Percutaneous Breast lesion Ablation: When avoid Open Surgery?

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Hartmann Clinic
Built in 1904
First Cobalt bomb

HARTMANN
1955
Minimal invasive treatment?
Local Treatment
Surgery / Minimaly treatment US procedures

Remove
- Surgery
- VABB
- Intact

Heat
- RF
- Laser
- FUS

Freeze
- CryoT
Clinical pathway

- **Before intervention**
  - Explanation
  - Concordance
  - Balistic
    - Guidance method
    - Biopsy device
- **At the moment of the Intervention**
- **After intervention**
  - Complications
  - Concordance
  - Histology
  - **What to do ?**
    - Follow up
    - Surgery
    - Neoadjuvant chemotherapy
Written informed consent is required before all breast interventions.

The risks explained to the patient include bleeding and infection.

Anticoagulation is a relative contraindication to all biopsies.
- Patients are usually asked to discontinue therapy for a short time prior to the biopsy.

The patient should be informed of the potential benefits of the biopsy:
- Including avoidance of surgery with benign results.
- Preoperative confirmation of malignancy, which allows definitive surgical treatment in one surgical setting.

Tailored prebiopsy counseling may better prepare women for percutaneous breast biopsy and improve their overall experience.
Minimal Invasive Interventions

Preconditions for Minimal Invasive Interventions

Methods - Overview

Risk and complications Tumor cells after Intervention

Methods - Comparison

Reimbursement pricing
Preconditions for Minimal Invasive Interventions:  
Complementary Breast Diagnostic

- Clinical Examination
- Mammography
- Sonography
- Radiological Special X-Rays
- Color Doppler Sonography
- MRI
Breast Biopsy

Why Ultrasound Guidance?

- Real-time imaging of the breast
- Patient is lying on their back
- Ultrasound has excellent contrast resolution
- Cost effective
- Non-ionizing
- Portable
Results

- 17 studies that included benign and malignant lesions
- The general lesion detection rate at second-look US was very heterogeneous ranged between 22.6% and 82.1%
- Highest second-look US detection rates for:
  - mass lesions (as opposed to nonmass lesions)
  - and malignant (vs benign) lesions ($P < .001$ for both).
- Positive or negative second-look US correlates of MR imaging–detected malignant or benign lesions
  - Positive predictive value $\text{PPV} : 30.7\%$ (95% CI: 25.3%, 36.4%; $I^2 = 75.4\%; P < .0001$)
  - Negative predictive values $\text{NPV} : 87.8\%$ (95% CI: 82.0%, 92.7%; $I^2 = 82.1\%; P < .0001$)
Specimens XRays
to excise or to sample?

- Excision for probably benign lesion + clip
  - Birads 3
  - Birads 4a

- Sample for suspicious or malignant lesion
  - Birads 4 b & c
  - Birads 5 & 6
Indications for diagnostic representative or ablative Vacuum - Biopsy (VABB) / US

1. After Large Core Needle Biopsy (LCNB) and suspicion of breast cancer (BI-RADS® 4c / 5, mismatch / discordance of the results of diagnostic imaging and histology)

2. Suspicious lesions (BI-RADS® 4 / 5) diameter ~ 5 mm

3. Resection of definitely benign, but symptomatic findings or High risk patients
   1. symptomatic Fibroadenoma
   2. recurrent symptomatic cysts

4. Intraductal / intracystical proliferations: singulary Papilloma, complex cyst

5. Neoadjuvant Chemotherapy

6. Suspiscious of local recurrence

7. Hazardous or dangerous location: deep, superficial, implants…
Indications for diagnostic representative or ablative Vacuum - Biopsy (VABB) /US

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7. Hazardous or dangerous location: deep, superficial, implants…
Local Treatment
Surgery / Minimaly treatment US procedures

Remove
- Surgery
- VABB
- Intact

Heat
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Freeze
- CryoT
big lesion
DBT 3D guided VABB
Prone position

Giotto Tomo Class
Digital Breast Tomosynthesis-guided Vacuum-assisted Breast Biopsy: Initial Experiences and Comparison with Prone Stereotactic Vacuum-assisted Biopsy

Radiology: Volume 274: Number 3—March 2015
DBT 3D guided VABB
Prone position
DBT 3D guided VABB

Giotto Class IMS – Prone position
DBT 3D guided VABB
DBT 3D guided VABB
DBT 3D guided VABB
Figure 2a: Bar graphs show the time needed per lesion for (a) the total intervention, (b) reidentification and targeting of the lesion, and (c) the actual biopsy procedure (tissue sampling) for DBT digital breast tomosynthesis, VAB vacuum-assisted biopsy and conventional PS prone stereotactic biopsy.

Digital Breast Tomosynthesis-guided Vacuum-assisted Breast Biopsy: Initial Experiences and Comparison with Prone Stereotactic Vacuum-assisted Biopsy

Simone Schrading, MD
Martina Distelmaier, MD
Timm Dirrichs, MD
Sabine Detering, MD
Liv Brolund, MD
Kevin Strobel, MD
Christiane K. Kuhl, MD

Radiology: Volume 274: Number 3—March 2015
Local Treatment
Surgery / Minimaly treatment US procedures

Remove
- Surgery
- VABB
- Intact

Heat
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Freeze
- CryoT
Intact system

1. With a small (6-8mm) incision, Intact® wands can easily access the target lesion under image guidance.

2. The wand envelops the target tissue. Capture takes less than 10 seconds.

3. The intact sample is withdrawn.
intact
Intact
Exérèse One Bloc
Post Minimal Invasive Therapy assessment
post intervention follow up

J8-J15
To successfully perform a minimally invasive breast biopsy
- it is important to not only be familiar with the technique
- but also with how to determine radiologic-pathologic concordance
- and the appropriate treatments for patients after the procedure

When reviewing pathologic results for concordance
- it is important to ensure that microcalcifications are identified in the histologic specimen
- and the specific pathologic diagnosis is consistent
  - with the morphologic characteristics seen at mammography
  - and the pretest probability of malignancy.
Benign and good radiologic-pathologic concordance

No surgery
At an histopathological benign result there should be performed an imaging control after 6 months

European Guidelines
At the follow-up examination

- both the histologic and imaging findings should be revisited
- and the mass should be assessed at mammography or US to ensure that it is stable
- If it has grown in size or its morphologic characteristics have changed
- If calcifications increase in number or extent or the mass changes
  - Increases in size or its features become more suspicious
  - appropriate action should be taken
  - **Excision is typically recommended**
- If the lesion is stable at follow-up examination
  - the patient may return to the general screening population
Discussion
Premalignant lesion

- Underestimation rate
  ADH, DCIS, LCIS

- Not eliminated with VABB
  - > PPV: malignant
  - > NPV: benign

- Surgical indication
DCIS underestimation rates by biopsy device were
- 20.4% (76 of 373) at large-core biopsy
- 11.2% (107 of 953) at vacuum-assisted biopsy (P < .001)
- 24.3% (35 of 144) of masses
- 12.5% (148 of 1,182) of microcalcifications (P < .001)

and by number of specimens per lesion
- 17.5% (88 of 502) with 10 or fewer specimens
- 11.5% (92 of 799) with greater than 10 specimens (P < .02)

DCIS underestimations increased with lesion size
- 1.9 times more frequent with masses than with calcifications
- 1.8 times more frequent with LCB than with VAB
- 1.5 times more frequent <10 or fewer specimens per lesion than with ≥ 10 specimens per lesion.
ADH

Frederick R. Margolin1 Jessica W. T. Leung1,2 Richard P. Jacobs1 Susan R. Denny1
Percutaneous Imaging-Guided Core Breast Biopsy: 5 Years' Experience in a Community Hospital, AJR:177, September 2001

<table>
<thead>
<tr>
<th>Study</th>
<th>Rate of ADH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Author</td>
</tr>
<tr>
<td>Liberman et al. [14]</td>
<td>1998</td>
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<tr>
<td>Brem et al. [16]</td>
<td>1999</td>
</tr>
<tr>
<td>Burak et al. [18]</td>
<td>2000</td>
</tr>
<tr>
<td>Philpotts et al. [19]</td>
<td>2000</td>
</tr>
<tr>
<td>Rao et al. [26]</td>
<td>2002</td>
</tr>
<tr>
<td>Pandelidis et al. [27]</td>
<td>2003</td>
</tr>
<tr>
<td>Winchester et al. [28]</td>
<td>2003</td>
</tr>
<tr>
<td>Sohn et al. [29]</td>
<td>2007</td>
</tr>
<tr>
<td>Lourenco et al. [30]</td>
<td>2007</td>
</tr>
<tr>
<td>This study</td>
<td>2009</td>
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</table>

ADH Prevalence 2% to 15%
Underestimation 10 to 35 %

### TABLE 1: Results of 9- and 11-Gauge Vacuum-Assisted Breast Biopsy

<table>
<thead>
<tr>
<th>Parameter</th>
<th>11-Gauge Biopsy (34 mo)</th>
<th>9-Gauge Biopsy (31 mo)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total no. of stereotactic vacuum-assisted breast biopsy procedures</td>
<td>391</td>
<td>600</td>
<td>991</td>
</tr>
<tr>
<td>Lesions with atypical ductal hyperplasia (ADH)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>58/391 (14.8)</td>
<td>83/600 (13.8)</td>
<td>141/991 (14.2)</td>
</tr>
<tr>
<td>ADH lesions with surgical follow-up</td>
<td>52/58 (89.7)</td>
<td>77/83 (92.8)</td>
<td>129/141 (91.5)</td>
</tr>
<tr>
<td>Lesions excluded because of mastectomy</td>
<td>3</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Number of lesions with excisional biopsy follow-up</td>
<td>49</td>
<td>74</td>
<td>123</td>
</tr>
<tr>
<td>Frequency of upgrade to DCIS or invasive carcinoma&lt;sup&gt;b&lt;/sup&gt;</td>
<td>10/49 (20.4)</td>
<td>16/74 (21.6)</td>
<td>26/123 (21.1)</td>
</tr>
</tbody>
</table>

**ADH Prevalence = 14.2%**

**Underestimation = 21.1%**
### ADH Prevalence and Underestimates at Prone Stereotactic Breast Biopsy

<table>
<thead>
<tr>
<th>Study and Year</th>
<th>ADH Lesions</th>
<th>14-gauge Large Core</th>
<th>14-gauge Vacuum Assisted</th>
<th>11-gauge Vacuum Assisted</th>
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</thead>
<tbody>
<tr>
<td>Jackman et al (1), 1994</td>
<td>19 of 450 (4)</td>
<td>9 (6 DCIS, 3 IC) of 16 (56)</td>
<td>0</td>
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<td>Liberman et al (2), 1995</td>
<td>25 of 264 (9)</td>
<td>11 (8 DCIS, 3 IC) of 21 (52)</td>
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<td>Tocino et al (3), 1996</td>
<td>18 of 358 (5)</td>
<td>9 (5 DCIS, 4 IC) of 18 (50)</td>
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<tr>
<td>Nguyen et al (4), 1996</td>
<td>32 of 433 (3)</td>
<td>4 (4 NA) of 13 (13)</td>
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<tr>
<td>Burbank (5), 1997</td>
<td>51 of 1,836 (3)</td>
<td>10 (7 DCIS, 3 IC) of 18 (36)</td>
<td>9 (7 DCIS, 2 IC) of 24 (38)</td>
<td>0</td>
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<tr>
<td>Lee et al (6), 1997</td>
<td>43 of 851 (5)</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Liberman et al (7), 1997</td>
<td>26 of 753 (3)</td>
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<tr>
<td>Moore et al (8), 1997</td>
<td>27 of 590 (5)</td>
<td>6 (4 DCIS, 2 IC) of 19 (32)</td>
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<td>Gadzala et al (9), 1997</td>
<td>8 of 1,386 (6)</td>
<td>5 (1 DCIS, 1 IC) of 13 (13)</td>
<td>0</td>
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<td>Brown et al (11), 1998</td>
<td>10 of 1,386 (7)</td>
<td>5 (1 DCIS, 4 IC) of 40 (13)</td>
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<td>Meyer et al (12), 1998</td>
<td>10 of 1,386 (8)</td>
<td>6 (5 DCIS, 1 IC) of 26 (23)</td>
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<td>Lin et al (13), 1998</td>
<td>10 of 1,386 (9)</td>
<td>5 (1 DCIS, 2 IC) of 10 (10)</td>
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<td>Fuhlman et al (14), 1998</td>
<td>10 of 1,386 (10)</td>
<td>5 (1 DCIS, 2 IC) of 10 (10)</td>
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<tr>
<td>Liberman et al (19), 1998</td>
<td>10 of 1,386 (11)</td>
<td>5 (1 DCIS, 2 IC) of 10 (10)</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Jackman et al (15), 1999</td>
<td>10 of 1,386 (12)</td>
<td>5 (1 DCIS, 2 IC) of 10 (10)</td>
<td>0</td>
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<tr>
<td>Brem et al (20), 1999</td>
<td>10 of 1,386 (13)</td>
<td>5 (1 DCIS, 2 IC) of 10 (10)</td>
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<tr>
<td>Meyer et al (16), 1999</td>
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<td>0</td>
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<tr>
<td>Burak et al (21), 2000</td>
<td>10 of 1,386 (15)</td>
<td>5 (1 DCIS, 2 IC) of 10 (10)</td>
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<td>Philipps et al (22), 2000</td>
<td>10 of 1,386 (16)</td>
<td>5 (1 DCIS, 2 IC) of 10 (10)</td>
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<td>O’Hea and Tornos (17), 2000</td>
<td>10 of 1,386 (17)</td>
<td>5 (1 DCIS, 2 IC) of 10 (10)</td>
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<td>Adrales et al (23), 2000</td>
<td>10 of 1,386 (18)</td>
<td>5 (1 DCIS, 2 IC) of 10 (10)</td>
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<td>Darling et al (18), 2000</td>
<td>10 of 1,386 (19)</td>
<td>5 (1 DCIS, 2 IC) of 10 (10)</td>
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<td>Cangierella et al (24), 2001</td>
<td>10 of 1,386 (20)</td>
<td>5 (1 DCIS, 2 IC) of 10 (10)</td>
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<td>Raza et al (25), 2001</td>
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<td>5 (1 DCIS, 2 IC) of 10 (10)</td>
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<td>Lai et al (26), 2001</td>
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<td>5 (1 DCIS, 2 IC) of 10 (10)</td>
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<tr>
<td>Present study</td>
<td>10 of 1,386 (23)</td>
<td>5 (1 DCIS, 2 IC) of 10 (10)</td>
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</tr>
</tbody>
</table>

**Total** | 894 of 18,601 (5) | 127 (93 DCIS, 30 IC, 4 NA) of 288 (44) | 24 (18 DCIS, 6 IC) of 102 (24) | 73 (52 DCIS, 19 IC, 2 NA) of 380 (19)

**ADH Prevalence 3% to 11% mean 5%**

**Underestimation**

- 44% with 14g LCB
- 19% with 11g VABB

Carcinoma was found at excision in
- 28% (8/29) of lesions with associated atypical hyperplasia
- 4% (5/128) of lesions without associated atypia

In the latter group, carcinoma was found at excision in
- 3% (2/60) of masse
- 8% (3/40) of architectural distortions
- 0% (0/28) of microcalcification lesions

Malignancy was missed in
- 9% (5/58) of lesions biopsied with a spring-loaded device LCB
- 0% (0/70) of lesions biopsied with a directional vacuum-assisted device VABB
- 8% (5/60) of lesions sampled with less than 12 specimens
- 0% (0/68) sampled with 12 or more specimens

Lesion type, maximal lesion diameter, and type of imaging guidance (stereotactic or sonographic) were not significant factors in determining the presence of malignancy.

CONCLUSION:
Diagnosis of radial scar based on core needle biopsy is likely to be reliable when no associated atypical hyperplasia biopsy includes at least 12 specimens (VABB) if mammographic findings are reconciled with histologic findings. If miss a criteria, excisional biopsy is indicated.
Lobular Neoplasia: ALH & LCIS
at Percutaneous Breast Biopsy: Variables Associated with Carcinoma at Surgical Excision
Rachel F. Brem, Mary C. Lechner, Roger J. Jackman
AJR 2008; 190:637–641

OBJECTIVE. better define the rate and variables associated with cancer underestimation when lobular neoplasia is found at breast biopsy. ALH or LCIS

MATERIALS AND METHODS.
- The records of 32,420 patients who underwent imaging-guided needle biopsy from 1988 to 2000 retrospectively reviewed.
- 278 cases in which lobular neoplasia was the highest-risk lesion at biopsy were included.
- 164 proceeded to surgical excision, allowing calculation of rates of underestimation from minimally invasive biopsy.

RESULTS
- lobular neoplasia was found in 278 = 0.9%
- 164/278 (59%) continued to surgical excision
- cancer confirmed in 38 = 23%
- No difference underestimation rates LCIS = 25%, 17 of 67 / ALH = 22%, 21 of 97 lesions
- Statistically significant underestimation
  - masses (with or without associated µcalcifications) > µcalcifications only
  - higher BI-RADS category
  - core biopsy device rather than a vacuum device
  - obtaining fewer specimens

CONCLUSION
- all patients with lobular neoplasia at core or vacuum-assisted biopsy should undergo surgical excision until further differentiating criteria can be determined.
Lobular carcinoma in situ/atypical lobular hyperplasia on breast needle biopsies: does it warrant surgical excisional biopsy? A study of 27 cases


- 3163 breast core needle biopsies were retrieved from the surgical pathology files between 2003 and 2009
- among them, 56 (1.8%) cases were identified with a diagnosis of ALH or LCIS
- Eleven cases were excluded because of the presence of a more severe lesion in the biopsies that mandated excision
- The remaining 45 cases contained only ALH or LCIS
  - 27 had surgical excision follow-up
  - In the surgical excision specimens, 5 (19%) of 27 (11% of 45) cases showed more severe lesions or were "upgraded »
    - 3 invasive ductal carcinomas
    - 1 invasive lobular carcinoma
    - 1 ductal carcinoma in situ
    - Histologic features of the lobular neoplasia on the core were found to have no predictive value for a more severe lesion in the subsequent excision

- We suggest that patients with LCIS/ALH on core needle biopsy should be considered for surgical excision to rule out a more significant lesion regardless of the histologic features.
Atypical Lobular Hyperplasia and Lobular Carcinoma in Situ at Core Breast Biopsy: Use of Careful Radiologic-Pathologic Correlation to Recommend Excision or Observation


Flow diagram of total number of cases partitioned into radiologic and histologic concordance or discordance. IC = invasive carcinoma.
Atypical Lobular Hyperplasia and Lobular Carcinoma in Situ at Core Breast Biopsy: Use of Careful Radiologic-Pathologic Correlation to Recommend Excision or Observation


- Advance in Knowledge
  - None of the 43 (95% CI: 0%, 8%) benign concordant cases were upgraded at subsequent surgical excision or extended imaging follow-up
  - which suggests that arbitrary excision in all cases of ALH or LCIS may not be necessary.

- Focused and complete radiologic-pathologic correlation may obviate excisional biopsy in patients with benign concordant biopsy findings
- Additional validation of this is required before this approach can be universally applied
- Total study duration = 13 years, median follow-up duration: 10 years.
- Accrual duration of 5.5 years and an further follow up period of 7.5 years
- 1842 patients (taking into account 5% dropout at 10 years and 5%
EXCLUSION

- Breast cancer in situ or high-grade DCIS or invasive breast cancer immediate or high-grade DCIS or low-grade DCIS
- Poor correlation of radiological findings and pathological findings
- Lower grade DCIS
- MRI suspicious or in situ or invasive breast cancer or other findings
- Biopsy proven DCIS or low-grade DCIS
- > 2 vacuum assisted core biopsies with pure benign lesion allowed
- Prior surgery or contralateral DCIS allowed
- Patients with expectancy > 5 years
- > 49 years of age
- Women

INCLUSION

- Restaging (contraindication) CT/MRI/Mammography results found at ultrasound performed within 28 days prior to referral to the hospital solely based on mammography and mammography by the national screening program or by opportunistic screening
- Microcalcifications as detected by mammography
- TSNA
- DCIS grade 1 on vacuum assisted core biopsy

BEFORE RANDOMIZATION

Eligibility Criteria

- Symptomatic mammogram and mammography
- Good correlation between radiological and pathological findings
- Breast cancer in situ or high-grade DCIS or invasive breast cancer
- Prior surgery or contralateral DCIS allowed
... therapeutic policies.

To compare the ipsilateral mastectomy rate between the two

and active surveillance arm.

To assess the biopsy rate during follow-up in the standard treatment

the standard treatment arm.

To assess the rate of higher grade DCIS at final pathology specimen in

the standard treatment arm.

To assess the rate of invasive disease at final pathology specimen in

MAIN SECONDARY OBJECTIVES

standard of care.

mastectomy, possibly followed by hormonal therapy, will remain the

either wide local excision (WLE) only, WLE plus radiotherapy or

active surveillance strategy or if the conventional treatment, being

ipsilateral invasive breast cancer rate (at 10 years) be managed by an

To determine whether low-grade DCIS can safely (measured by

OBJECTIVES

OBJECTIVES
Minimal invasive diagnosis

- Benign lesion
- Malignant lesion
- Premalignant lesions

Minimal invasive treatment?

- Overdiagnosis
- Overtreatment

- New paradigm
- New guideline
- Most studies

- Benign lesion
- Malignant lesion?
Take home message

- Clinical pathway/Parcours Patient
  - Faisability
  - Explanation
  - Device and guidance
  - Concordance +++
  - Follow up/Treatment

- Direct excision for ACR 3/4A
  - All in one
  - If benign : follow up

- Sampling for ACR 4BC and 5
  - Discussion for resection dependind histologic patern and patient
    - Interventionnal
    - surgery

- Success rate : 95 à 98 %
No imaging specificity for PML

Histology correlation for all Birads 4 and 5 lesions

PML prevalence out of DCIS
- ADH 5%
- ALH/LCIS 0.9 to 2%

Under-estimation rate
- ≈ 10% VABB
- ≈ 20% LCNB

PML refered for surgical excision
- ALH ?...

Present & Next Futur :
- Minimal invasive therapy/ patient selection
  - Benign
  - Premalignant +/- ...?
  - and Malignant ??? Etude LORD