensitivity of the system can be further adapted via sample concentration and pretreatment.

Conclusion
There is strong evidence to support the use of VOCs in exhaled breath to accurately detect breast cancer. The implementation of VOC analysis for accessible screening and early detection of breast cancer could improve patient outcomes and reduce the number of breast cancer–related deaths, as well as the global disease burden. We propose a proof-of-concept case-control study to determine the sensitivity and specificity of exhaled breath analysis, using a novel point-of-care tool for the diagnosis of breast cancer and previously described VOC breath prints.
Improving Electronic Medical Record (EMR) Documentation of Genomic Test Scores for Patients With Breast Cancer

Elizabeth Ulrich, MD\textsuperscript{1}; Haythem Ali, MD\textsuperscript{1,2}; Jessica Bensenhaver, MD\textsuperscript{1,2}; Lisa Landvogt, BA\textsuperscript{1}; Lindsay Petersen, MD\textsuperscript{1,2}

\textsuperscript{1}Henry Ford Health System, Detroit, MI.
\textsuperscript{2}Henry Ford Cancer Institute, Detroit, MI.

\textbf{Background}
Genomic test scores are commonly used for T1b to T1cN0 hormone-positive, HER2-negative breast cancers as a decision aid for systemic chemotherapy recommendations. As these tests are often run by outside labs, they are not automatically listed in a patient’s EMR. They can, however, be included in a patient’s staging tool and subsequently appear in the problem list. Not manually entering genomic test scores leads to lost test results, wasted time, and incomplete discussions when patients are reviewed at multidisciplinary tumor board. The aim of this quality improvement study was to improve genomic test scoring documentation.

\textbf{Materials and Methods}
The Metriq Cancer Registry Department Database at a large multihospital health system was queried for patients with cT1b to T1cN0 hormone-positive, HER2-negative breast cancer from January 2019 through August 2020. Patients who underwent surgery and had genomic testing results were included. Improvement goals in genomic testing documentation were discussed at the Breast Program Leadership Committee of 2020, and reminders were sent via email to physicians, midlevel providers, and other support staff. Epic EMRs were reviewed for the appropriate documentation.

\textbf{Results}
Prior to the goal-setting intervention, 100 patients meeting inclusion criteria were identified in 2019. Fifty-six patients were identified in 2020 after the goal-setting intervention. Following intervention, clinical stage was documented in 95% of cases compared with 91% of cases prior. After the intervention, pathologic stage was documented in 96% of cases compared with 95% of cases prior. After the intervention, genomic test score was documented in 84% of cases compared with 46% of cases prior.

\textbf{Conclusions}
Genomic test score documentation in the pathologic staging tool in the EMR improved from 46% to 84% with intervention being only an initial request with email reminders. This improved documentation will be a quick reference for breast cancer caregivers, add to discussion at multidisciplinary tumor board, and aid with electronic searchable research efforts.
**32 Triple-Negative Breast Cancer and Pathological Complete Response: A Study of Racial Disparities**

Maithreyi Sarma, MBBS1; Samar Nasir, MD1; Ashwini Ronghe, MD1; Kristopher Atwood, PhD1; Medhavi Gupta, MBBS1; Amy Early, MD1; Tracey O’Connor, MD1; Ellis Levine, MD1; Shipra Gandhi, MD1

1Roswell Park Comprehensive Cancer Center, Buffalo, NY. 2State University of New York at Buffalo, School of Medicine & Biomedical Sciences, Buffalo, NY.

**Background**

Triple-negative breast cancer (TNBC), one of the more aggressive subtypes of breast cancer, is twice as frequent and associated with higher mortality in Non-Hispanic Black (NHB) women compared with non-Hispanic White (NHW) women. Factors contributing to this racial disparity have been shown to include socioeconomic status, insurance variables, delays in diagnosis/treatment, and comorbidities. We examined the association between race and clinical outcomes—pathological complete response (pCR), recurrence-free survival (RFS), and overall survival (OS)—in patients (pts) treated with neoadjuvant chemotherapy (NAC) at our institution.

**Materials and Methods**

Pts diagnosed with stage I to III TNBC from 2000 through 2018 who received NAC were included in this retrospective study. pCR was considered as absence of residual invasive cancer in the breast and lymph nodes after NAC. Association of race with pCR and survival outcomes were evaluated using logistic and Cox regression models, respectively. Multivariate models were used to evaluate the association between race and pCR or survival while controlling for relevant confounders including age, body mass index (BMI), insurance status, comorbidities, tumor stage, grade, and time from diagnosis to chemotherapy or surgery. Analysis was conducted using SAS version 9.4 (SAS Institute) at a significance level of .05.

**Results**

Included in the analysis were 186 pts (126 NHW, 67.7%; 50 NHB, 26.9%; 10 other, 5.4%). NHB pts had higher mean BMI at baseline (32.93 vs 27.45 kg/m²; P < .001), with fewer NHB pts having private insurance than NHW pts (46.0% vs 71.4%; P = .013). No significant association of race with other variables was observed. Pts with pCR were younger at diagnosis (48 vs 52 years; P = .019). Advanced age, higher tumor stage, and longer time from diagnosis to surgery were associated with worse RFS and OS (P < .05). On multivariate analysis, there were no significant associations between race and pCR, RFS, or OS, with similar pCR noted between different races (Table).

**Conclusions**

Our study suggests similar outcomes between races for TNBC treated at a single academic center. Further studies comparing molecular characteristics of TNBC from different races are warranted.

---

**TABLE. Association of Race With pCR and Survival Outcomes on Multivariate Analysis**

<table>
<thead>
<tr>
<th>Patient subgroup</th>
<th>pCR</th>
<th>OS</th>
<th>RFS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>OR (95% CI)</td>
<td>P</td>
</tr>
<tr>
<td>NHW</td>
<td>34.9%</td>
<td>1.00</td>
<td>0.83</td>
</tr>
<tr>
<td>NHB</td>
<td>33.3%</td>
<td>0.79 (0.37-1.69)</td>
<td>n/a</td>
</tr>
<tr>
<td>Other</td>
<td>33.3%</td>
<td>0.96 (0.22-4.19)</td>
<td>n/a</td>
</tr>
</tbody>
</table>

n/a, not applicable; NHB, non-Hispanic Black; NHW, non-Hispanic White; OR, odds ratio; OS, overall survival; pCR, pathologic complete response; RFS, recurrence-free survival.
Demographics, Clinical Characteristics, and Treatment Patterns for Patients With BRCA-Mutated, HER2-Negative Early-Stage Breast Cancer: a CancerLinQ Real-World US Study

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Background
Despite several reports of the real-world clinical characteristics and treatment patterns of patients with early-stage breast cancer (ESBC), specific information is lacking for patients with BRCA-mutated (BRCAm) ESBC. We conducted a retrospective study focusing on patients with BRCAm, HER2-negative (HER2–) ESBC, including both hormone receptor–positive (HR+) and –negative (HR–), as well as triple-negative breast cancer (TNBC).

Materials and Methods
We identified patients (≥ 18 years) from the CancerLinQ electronic medical record database, diagnosed with stage I through IIIA HER2– breast cancer between January 1, 2014 and January 1, 2019. BRCA mutation status was determined based on available test results: BRCAm, wild-type BRCA (BRCAwt), or unknown/untested (BRCAunk). Patient characteristics and treatments were summarized by BRCA status for HR+ and TNBC cohorts. AstraZeneca-ConcertAI Confidential and Proprietary Information Version 3.0 Page 2 of 2 January 13, 2021.

Results
In total, 4566 patients (BRCAm = 41; BRCAwt = 492; BRCAunk = 4033) were identified in the HR+ cohort and 703 (BRCAm = 20; BRCAwt = 135; BRCAunk = 548) in the TNBC cohort. Patients with BRCAm were younger and received surgery plus adjuvant therapy more frequently, whereas fewer patients received radiation versus BRCAwt.

Conclusions
This study provides insight into characteristics and treatment patterns of patients with BRCAm ESBC in real-world oncology settings in the United States. Consistent with prior studies, patients with BRCAm were diagnosed at a younger age, and for the HR+ cohort, with higher tumor grade and at a later disease stage. The use of chemotherapy, in both neoadjuvant and adjuvant settings, was more frequent for patients with BRCAm.

Sponsor: AstraZeneca
Delay in Presentation and Management of Patients With Breast Cancer in Baghdad, Iraq

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Background
In Iraq, breast cancer represents the leading cause of cancer-related mortality among women and represents 19% of all cancers. There is a tendency for patients with breast cancer to present with later stages of disease, as 46% of patients in Iraq present at stage III or IV. This study aimed to assess the prevalence of delays in Iraq in presentation and management of breast cancer, and the association of these delays with sociodemographic, patient-related, and clinical factors; no previous data were found on this topic in the literature.

Materials and Methods
A retrospective cross-sectional study was conducted in a national center of cancer and oncology teaching hospital in 2019. Using convenience sampling, 120 female patients were selected then interviewed by the authors. For ease of acquisition, data were collected from patients using the Quick tap survey application and analyzed with SPSS Statistics, version 24 (IBM). Chi-square tests for significance and associations were used, with a \( P \) value less than .05 considered significant.

Results
Delay in consultation was most often cited (29.3%) vs the other delays (diagnosis, surgery, and chemotherapy delays). About half of patients (50.9%) had not been aware that their symptoms could be related to cancer and 42.2% were afraid to know what their symptoms meant. Less than 20% of patients attributed their delay to faulty medical diagnosis, inappropriate biopsy, or surgery. Only 20.7% had performed breast self-examination, which had a significant association with diagnosis delay \( (P = .018) \).

Conclusions
These study results reveal that delay in seeking consultation is the most common cause of delayed presentation of patients with breast cancer. In Iraq, it is important and necessary to spread awareness about breast self-examination, the nature of possible symptoms, and seeking medical advice, and to publicize how all of these can affect disease prognosis.
A Biomarker Assay Predicts Women Diagnosed With DCIS Without Microinvasion Are at Increased Risk for Breast Cancer-Specific Death

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Background
While rare, patients diagnosed with ductal carcinoma in situ (DCIS) can die from breast cancer. We investigated the association of DCISionRT test results with breast cancer mortality (BCM). DCISionRT is a validated test to assess 10-year breast cancer risk for patients with DCIS. Due to the very low incidence of death in DCIS, we used a prior nested case control study.

Materials and Methods
The case control study identified 96 women who died of breast cancer and 318 controls from a population of 6964 in Sweden diagnosed with DCIS without microinvasion (1992-2012). DCISionRT testing was performed on a subset of patients with formalin-fixed embedded tissue microarray while blinded to outcome. Conditional logistic regression was used to calculate odds ratios (ORs) for the risk of BCM accounting for clinicopathologic factors, treatment, and continuous and categorical Decision Score (DS).

Results
DS results were available for 157 of the 414 women in the original case control study. Primary DCIS was treated with breast-conserving surgery (BCS) alone (34%), BCS plus radiotherapy (29%), or mastectomy (37%). Clinicopathologic factors and treatment distributions were consistent with those in the original case control study, except there were 15% fewer patients who had larger tumors (>2.5 cm). Continuous and categorical DS were independently associated with BCM in multivariate analyses, accounting for treatment differences and clinicopathology. Patients with increasing continuous DS had increasing BCM (OR, 10 per 5 DS units; P = .004), and patients with high categorical DS (>6) were at greater risk of BCM (OR, 19; P = .007). Treatment was not independently associated with decreased BCM risk in this study. Patients selected for treatment with mastectomy tended to have increased BCM compared with those who were treated with BCS. Young age (<50 years), tumor size (>1 cm), and grade 3 disease were not statistically associated with BCM.

Conclusions
In this case-control study, patients with higher DCISionRT scores had an increased risk of BCM. DCISionRT may help to identify patients with the potential to develop more aggressive subsequent disease that warrants more aggressive up-front treatment. Additional data are needed to validate these findings.

Reference:

Disclosures:
Charlotta Wadsten, MD, PhD: research support from PreludeDx
Rachel Rabinovitch, MD: no disclosures
Frank Vicini, MD: research advisor for PreludeDx
Chirag Shah, MD: research advisor for PreludeDx
Steven C. Shivers, PhD: employee of PreludeDx; stock options for PreludeDx
Anna-Karin Wennstig, MD: no disclosures
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Troy Bremer, PhD: employee of PreludeDx; stockholder for PreludeDx

“This nested-case control study indicates a tool, DCISionRT, may be used to identify patients with pure DCIS who are at higher risk of breast cancer mortality. While higher DCISionRT score is associated with higher BCM, the clinical implications of this are not clear as other clinical factors may account for higher risk (for example, DCIS >5 cm where microinvasion may have been missed by pathologist). Moreover, the rarity of BCM from pure DCIS is quite notable, making the clinical implications of these data less impactful.” - Sara Hurvitz, MD
**48 TiP** The PREDICT Registry: A Prospective Registry Study to Evaluate the Effect of a Predictive Assay on Treatment Decisions in Patients With DCIS Following Breast-Conserving Therapy

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**Background and Significance**
The benefits of adjuvant radiation therapy (RT) in patients with ductal carcinoma in situ (DCIS) treated with breast-conserving surgery (BCS) remain controversial. Although there is level I evidence supporting the role of RT in reducing the risk of local recurrence, the absolute benefit is variable. Current guidelines generally recommend RT for all patients having BCS, but it is important to develop prognostic and predictive tools to better assess risk and understand the impact such a tool would have on treatment decisions. The DCISionRT Test (PreludeDx, Laguna Hills, CA) is a biologic signature that provides a validated score for assessing 10-year risk of recurrence and for assessing RT benefit; it uses individual tumor biology as assessed by clinical and pathologic biomarkers.

**Design and Methods**
This is a prospective cohort study for patients diagnosed with DCIS of the breast. Treating physicians complete a treatment recommendation survey before and after receiving DCISionRT test results. Test results, treatment recommendations, patient preferences, and clinicopathologic features are stored in a deidentified registry for participating institutions from a variety of geographic regions across the United States. The study will also collect 5- and 10-year recurrence and survival data. The study includes females aged over 25 years who are candidates for BCS and eligible for RT and/or systemic treatment; they must have sufficient tissue to generate test results. Subjects must not have been previously treated for DCIS or have previous or current invasive or microinvasive breast cancer. The primary end points are changes in treatment recommendations for surgical, radiation, and hormonal therapy. Secondary end points are identification of key drivers for treatment recommendations, including age as well as tumor size, grade, necrosis, hormone receptor status, and other clinicopathologic factors. Changes in treatment recommendations will be assessed using McNemar's test with an α level of 0.05. Differences in recurrence-free and overall survival will be evaluated by Kaplan-Meier survival analysis using the log-rank test and/or the Cox proportional hazards model. A planned early interim analysis based on the first 200 patients has been recently completed and reported.

**Status**
As of January 18, 2021, 1401 patients have been accrued from 52 institutions. Twelve additional sites are currently in the process of joining the study. We are planning to enroll up to 2500 patients from up to 100 institutions.
BC200 RNA Changes in Breast Cancer Patients After Treatment

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Background
Regulatory brain cytoplasmic 200 RNA (BC200 RNA) is a nucleotide RNA transcript found under normal conditions in the brain that inhibits the initiation of translation. It has recently been found to be associated with numerous cancer cells, including human mammary carcinoma cells. Iacoangeli and colleagues previously demonstrated that quantitative reverse-transcription polymerase chain reaction methods could be used as the basis for a blood test for BC200 RNA in patients with invasive breast cancer.1 They were able to demonstrate high sensitivity and specificity of blood levels of BC200 RNA and suggested it could be used as a circulating tumor cell marker (CTC). What is not known is how this marker changes over time and with treatment. Our objective is to investigate how BC200 RNA blood levels in patients with breast cancer correlate with treatment and to establish whether monitoring BC200 RNA in patients’ blood will be useful for evaluating treatment outcomes.

Materials and Methods
We are recruiting all newly diagnosed patients with locally advanced and metastatic breast cancer (aged 18 to 100 years) from the year 2019 and ongoing in a tertiary institution to our study. Treatment interventions are provider dependent. Patients with known genetic conditions are excluded from the study, as are patients who have already had a treatment intervention before the first blood sample was drawn for the study. Blood samples are to be collected at the time of diagnosis, monthly during chemotherapy, after surgery, and every 6 months thereafter. Primary outcomes include assessment of the change in BC200 RNA blood levels over time and with treatment interventions.

Status
The study is open, with ongoing recruitment. Twenty-two participants have been recruited at time of submission. Currently, all patients have had an initial blood sample.

Reference:

Due to COVID-19, follow-up sample collections have been sporadic. One patient has withdrawn from the study and 1 patient has died since starting the study.
In 10-15 minute increments over the course of a few days, I can be caught up with the most relevant up to the minute standards in clinical oncology.

- 2020 Attendee