Controversies and Problematic Issues in Core Needle Biopsies
(To excise or not to excise)

Laura C. Collins, M.D.
Beth Israel Deaconess Medical Center
and Harvard Medical School
Boston, MA
Schematic Representation of Percutaneous Biopsy Techniques

Adapted from Wong et al, Adv Anat Pathol 2000;7:26-35
Comparison of Specimen Size

8G 14G
Upgrade Rates are Dependent on Needle Size

<table>
<thead>
<tr>
<th>Bx Device</th>
<th>Underestimation</th>
</tr>
</thead>
<tbody>
<tr>
<td>14g Gun</td>
<td>45%</td>
</tr>
<tr>
<td>14g DVA</td>
<td>25%</td>
</tr>
<tr>
<td>11g DVA</td>
<td>18%</td>
</tr>
<tr>
<td>8g DVA</td>
<td>&lt;10%</td>
</tr>
</tbody>
</table>
Diagnoses On Core Needle Biopsies

• **Specific diagnoses**
  – Invasive cancer
  – DCIS
  – LCIS
  – Atypical hyperplasias
  – Fibroadenoma

• **Non-specific diagnoses**
  – Cysts
  – Fibrosis
  – “Fibrocystic changes”
  – Normal breast tissue
CNB Diagnoses may be Specific but not Definitive

- **Atypical ductal hyperplasia**
  - 14G carcinoma in 50-60% (2/3-3/4 DCIS; remainder invasive)
  - 11G (and 9G) DVA carcinoma in ~20%

- **Ductal carcinoma in situ**
  - 14 G invasive carcinoma in ~20%
  - 11G DVA invasive carcinoma in ~ 10%
Likelihood of Specific Diagnosis Related to Presence of Calcifications on Specimen Radiograph

(Liberman, 1994)

Specific Diagnosis

<table>
<thead>
<tr>
<th>Ca^{++} present</th>
<th>118/146 (81%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ca^{++} absent</td>
<td>81/215 (38%)</td>
</tr>
</tbody>
</table>
Likelihood of Malignant Diagnosis Related to Presence of Calcifications on Specimen Radiograph
(Margolin, 2004)

**Malignant Diagnosis**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ca^{++} present</td>
<td>98/116</td>
<td>84%</td>
</tr>
<tr>
<td>Ca^{++} absent</td>
<td>82/116</td>
<td>71%</td>
</tr>
</tbody>
</table>

p=0.02
Likelihood of Missed Malignant Diagnosis Related to Absence of Calcifications on Specimen Radiograph
(Margolin, 2004)

<table>
<thead>
<tr>
<th>Calcium Presence</th>
<th>Missed Malignant Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ca++ present</td>
<td>1/116 (1%)</td>
</tr>
<tr>
<td>Ca++ absent</td>
<td>13/116 (11%)</td>
</tr>
</tbody>
</table>

P<0.001
Pathologist Agreement: 
Local vs. Central Dx

<table>
<thead>
<tr>
<th></th>
<th>CNB (n=2002)</th>
<th>Open (n=596)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>96%</td>
<td>93%</td>
<td>0.008</td>
</tr>
<tr>
<td>Benign</td>
<td>99%</td>
<td>96%</td>
<td>ns</td>
</tr>
<tr>
<td>Invasive</td>
<td>97%</td>
<td>98%</td>
<td>ns</td>
</tr>
<tr>
<td>DCIS</td>
<td>84%</td>
<td>92%</td>
<td>ns</td>
</tr>
<tr>
<td>ADH</td>
<td>64%</td>
<td>58%</td>
<td>ns</td>
</tr>
<tr>
<td>ALH/LCIS</td>
<td>56%</td>
<td>67%</td>
<td>ns</td>
</tr>
</tbody>
</table>
Mammographic-Pathologic Correlation

• The pathologic diagnosis on a core biopsy must be concordant with the impression from imaging studies

• Discordant diagnoses must be reconciled; may require repeat core biopsies or surgical excision
Examples of Discordance

<table>
<thead>
<tr>
<th>Imaging</th>
<th>Pathology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spiculated mass</td>
<td>any benign dx (except RS/CSL)</td>
</tr>
<tr>
<td>Circumscribed mass</td>
<td>benign, non-specific dx</td>
</tr>
<tr>
<td>“Malignant” Ca++</td>
<td>any benign dx, even if Ca ++ present</td>
</tr>
</tbody>
</table>
Diagnostic Problems

• Similar to those encountered in open surgical biopsies:
  – ADH vs. DCIS
  – Identifying foci of invasion in association with DCIS
  – DCIS vs. LCIS
  – Tubular carcinoma vs. benign sclerosing lesions
  – Papillary lesions
  – Mucocele-like lesion vs. mucinous carcinoma
  – Fibroepithelial lesions
Diagnostic Problems

- Err on the conservative side
- Avoid overdiagnosis when findings are equivocal
Management Problems
To Excise or Not to Excise?

- ADH
- Lobular neoplasia (ALH, LCIS)
- Papillary lesions
- Radial scars
- Fibroepithelial lesions
- Columnar cell lesions
Management Problems
To Excise or Not to Excise?

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ADH on CNB

Conventional Wisdom:
ADH on CNB requires surgical excision to exclude carcinoma (DCIS ± invasion)
ADH on CNB

Likelihood of Carcinoma on Excision Related to:

• Technical aspects:
  – Gauge of needle
  – Lesion targeted (calcs vs. mass)
  – Completeness of removal

• Pathologic aspects:
  – Extent of ADH on core
  – Histologic features of ADH
Attempts at Pathologic Stratification

- **Extent of ADH on CNB**
  - # of foci of ADH

- **Features of ADH on CNB**
  - Micropapillary pattern of ADH
  - Marked ADH
  - Cytologic features bordering on DCIS

- **Features of Microcalcifications**
  - Linear, branching vs. fine, rounded calcifications

Ely, 2001; Sneige, 2003; Dalton, 2003; Eby, 2008; Hoang, 2008; Wagoner, 2009; VandenBussche, 2013
Attempts at Stratification
Forgeard, AJS 2008

Figure 1  Proposition of management for patients with ADH on directional vacuum-assisted stereotactic biopsy.
### TABLE 4: Underestimation Rate of Atypical Ductal Hyperplasia (ADH) Using Residual Microcalcification as Criterion

<table>
<thead>
<tr>
<th>Authors</th>
<th>Reference No.</th>
<th>Year of Publication</th>
<th>Needle Gauge</th>
<th>No. of Core Samples (range)</th>
<th>Underestimation Rate of ADH (%)</th>
<th>Results for Lesions Without Residual Microcalcification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liberman et al.</td>
<td>18</td>
<td>1998</td>
<td>11</td>
<td>14 (1–34)</td>
<td>1/10 (10)</td>
<td>None with no residual microcalcification</td>
</tr>
<tr>
<td>Philpotts et al.</td>
<td>9</td>
<td>2000</td>
<td>11</td>
<td>12 (5–20)</td>
<td>6/26 (23)</td>
<td>No underestimation rate when all calcifications were removed (10 clusters)&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Jackman et al.</td>
<td>8</td>
<td>2002</td>
<td>11</td>
<td>At least 12</td>
<td>22/104 (21)</td>
<td>8% (3/36) when percentage of lesion removed was 100%</td>
</tr>
<tr>
<td>Sneige et al.</td>
<td>13</td>
<td>2003</td>
<td>11</td>
<td>10.8 (6–22)</td>
<td>3/42(7.1)</td>
<td>Underestimation rate was 0% without residual microcalcifications</td>
</tr>
<tr>
<td>Forgeard et al.</td>
<td>28</td>
<td>2008</td>
<td>11</td>
<td>16</td>
<td>29/116(25)</td>
<td>None when lesion size was &lt; 6 mm and all microcalcifications removed</td>
</tr>
<tr>
<td>Wagoner et al.</td>
<td>15</td>
<td>2009</td>
<td>11 and 14</td>
<td>10 (2–26)</td>
<td>33/123 (26.8)</td>
<td>5% underestimation rate without residual microcalcification</td>
</tr>
<tr>
<td>Kohr et al.</td>
<td>16</td>
<td>2010</td>
<td>11</td>
<td>No. of specimens not given</td>
<td>20/101(19.8)</td>
<td>17% (7/41) without residual microcalcification</td>
</tr>
<tr>
<td>Penco et al.</td>
<td>29</td>
<td>2010</td>
<td>8 and 11</td>
<td>No. of specimens not given</td>
<td>13/46 (28.2)</td>
<td>6.7% (1/15) when all calcifications were removed</td>
</tr>
<tr>
<td>Present study</td>
<td>11</td>
<td>2010</td>
<td>11</td>
<td>12 (9–16)</td>
<td>8/67 (11.9)</td>
<td>0% (0/26) with no residual microcalcification; 1.6% (1/61) considering patients in follow-up</td>
</tr>
</tbody>
</table>

<sup>a</sup>Lesions were calcifications and architectural distortions. Five of six underestimated lesions were calcifications cluster.  
<sup>b</sup>No underestimation rate occurred even for two mass lesions (data not included).
Borderline Atypical Ductal Hyperplasia/Low-grade Ductal Carcinoma In Situ on Breast Needle Core Biopsy Should Be Managed Conservatively

Christopher J. VandenBusche, MD, PhD,* Nagi Khouri, MD,† Eman Sbait, MD,‡ Theodore N. Tsangaris, MD,‡ Russell Vang, MD,* Armanda Tatsas, MD,* Ashley Cimino-Mathews, MD,* and Pedram Argani, MD*
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MADH involving a large duct significantly more likely to show DCIS on excision (p<0.01)
Borderline Atypical Ductal Hyperplasia/Low-grade Ductal Carcinoma In Situ on Breast Needle Core Biopsy Should Be Managed Conservatively

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MADH arising in association with CCL significantly more likely to show ADH or benign findings on excision (p<0.05)
Attempts at Stratification

• We may be getting closer to identifying a subset of patients with ADH on CNB who can safely be spared excision
  – Larger gauge needles
  – Multiple cores
  – No residual calcifications
  – Limited ADH on histology
Distinction between ADH and DCIS (on CNB)

- ADH is composed of the same population of atypical epithelial cells as LG DCIS
- Incompletely filling the space
- Some features of UDH
- Comprises 2 spaces or less or 2 mm or less
- May be difficult to be definitive on CNB
Management of ADH vs. DCIS on CNB

• On CNB, determination of the extent is not possible, it may be more prudent to classify a lesion as “ADH bordering on low grade DCIS” or “severely atypical intraductal proliferation bordering on low grade DCIS”

• Both ADH and DCIS are managed with excisional biopsy

• As such it may be more appropriate to classify a lesion as ADH rather than labeling a patient with DCIS on a limited amount of tissue
Our current practice is to perform excision for patients with ADH diagnosed on CNB.
Management Problems
To Excise or Not to Excise?

- ADH
- Lobular neoplasia (ALH, LCIS)
- Papillary lesions
- Radial scars
- Fibroepithelial lesions
- Columnar cell lesions
Management Problems
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- Radial scars
- Fibroepithelial lesions
- Columnar cell lesions
Intraductal Papilloma on CNB

Issues of Concern

• Papilloma vs. papillary DCIS may be difficult, especially with limited material

• ? Representative of lesion as whole - otherwise benign papillomas may harbor foci of ADH or DCIS

• Limited data available
## Benign Papilloma on CNB with Excision Follow-up

<table>
<thead>
<tr>
<th>Author</th>
<th># with excision f/u</th>
<th>CA on</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philpots</td>
<td>6</td>
<td>1 (17%)</td>
</tr>
<tr>
<td>Liberman</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Ivan</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Renshaw</td>
<td>18</td>
<td>0</td>
</tr>
<tr>
<td>Mercado</td>
<td>36</td>
<td>2 (6%)</td>
</tr>
<tr>
<td>Kil</td>
<td>76</td>
<td>6 (8%)</td>
</tr>
<tr>
<td>Bernik</td>
<td>47</td>
<td>14 (36%)</td>
</tr>
<tr>
<td>Tseng</td>
<td>24</td>
<td>7 (29%)</td>
</tr>
<tr>
<td>Rizzo (2012)</td>
<td>234</td>
<td>21 (9%)</td>
</tr>
<tr>
<td>Linda (2012)</td>
<td>64</td>
<td>4 (6%)</td>
</tr>
<tr>
<td>Lu (2012)</td>
<td>66</td>
<td>4 (6%)</td>
</tr>
<tr>
<td>Fu (2012)</td>
<td>203</td>
<td>34 (6%)</td>
</tr>
<tr>
<td>Li (2012)</td>
<td>370</td>
<td>7 (2%)</td>
</tr>
<tr>
<td>Swapp (2013)</td>
<td>77</td>
<td>0</td>
</tr>
</tbody>
</table>
Intraductal Papilloma on CNB

• 234 with IDP only
• 21/234 (9%) upgraded to DCIS or IDC
• Among many clinical and radiologic variables analyzed, only older age was predictive
• Recommend excision due to lack of predictors for upgrade
Solitary Intraductal Papilloma on CNB
Swapp, Ann Surg Oncol, 2013

- 77 with IDP only and excision
- 100 with no excision and stable f/u
- No upgrades to atypia or malignancy
- Recommend imaging f/u rather than excision for solitary intraductal papillomas with no atypia and radiologic concordance
• 34 studies
• 2,236 non malignant papillary lesions
• 346 upgraded to malignant
• Pooled underestimation rate of 15.7%
• Rate for benign papillomas =7.0% (5.6-8.3%)
• Rate for atypical papillomas =36.9% (29.5-44.3%)
Micropapillomas
Microscopic Incidental Intraductal Papillomas on CNB

- **Jaffer, Breast J 2013**
  - 14 excisions for incidental papilloma
  - 8 fibrocystic change, 5/6 incidental papillomas
  - 1 alteration to targeted papilloma
  - No upgrades to atypia

- **Lee AJR 2012**
  - 17 microscopic papillomas
  - Could not determine if incidental or associated with imaging target
  - No upgrades to malignancy

- **BIDMC experience**
  - 10% of papillomas (12/121) on CNB represent incidental findings
  - 50% underwent excision with no upgrades to malignancy
Targeted benign papilloma on CNB requires excision
Management Problems
To Excise or Not to Excise?

• ADH
• Lobular neoplasia (ALH, LCIS)
• Papillary lesions
• Radial scars
• Fibroepithelial lesions
• Columnar cell lesions
Radial Scar on CNB

- **7 studies** (1996-2008)
  - 7/113 pts (6.1%) with RS on CNB had carcinoma on excision

- **Largest study to date** (Brenner, 2002)
  - 157 cases with RS on CNB with either surgical excision (n=102) or 24 month follow-up
    - Malignancy in 13 cases (8.3%)
    - No malignancy if
      - No associated AH
      - CNB ≥12 specimens
      - Mammotome used
Radial Scar on CNB
Linda, AJR, 2012

• 54 women with radial scar diagnosed on US or MRI guided core needle biopsy underwent excision
• 2 upgrades (3.7%)
  – 1 ILC
  – 1 “incidental” low grade DCIS
• Suggest that with negative MRI, may be able to “observe” patients with radial scar
### TABLE 4: Overall Performance of MRI

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Papilloma</th>
<th>Radial Scar</th>
<th>Lobular Neoplasia</th>
<th>Atypical Ductal Hyperplasia</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>75.0 (62–85)</td>
<td>50.0 (36–64)</td>
<td>75.0 (57–87)</td>
<td>75.0 (47–92)</td>
<td>72.7 (65–79)</td>
</tr>
<tr>
<td>Specificity</td>
<td>63.3 (50–75)</td>
<td>78.8 (65–88)</td>
<td>95.7 (81–99)</td>
<td>75.0 (47–92)</td>
<td>74.8 (67–81)</td>
</tr>
<tr>
<td>Positive predictive value</td>
<td>12.0 (6–23)</td>
<td>8.3 (3–20)</td>
<td>90.0 (74–97)</td>
<td>50.0 (25–74)</td>
<td>30.2 (23–38)</td>
</tr>
<tr>
<td>Negative predictive value</td>
<td><strong>97.4 (89–100)</strong></td>
<td><strong>97.6 (88–100)</strong></td>
<td><strong>88.0 (72–96)</strong></td>
<td><strong>90.0 (63–99)</strong></td>
<td><strong>94.8 (90–97)</strong></td>
</tr>
</tbody>
</table>

Note—Data are percentages with 95% CI in parentheses.
All Patients with Radial Scar on CNB Undergo Excision
Management Problems

To Excise or Not to Excise?

- ADH
- Lobular neoplasia (ALH, LCIS)
- Papillary lesions
- Radial scars
- Fibroepithelial lesions
- Columnar cell lesions
Fibroepithelial Lesions on CNB

- Dx of fibroadenoma usually readily made on CNB; excision not required....
Fibroepithelial Lesions of the Breast
Issues for Core Needle Biopsy

Predictors of phyllodes tumors on core needle biopsy
Fibroepithelial Lesions of the Breast Issues for Core Needle Biopsy

• Several studies have attempted to stratify cellular fibroepithelial lesions
  • Jacobs et al. (Am J Clin Pathol, 2005)
    – Evaluated 29 FELCS on CNB (16 FA and 12 PT)
  • Lee et al. (Histopathol, 2007)
    – Evaluated 36 PT and 38 FA with prior CNB
  • Jara-Lazaro et al. (Histopathol, 2010)
    – Evaluated 261 CNB of FEL
Fibroepithelial Lesions of the Breast

Issues for Core Needle Biopsy

- **Jacobs et al.** (Am J Clin Pathol, 2005)
  - Evaluated 29 FELCS on CNB (16 FA and 12 PT)
  - Features assessed included:
    - Stromal cellularity (mild, moderate, marked)
    - Stromal cell nuclear atypia
    - Stromal mitotic count
    - Stromal to epithelial ratio (%)
    - Stromal overgrowth (4x field)
    - Infiltrative edge
    - Epithelial hyperplasia
    - Stromal condensation
    - Growth pattern (peri-, intracanalicular, mixed)
    - Leaf-like pattern
    - Multinucleated stromal giant cells
FELCS on CNB
Jacobs et al. (Am J Clin Pathol, 2005)

% of cases

- Mildly Increased
- Moderately Increased
- Markedly Increased
- Stromal Cellularity
Fibroepithelial Lesions of the Breast
Issues for Core Needle Biopsy

- Lee et al. (Histopathol, 2007)
  - Evaluated 36 PT and 38 FA with prior CNB
  - Features assessed included:
    - Stromal cellularity
    - Stromal condensation
    - Stromal cell pleomorphism
    - Stromal overgrowth (10x and 20x)
    - Percentage of lesion composed of stroma
    - Lesion edge (circumscribed, infiltrative, NA)
    - Stromal mitoses
    - Specimen fragmentation
    - Intracanalicular pattern (present vs. absent)
    - Clefting
    - Stromal adipose tissue or heterologous elements
Fibroepithelial Lesions of the Breast
Issues for Core Needle Biopsy

• Jara-Lazaro et al. (Histopathol, 2010)
  – Evaluated 261 CNB of FEL (21 FA and 36 PT on excision included in the histologic assessment)
  – Features assessed included:
    • Lesional edge
    • Stromal cellularity
    • Stromal overgrowth (4x)
    • Stromal distribution (condensation)
    • Stromal nuclear atypia
    • Stromal mitoses
    • Ratio of epithelial to stromal elements
    • Leaf-like pattern
    • Epithelial hyperplasia
    • Presence of PASH
Fibroepithelial Lesions of the Breast
Issues for Core Needle Biopsy

Predictors of phyllodes tumors
on core needle biopsy

Immunohistochemistry
Fibroepithelial Lesions of the Breast Immunohistochemistry

- Jacobs et al. (Am J Clin Pathol, 2005)
  - Evaluated Ki-67, topoisomerase II and p53

<table>
<thead>
<tr>
<th>Table 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ki-67, DNA Topoisomerase II α, and p53 Immunostaining of Fibroepithelial Lesions With Cellular Stroma in Core Needle Biopsy Specimens in Relation to Outcome at Surgical Excision*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Immunostaining</th>
<th>Fibroadenoma at Excision (n = 15)</th>
<th>Phyllodes Tumor at Excision (n = 9)</th>
<th>( P )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ki-67 index (%)</td>
<td>1.6 (0.4-4.4)</td>
<td>6.0 (0-18.0)</td>
<td>.002</td>
</tr>
<tr>
<td>Topoisomerase II α index (%)</td>
<td>2.8 (0-10.0)</td>
<td>7.0 (1.2-29.0)</td>
<td>.014</td>
</tr>
<tr>
<td>No. (%) of p53+ cases</td>
<td>3 (20)</td>
<td>2 (22)</td>
<td>1.0</td>
</tr>
</tbody>
</table>

* The Ki-67 and topoisomerase II α indices, given as the median (range), represent the percentage of stromal cells that showed a positive nuclear stain. Staining for p53 was considered positive when more than 5% of the stromal cells showed distinct nuclear staining.
Fibroepithelial Lesions of the Breast Immunohistochemistry

• Jara-Lazaro et al. (Histopathol, 2010)
  – Evaluated Bcl-2, CD117, Ki-67, topoisomerase II and CD34
Fibroepithelial Lesions of the Breast
Immunohistochemistry

- Jara-Lazaro et al. (Histopathol, 2010)

<table>
<thead>
<tr>
<th>Table 3. Summary of immunohistochemical findings of core biopsies correlating with outcome on excision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>KI67</td>
</tr>
<tr>
<td>Negative (n = 32)</td>
</tr>
<tr>
<td>&lt;5% (n = 4)</td>
</tr>
<tr>
<td>≥5&lt;10% (n = 12)</td>
</tr>
<tr>
<td>10–15% (n = 6)</td>
</tr>
<tr>
<td>&gt;15% (n = 3)</td>
</tr>
<tr>
<td>Topoisomerase IIα</td>
</tr>
<tr>
<td>Negative (n = 31)</td>
</tr>
<tr>
<td>&lt;5% (n = 11)</td>
</tr>
<tr>
<td>≥5–20% (n = 7)</td>
</tr>
<tr>
<td>&gt;20% (n = 8)</td>
</tr>
<tr>
<td>CD34</td>
</tr>
<tr>
<td>Negative (n = 3)</td>
</tr>
<tr>
<td>Focal (5–30%)</td>
</tr>
<tr>
<td>Patchy (30–&lt;70%)</td>
</tr>
<tr>
<td>Diffuse (≥70–100%)</td>
</tr>
</tbody>
</table>
Fibroepithelial Lesions of the Breast
Issues for Core Needle Biopsy

- Management recommendations include:
  - Excision with margin of normal tissue if two or more features present
  - Less extensive excision if only one feature is present
  - Possibly observation

- **BUT**.....given sampling issues excision recommended for all cellular fibroepithelial lesions
  - Core needle biopsy diagnosis of fibroadenoma does not completely exclude phyllodes tumor

Jacobs, 2005
Lee, 2007
Jara-Lazaro, 2010
Resetkova, 2010
Management Problems

To Excise or Not to Excise?

- ADH
- Lobular neoplasia (ALH, LCIS)
- Papillary lesions
- Radial scars
- Fibroepithelial lesions
- Columnar cell lesions
Columnar Cell Change/Hyperplasia

Found on excision:
- No further treatment

Found on CNB:
- No excision necessary

No additional levels obtained
Flat Epithelial Atypia

FEA on core biopsy

– Excision required
– “Upgraded” in 0-30% of cases

Bianchi, Virchow Arch, 2012
Peres, BCRT, 2012
De Mascarel, Mod Pathol, 2011
Lee, Breast Journal, 2010
Ingegnoli, Breast Journal, 2010
Tomasino, J Cell Physiol, 2009
Chivukula, Am J Clin Pathol, 2009
Senetta, Mod Pathol, 2009
Kunju, Hum Pathol, 2007
Flat Epithelial Atypia

FEA on core biopsy

- “Upgraded” in 0-30% of cases
- But need for excision remains uncertain
- Rad-path correlation required

WHO, 2012
Management Problems
To Excise or Not to Excise?

- A major role of CNB is to spare patients with probably benign lesions open surgical excision where possible
- Threshold for recommending open biopsy should be low
- If there is doubt, take it out
Consequences, Complications and Artifacts Related to Core Needle Biopsies

- Hemorrhage, granulation tissue, scarring and bx site
- Infarction
- Epidermoid cysts
- The missing cancer
- Epithelial displacement
Consequences, Complications and Artifacts Related to Core Needle Biopsies

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Two major types

- Pellets of resorbable copolymer of polylactic acid/polyglycolic acid
  - Cell poor fibrotic reaction around empty spaces followed by FBGCR
- Plug of bovine collagen
  - Eosinophilic hyalinized acellular material with lymphocytic infiltrate
  - Degradation of plug associated with deposition of native collagen
  - Absence of significant FBGCR
Consequences, Complications and Artifacts Related to Core Needle Biopsies

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The Missing Cancer

- Cancer in core; no cancer in surgical specimen
- Uncommon
- Likely to be seen increasingly with larger gauge needles and use of mammotome
Schematic Representation of Percutaneous Biopsy Techniques

- Microcalcification
- Core biopsy

CNB 14G

VACB 11 or 8 G

ABBI or En Bloc

Adapted from Wong et al, Adv Anat Pathol 2000;7:26-35
The Missing Cancer

- Patient misidentification
- False positive CNB
- Biopsy site not excised
- Inadequate sampling
- Lesion entirely removed by CNB
- Obliteration of residual cancer by healing process
Contents of the Surgical Pathology Report

• Sufficient information to permit radiologic-pathologic correlation and to get patient into appropriate therapeutic algorithm

• Optimal amount of information to include for cases of invasive cancer controversial
  – Inclusion of too much information can be problematic
Which features should be noted in pathology reports of CNB specimens containing an invasive cancer?
Assessment of Standard Prognostic Factors on CNB
Sharifi, 1999

<table>
<thead>
<tr>
<th>Factor</th>
<th>Agreement Between CNB and Excision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>21%</td>
</tr>
<tr>
<td>Histologic type</td>
<td>81% (72-82%)*</td>
</tr>
<tr>
<td>Histologic grade</td>
<td>75% (62-83%)*</td>
</tr>
</tbody>
</table>

*range reported in literature

Rakha, J Clin Pathol, 2007
Assessment of Standard Prognostic Factors on CNB

• If size, special histologic type, and/or grade are reported, should have a caveat
  – “in this limited sample”
  – for size: “this represents a minimum size”
## Assessment of Prognostic and Predictive Markers

Jacobs, 1998

<table>
<thead>
<tr>
<th>Factor</th>
<th>Agreement Between CNB and Excision</th>
</tr>
</thead>
<tbody>
<tr>
<td>ER</td>
<td>100%</td>
</tr>
<tr>
<td>HER2</td>
<td>100%</td>
</tr>
<tr>
<td>p53</td>
<td>100%</td>
</tr>
<tr>
<td>bcl2</td>
<td>100%</td>
</tr>
</tbody>
</table>

Rakha, J Clin Pathol, 2007  
Sutela, Acta Oncol, 2008
Assessment of Prognostic and Predictive Markers

• False negative ER on CNB (Lee, J Clin Pathol, 2008)

• Intratumor heterogeneity for HER2 (Striebel, Am J Clin Pathol, 2008; Chivukula, Mod Pathol, 2008)

• Our practice is to perform markers on all CNBs and not on excisions

• Repeat on excision for aberrant results, negative results or cases of neoadjuvant therapy
Conclusions

- Core needle biopsies represent an important advance in the evaluation of non-palpable breast lesions
- Pathologists, radiologists, and clinicians need to understand limitations
- Pathologists need to be aware of the artifacts associated with CNB
- Radiologic-pathologic correlation is essential in every case