Handout for Dr Allison’s Lectures on Grossing Breast Specimens:

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General Principles of Gross Examination of Breast Specimens:

1. Understand what specimen type you are grossing  
2. Know what is expected/targeted (clinical/imaging correlation)  
3. Know what you will be required to document and report (tissue handling, staging information, etc)  
4. THEN examine the gross findings  
5. Correlate gross findings with expected findings  
6. Perform a TARGETED tissue sampling (if all the tissue is not being submitted)  
7. The gross description of tissue sampling needs to be detailed enough that accurate sizes/extent of grossly non-apparent lesions can be estimated after microscopic examination (often requires a map or diagram in complex cases)  
8. Correlate histology with gross, imaging and clinical to get most complete and accurate pathology

<table>
<thead>
<tr>
<th>Specimen Type</th>
<th>Clinical Indications/Goals of Surgery</th>
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<tbody>
<tr>
<td><strong>Core biopsy</strong></td>
<td>Performed to sample a clinical or imaging-detected abnormality for initial diagnosis.</td>
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<tr>
<td>- palpation guided</td>
<td>- used to sample a clinically palpable mass</td>
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<tr>
<td>- stereotactic</td>
<td>- used to sample mammographic findings (typically calcifications)</td>
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<tr>
<td>- ultrasound guided</td>
<td>- commonly used to sample mass lesions or MRI findings with ultrasound correlates</td>
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<tr>
<td>-MRI guided</td>
<td>- used to sample findings not well visualized by other imaging modalities</td>
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<tr>
<td><strong>Excisional biopsy</strong></td>
<td>Commonly performed after core biopsy containing a risk lesion to rule out an adjacent un-sampled worse lesion. Also performed for lesions where core biopsy sampling could not be performed.</td>
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<tr>
<td><strong>Lumpectomy/Partial mastectomy/Quadrantectomy/Excision</strong>:</td>
<td>Usually performed for complete removal of a targeted imaging or clinical finding for a known DCIS, invasive carcinoma, fibroepithelial lesion or other malignancy. Negative margins are a goal.</td>
</tr>
<tr>
<td>-wire-localized</td>
<td>- localization wires placed to mark or bracket</td>
</tr>
</tbody>
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lesions to be removed by surgeon

- central lumpectomy
  - includes nipple

### Re-excision/Additional margins:
Additional margin tissue removed either after initial surgery (re-excision) or at the time of initial surgery (additional margins) in order to obtain negative final margins.

### Mastectomy:
As above in lumpectomy or for prophylaxis/risk reduction
- simple
  - without axillary dissection (+/- SNL biopsies)
- modified radical
  - with axillary dissection
- skin-sparing or nipple sparing
  - no attached skin or nipple (respectively)

### Sentinel lymph node biopsy:
Identified as “first draining” lymph nodes by a variety of techniques. Performed in cases with invasive breast cancer in the breast to identify if there is early metastatic spread to the axilla.

### Axillary dissection:
Removal of all lymph nodes in the axilla when clinically or previously identified as lymph node positive with a high risk of axillary recurrence.

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**Example of information to be collected from imaging/clinical records before grossing a surgical breast case:**

**Targeted lesions expected:**
- Total number of lesions expected:
- Post-neoadjuvant chemotherapy?:

For each expected lesion determine the following:

**Lesion 1:**
- Label of lesion used in imaging reports: [ex. L1, R1]
- Targeted imaging finding: [mass, asymmetry, calcifications, MRI enhancement]
- Expected location: [relative location in a lumpectomy, distance and location relative to other lesions, in a mastectomy the quadrant, o’clock and distance from nipple or margins.]
- Expected size/extent: (for post-neoadjuvant cases, need to know pre-treatment size)
- Expected clip/biopsy: [@prior biopsy documented with clip placement/prior biopsy documented without clip placement/no prior biopsy or clip placement documented]

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**Tissue handling recommendations when performing ER/PR and HER2 testing on breast cancers**
Time from tissue acquisition to fixation should be as short as possible (preferably < 1 hour).

Samples for ER/PR and HER2 testing should be fixed in 10% NPBF for 6 to 72 hours.

Core biopsies of cancer are preferred for testing due to shorter ischemic time and better fixation. However, if the core biopsy sample is not representative of the cancer or results are negative and there are high-risk features (such as high grade) at resection, retesting on the cancer in the resection should be considered.

Resection samples should be sliced at 4-5-mm intervals after inking/orientation and placed in sufficient volume of fixative to allow adequate tissue penetration.

If a surgical specimen comes from a remote location, it should ideally be bisected through the cancer on removal and sent to the laboratory immersed in a sufficient volume of formalin.

Cold ischemia time (time to fixation), fixative type, and time in fixative should be available and recorded.

ER or HER2 negative samples that have pre-analytical issues such as prolonged ischemia times, alternative fixation protocols not validated (ex. alcohol fix or decalcification), or fixation less than 6 hours or more than 72 hours should be reported with the caveat that results may not be valid and recommend repeating on another sample.

**Scenarios where more extensive tissue sampling may be required:**

- Expected lesions are not grossly apparent
- Invasive lobular carcinoma and other invasive patterns with minimal gross findings
- Multiple lesions (need to sample in between them if close)
- DCIS (or extensive LCIS)
- Tumor bed sampling after neoadjuvant chemotherapy

**Recommendations for tissue sampling of surgical breast cases:**

**Grossly obvious mass/lesion that correlates with targeted imaging finding:**

- Submit tissue from a complete cross section and the ends of the gross lesion so can document the size in 3–dimensions microscopically.
- Include samples just beyond the borders of the grossly obvious mass/lesion to detect additional microscopic disease or relevant precursor lesions.
- Include samples of close margins (< 1 cm to mass/lesion).

**Cases with multiple lesions:**

- Submit tissue between lesions that are close (within 1-2 cm) to determine if they connect.
Cases to sample more extensively:
1. **Extent of the lesion is not obvious grossly** (ex. invasive lobular carcinoma)
2. **Post-neoadjuvant chemotherapy** (submit entire tumor bed when feasible)
3. **Extensive carcinoma in situ** (to exclude invasion)

- Determine area of interest using expected imaging extent of disease (pre-treatment if neoadjuvant).
- Sample entire area of interest (with map of blocks submitted) if can submit in ~20 cassettes, or submit at least 1 cross section per centimeter.
- Sample borders of lesion and margins as above.

**Tissue cassette submission key:** **MUST DICTATE the slice number** each sample is taken from (even when submitting in entirely) as well as if gross lesion is present in the sample. Never just say “ex. sections are submitted in cassettes X1-X10” unless you specify that there is a single slice in each cassette or the exact slice number each corresponds to. Cassette keys should also be diagramed on the radiographs when the specimen is not entirely submitted. **MAP IT OUT.**

**How a Pathologist Estimates Size/Extent of a Breast Lesion:**

Estimating size or extent of invasion or DCIS can only be performed when the tissue sampling is appropriately documented or mapped out at the time the specimen is grossed. If the lesion is only present only on a single slide in a well-sampled case, the size can be measured directly on that slide. If the lesion is grossly obvious and the gross findings correlate well with the histology, the gross size estimate can be used. However, for larger lesions whose extent is not obvious grossly, the size needs to be estimated in the largest dimension by either reconstruction of the span of disease in a composite section or by multiplying the slice thickness by the number of consecutively involved slices. The latter method requires close correlation with imaging sizes and exact slice thickness in order to not vastly over or underestimate extent. Lastly, if a lesion extends across an entire specimen with involvement of margins on opposite
sides of the specimen, the distance between these two margins can be used as the extent if this is the largest dimension.

Example Gross Template for Breast Surgical Specimens

**Specimen type:**

**Cold ischemic time < 1 hour?:**[yes][no][not provided]

**Time in formalin:**

**Formalin fixation time between 6-48 hours?[yes][no]**

**Neoadjuvant chemotherapy?[yes][no]**

**Gross Description:** Received [fresh][in formalin] is a [] cm medial-lateral x [] cm superior-inferior x [] cm anterior-posterior [right][left] [lumpectomy][excisional bx][mastectomy][mastectomy with attached axillary dissection] labeled [] with the patient's name and medical record number. The specimen is [intact][sectioned], [with][without] localization wires and is received [inked][uninked] with [orientation by sutures as follows:][orientation by ink colors as listed below][no orientation]. The nipple is [present,][not present] [everted][inverted] and skin is [absent][present,] measuring [] cm x [] cm x [] cm with [no lesions identified]. Skeletal muscle is [not present][present at the posterior aspect]. Axillary lymph nodes [are also][are not] received as part of the specimen.

**Inking scheme used:**

**Tissue sectioning:** The specimen is serially sectioned into [] slices from [medial to lateral][lateral to medial] with the nipple in slice [].

**Radiographs /Photographs of the sliced specimen are performed** (total number = []). The expected radiologic/clinically-evident lesions and the lesions identified on gross tissue examination and specimen radiograph in pathology are enumerated below.

**Targeted lesions expected (based on available radiology/clinical notes):**

  **Lesion 1:** Label of lesion used in imaging reports: [ ex. L1, R1]

  Targeted imaging finding: [mass, asymmetry, calcifications, MRI enhancement]

  Expected location: [relative location in a lumpectomy, distance and location relative to other lesions, in a mastectomy the quadrant, o’clock and distance from nipple or margins,]

  Expected size/extent:

  Expected clip/biopsy:

**Gross/radiographic findings:**

  **Lesion 1:**

  Description of lesion:

  Location (slice#s, o’clock/quadrant, distance to nipple in mastectomy):

  Correlates with targeted findings? [yes] [no]

  Size/extent:

  Associated clip(s):

  Closest margins grossly:

  **Additional findings:** [calcifications, potential lymph node nodes, potential fibroepithelial lesions]
**Block Key:** [indicate slides each block sample submitted from, if contains lesion, and indicate on photo or radiograph map when submitting composites]