INTRAOPERATIVE MARGIN ASSESSMENT WITH THE MARGINPROBE® SYSTEM
Breast Conserving Surgery - More challenging as imaging and screening improves

- Advances in imaging (mammography, ultrasound, MRI, tomosynthesis) mean that most breast cancers are detected in an early stage.

- Early detection means that most breast cancer patients have the choice between a mastectomy and a lumpectomy:
  - Lumpectomy followed by radiation offers equivalent survival, while preserving the breast.
  - 60-70% of women prefer breast conservation.

- Early detection has led to an increase in the diagnosis of DCIS:
  - DCIS is not palpable, or visible macroscopically, during lumpectomy.

McCahill, JAMA. 2012;307(5):467-475
Obtaining negative margins during surgery is a significant challenge:
- 20-25% national average re-excision rate (repeat surgery after lumpectomy).
- 35-50% average re-excision rates in DCIS
- Recent developments:

Increased Pressure to reduce positive margins and repeated lumpectomies

New SSO Guidelines for Positive margins

Healthcare reform

McCahill, JAMA. 2012;307(5):467-475
Positive margins are associated with a two-fold risk for recurrence

- most patients with positive margins will go back to the OR for additional surgery¹

- Each year, over 35,000 women have additional surgery for positive or close margins in the US²

- These procedures lead to over $200 million in added cost to the healthcare system²

¹) Society of Surgical Oncology consensus guideline on margins for breast-conserving surgery
²) Source: internal estimates
Impact of Re-excisions

- Added discomfort\(^1\)
- Increased surgical complications\(^1\)
- Compromise in cosmetic outcomes\(^1\)
- Additional unnecessary emotional stress for patients and families\(^1\)
- Delay to Adjuvant Therapy\(^2\)
- Increased Health Care costs\(^1\)
- Influences preference for conversion to mastectomy\(^2\)
- Influences patient preference for conversion to prophylactic contralateral mastectomy\(^3\)

(1) Moran, Annals of Surgical Oncology (2014) doi 10.1245/s10434-014-3481-4
(3) King, Journal of Clinical Oncology (2011) November pgs. 2163-2164
Newer therapeutic techniques in breast cancer treatment rely even more heavily on achieving negative margins.

- **OncoPlastic Surgery**
- **Partial Breast Irradiation**
- **Intraoperative Radiation Therapy**
The Patient’s Lumpectomy Experience

A positive margin puts the patient back to where they were after diagnosis
- Confidence in the treatment course is shaken, and often leads to second opinion meetings, possibly at second provider
- Most patients with a positive margin undergo a 2nd lumpectomy surgery
- 10-36% of patients convert to a mastectomy
- Some patients do not comply with additional surgery, proceeding with radiation (and a 2x higher risk of recurrence)
The Challenge of Intraoperative Detection

- Current methods are inadequate
  - Pathology techniques (frozen section, touch prep) are difficult due to fatty nature of breast tissue and have high sampling error. In addition they add up to 40 minutes of OR time.
  - Specimen X-ray (including intraoperative x-ray like Faxitron) cannot identify the small amounts of tumor
  - These techniques have very little sensitivity to DCIS at the margin

- There have been no innovations in helping the surgeon to identify positive margins in 20 years
MARGINPROBE

- MARGINPROBE System consists of a single-use probe attached to a portable console
- Adjunctive tool to standard of care (SOC)
- Identifies positive margins for *immediate* resection

- Probe applies a localized RF field and captures reflected signals from tissue
- These signals contain information that allows the tissue to be characterized as cancer or non-malignant
- Console performs signal analysis, and displays results to surgeon
The MarginProbe System detects the bioelectric differences in cancerous cells, using a technique called RF Spectroscopy.

- Membrane de-polarization
- Alterations in nuclear morphology
- Increased vascularity
- Cell to cell connectivity

Applying a localized RF field and measuring the tissue response, the MarginProbe can measure the electrical *signature* of the tissue.
GROWING BODY OF CLINICAL STUDIES
## Clinical Study Data

<table>
<thead>
<tr>
<th>Study Type</th>
<th>Device + SOC</th>
<th>SOC</th>
<th>P-value</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAST Study</td>
<td></td>
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</tr>
<tr>
<td>Re-excision rate</td>
<td>5.6% (8/143)</td>
<td>12.7% (19/150)</td>
<td>0.0027</td>
<td>56%</td>
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<tr>
<td>FDA Pivotal Study</td>
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<tr>
<td>Positive margins</td>
<td>15.4% (46/298)</td>
<td>38.3% (114/298)</td>
<td>&lt;0.0001</td>
<td>60%</td>
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<tr>
<td>DCIS Study</td>
<td></td>
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<tr>
<td>Re-excision rate</td>
<td>17% (7/42)</td>
<td>39% (26/67)</td>
<td>0.018</td>
<td>56%</td>
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<tr>
<td>Post-market Studies</td>
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<tr>
<td>Blohmer – re-excision rate</td>
<td>14.6%</td>
<td>29.7%</td>
<td>0.0014</td>
<td>51%</td>
</tr>
<tr>
<td>Sebastian – re-excision rate</td>
<td>9.7% (16/165)</td>
<td>25.8% (48/186)</td>
<td>&lt;0.0001</td>
<td>62%</td>
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<tr>
<td>Hareufa – re-excision rate</td>
<td>6% (4/64)</td>
<td>Historical not reported</td>
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</tr>
<tr>
<td>Sebastian – re-excision rate</td>
<td>10.7% (31/290)</td>
<td>25.8% (48/186)</td>
<td>&lt;0.0001</td>
<td>59%</td>
</tr>
</tbody>
</table>

Consistent >50% reduction in positive margin and re-excision rates
High Patient Satisfaction

- Patients growing awareness to risk for positive Margins and possible additional surgery leads to patients seeking MarginProbe sites

- Cosmetic outcome is known to correlate to patient satisfaction in breast conserving surgery
  - Re-excisions adversely affect cosmetic outcomes (Wazer et al, 1992)
  - Lower re-excision rate improves patient satisfaction (Rizzo et al, 2009)

- Studies with MarginProbe use have shown cosmesis scores of:
  - Allweis
    - 70% good/excellent (all patients)
    - 78% good/excellent (screening patients)
  - Thill
    - 80% good/excellent (surgeons)
    - 92% good/excellent (patient reported)
Medicare recognizes intraoperative margin assessment as a covered service
- 88331/88332 – Frozen Section analysis of margins
- 88333/88334 – Touch Prep analysis of margins
- Frozen Section can add over $1000 per patient

Intraoperative assessment using RF Spectroscopy
- 19499 – breast unlisted code
- Medicare national average facility payment of $987
- Commercial payments will vary based on contracting

Comprehensive coding and reimbursement support provided by Dune
- Coding, Coverage and Payment guide
- Hotline support
Value to the Hospital

- More lumpectomies + radiation therapy
  - ~70% of patients prefer breast conservation
  - The possibility of multiple surgeries is a significant deterrent
- Fewer conversions to mastectomy
  - Negative margins the first time keep a patient headed to radiation instead of mastectomy
- Improved OR efficiency
  - Fewer add-on cases
  - Increased OR availability
  - Reduction in frozen section wait time (where relevant)
- More patients
  - Surgeons can accept more new patients
  - Marketing benefits increase patient draw radius (frequent local TV and Web pickup, for early in market)
- More satisfied Patients

Looking ahead towards the healthcare reform emphasis on payment to providers per quality (vs per procedure): the MarginProbe is perfectly positioned
Thank you!

Questions?
Many centers find that their MarginProbe program is a net breakeven financially.
Lumpectomy Processing in Pathology

1. Orientation
2. Specimen Inking (OR or pathology)
3. Sectioning the specimen
4. Tissue samples from each margin
5. Microscopic review:
   1. Tumor cells
   2. Distance to ink