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Centre Oscar Lambret
Centre Régional de Lutte contre le Cancer

JFIM Journées Francophones d'Imagerie Médicale

Breast MRI interventional

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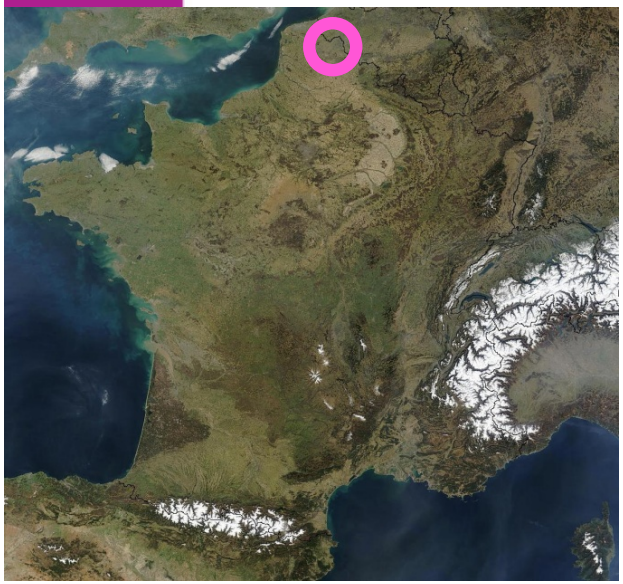


Breast MRI : respect indications

- Screening in BRACx mutation (or equivalent)
- Recurrence ?
- Problem solving (after mammography & US / Biopsy)
- Implants examination
- Assessment of neoadjuvant chemotherapy
- Before treatment in some cases of breast cancer
  - BRACx and very high risk
  - < 40 year-old
  - Lobular carcinoma
  - Doubt about multifocality, size discordance

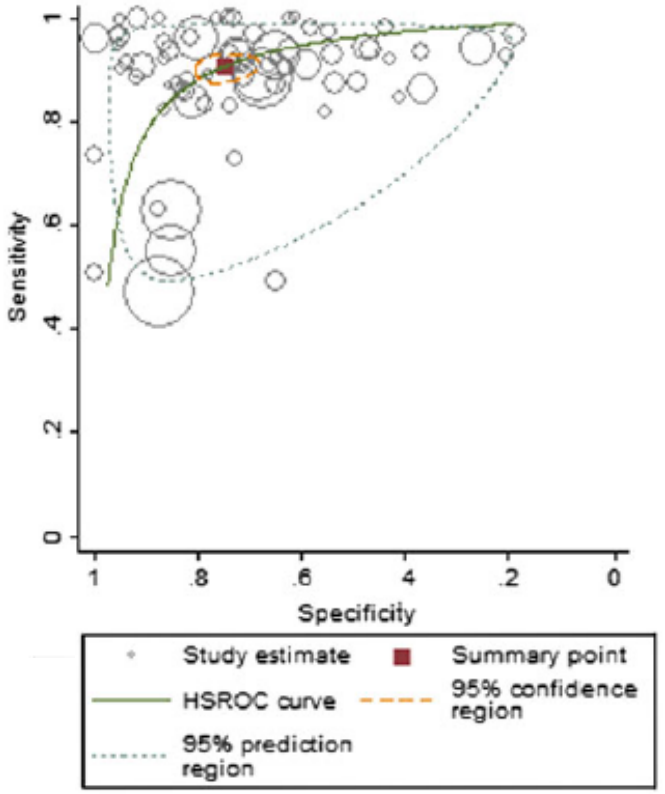
ACR, HAS, EUSOMA

MRI = low specificity

Accuracy of magnetic resonance in suspicious breast lesions: a systematic quantitative review and meta-analysis

Medeiros LR et al. Breast Cancer Research and Treatment 2011

- 69 studies. 1985 – 2010. 9298 pts, 9884 lesions.
- **Se : 90% [0.88-0.92]**
- **Sp : 75% [0.70-0.79]**
- LR+ : 3,64 [3-4,2]
- LR- : 0,12 [0.09-0.15]
- AUC : 0.91
- Point Q* : 0.84



2nd look US

Spick, Radiology 2014 : Diagnostic Utility of Second- Look US for Breast Lesions Identified at MR Imaging: Systematic Review and Meta-Analysis

- 17 studies (until 2013) , MRI 2201 lesions
- Dg 2082 L : BL 1581, ML 501 : Prevalence malignancy : 22% [2%-51%]
- 1266 / 2201 seen at 2nd look US : **57,7%** [22,6 – 82,1%]

→ BL 829, ML 380, 57 ?

- **VPP = 31% [4-56%]**
- **VPN = 88% [46,2-100%]**

- Mass enhancement & Malignant L : significant variables,
- Size (cut-of 1cm) non significant variable

→ **A negative 2nd look US not exclude malignancy**

Indication of MRI breast biopsy

Type of lesions :

- Suspicious contrast enhancement : BI-RADS 4, 5 or even 3
- **AND** no target on mammography **and** US (2nd look)

→ Use the most effective, easiest and fastest method

→ **Average malignancy rate : 20-60%** : 3% < 5 mm / 31% > 20 mm

Practical conditions

- Training recommendations - Eusoma 2010 :
  - Experienced breast centers
  - Team with 150 Breast MRI and 50 biopsies / year
  - Work alone after 3-15 procedures (French or European guidelines)

- Equipment
  - Magnet : 1T to 3 T, most often 1.5T

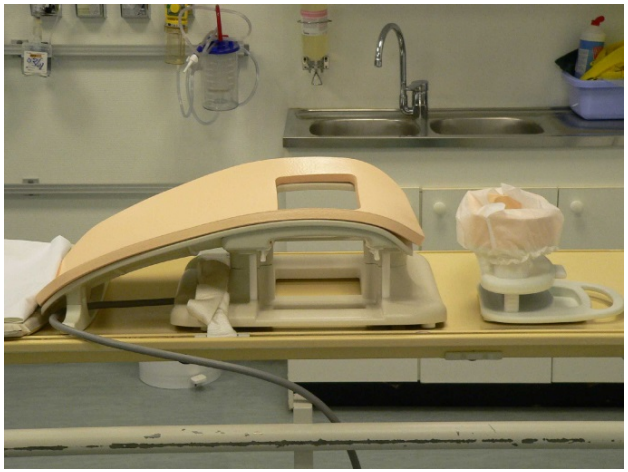
  2007 – 2009 : Philips Intera 1,5T - 50 procedures

  2010 - now : GE discovery 750 3T – more than 200 procedures

  2007 – 2016 : 400 – 900 Breast MRI / year

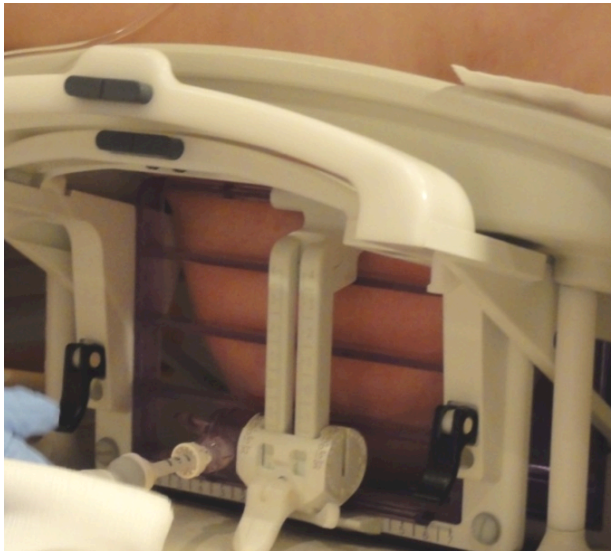
Practical conditions

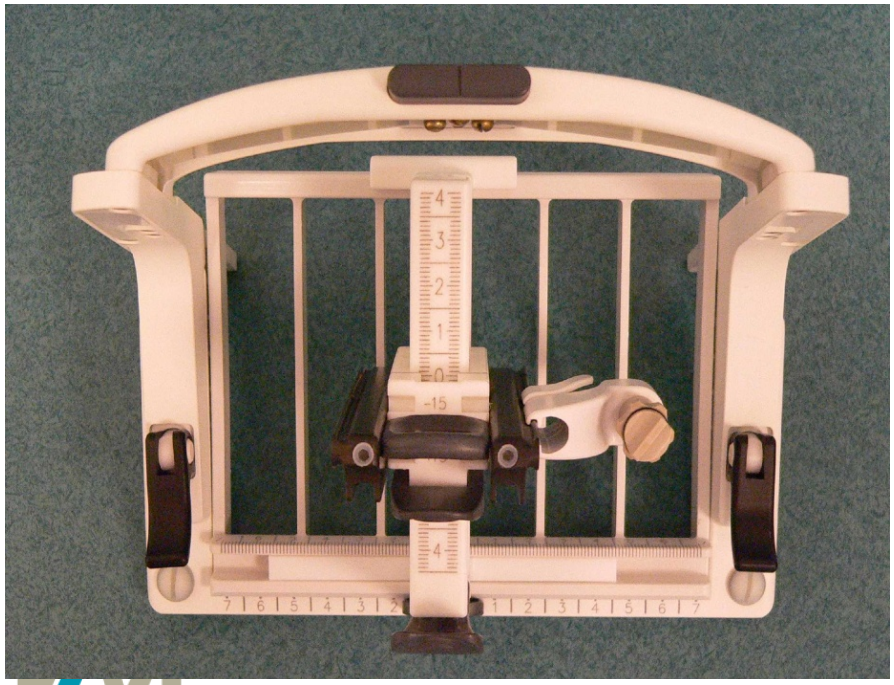
- Equipment
  - Coils : we use same coils for diagnosis and interventional

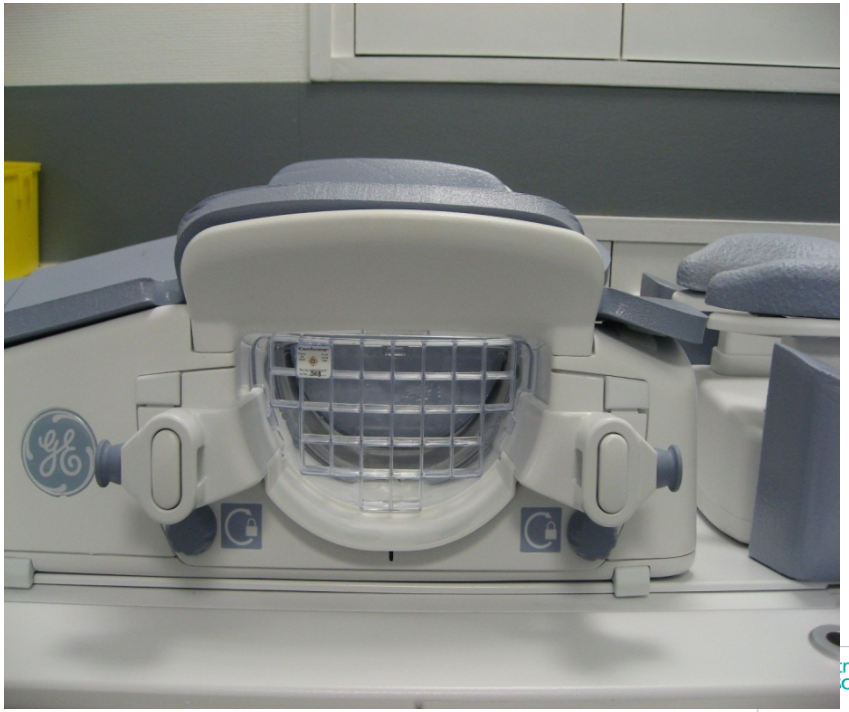


Practical conditions

- Equipment
  - Grids







Practical conditions

- Equipment
  - Devices :

→ Mammotome (Breast Care)

→Atec (Suros)

→Vacora (Bard)

→Senorex Encor (Bard)

7 to 11 gauges

Before procedure

- **Pre-VABB work-up : Valid indication**

  → review mammogram, US and MRI

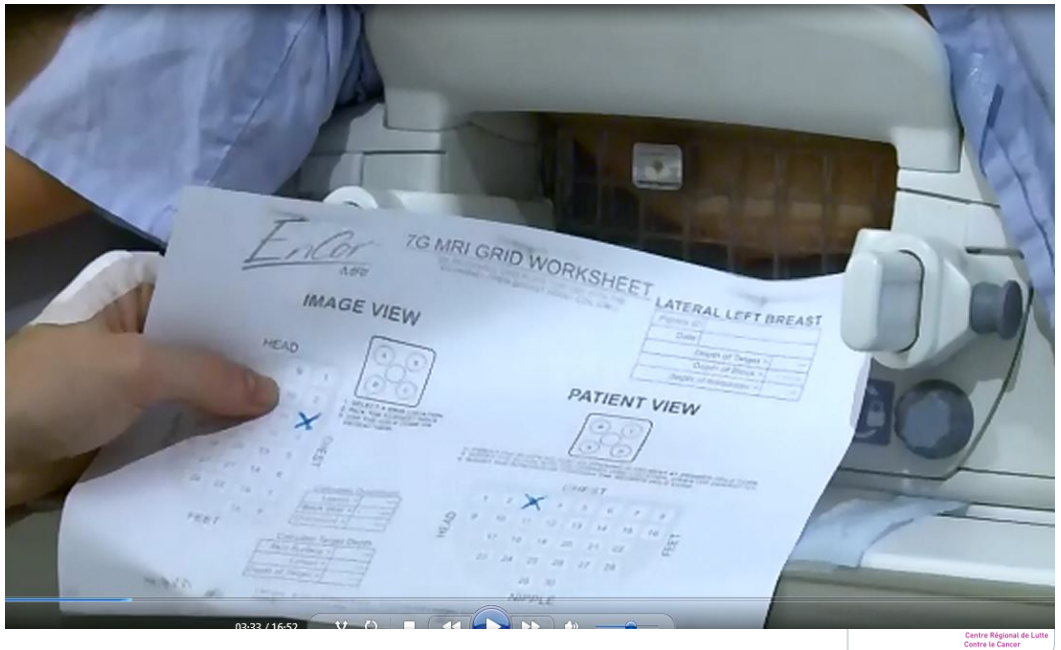
- **Pre-VABB consultation :**
  - Check out contra-indications (CI to MRI, Relative CI : coagulation pb, locations of the lesion - close to the chest wall, nipple area, implant)
  - Explanations about procedure and associated complications
  - Patient leaves with :
    - Information letter
    - Contrast agent prescription
    - Blood coagulation test prescription
    - Letter of convocation
    - Need to be accompanied the day of biopsy
    - Convocation for MRI, MMG and results annoucement 8 days later

Procedure : positioning

- Out side magnet's room (need 2 MRI beds)

Procedure : Localizer

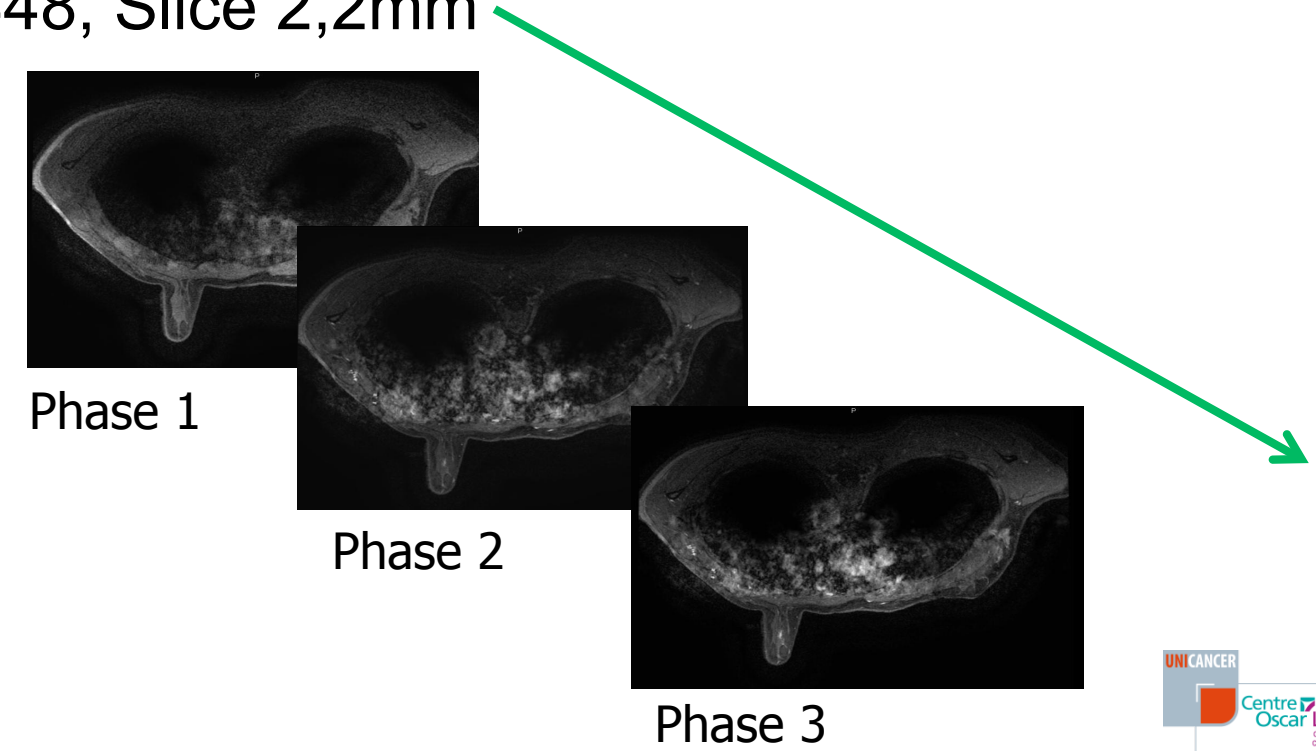
Localizer : next to the lesion



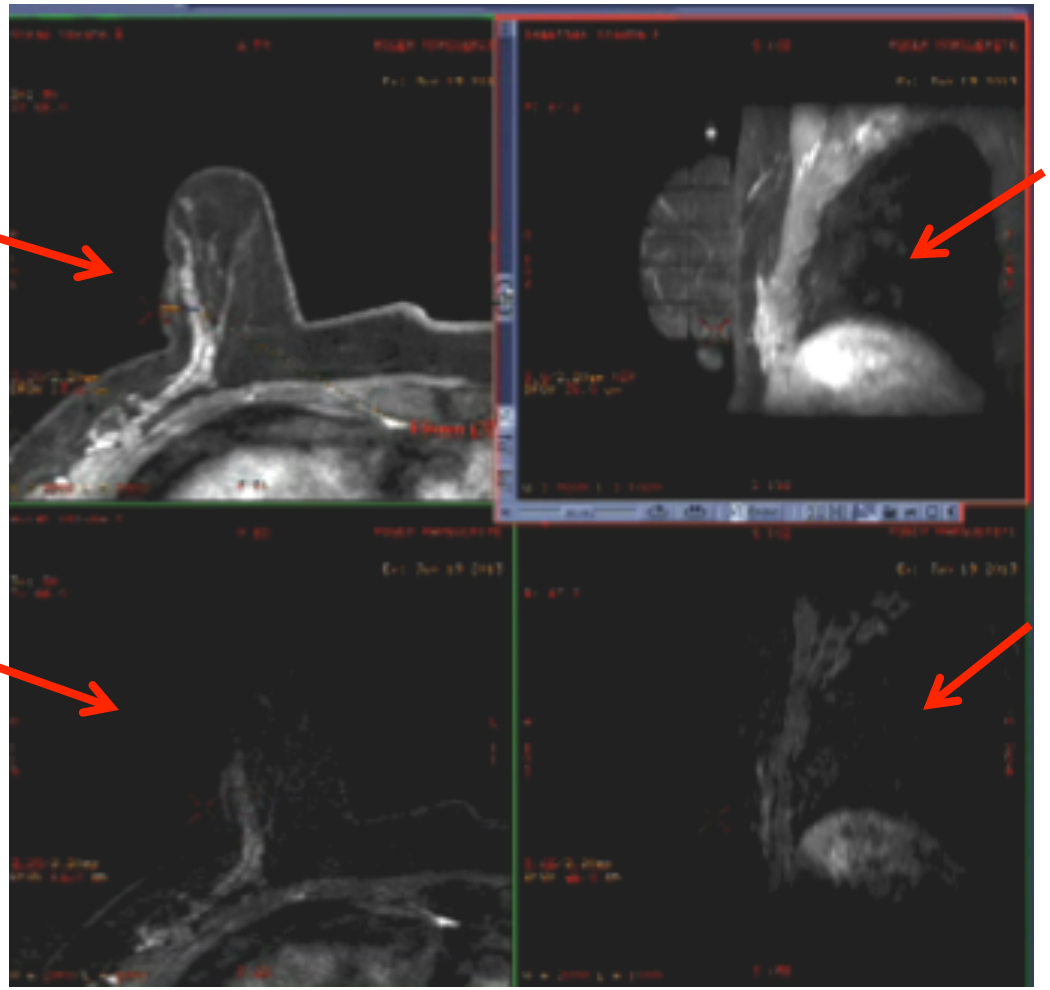
Procedure : target identification

Patient in magnet's room

- Scout view
- One dynamic axial sequence in 3 phases (3x1mn20),
- Injection complete gadolinium volume 20 sec before the end of the 1st phase
- Matrix : 512x448, Slice 2,2mm



Procedure : target identification



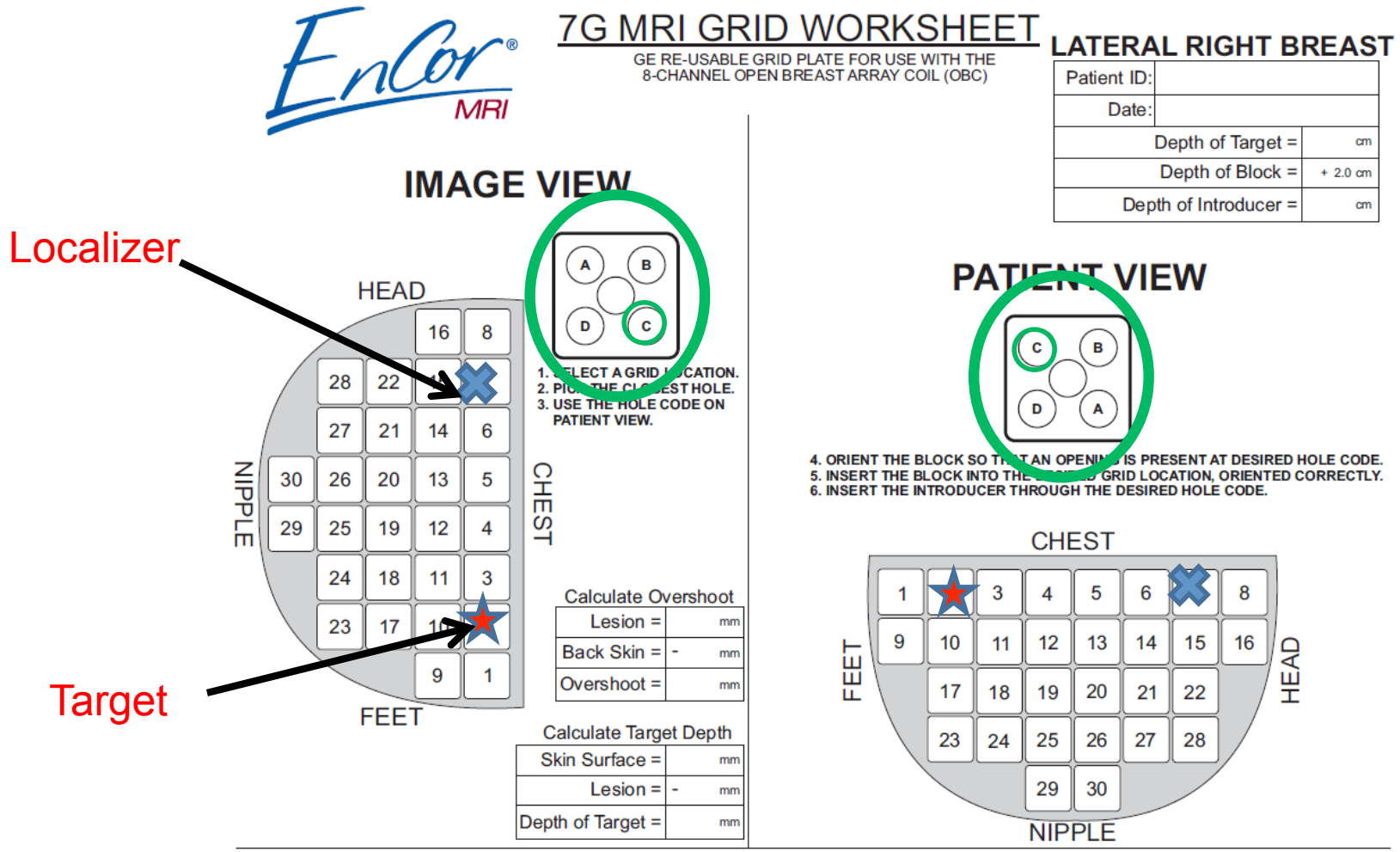
Ph 3
Axial

Ph 3 Sagittal

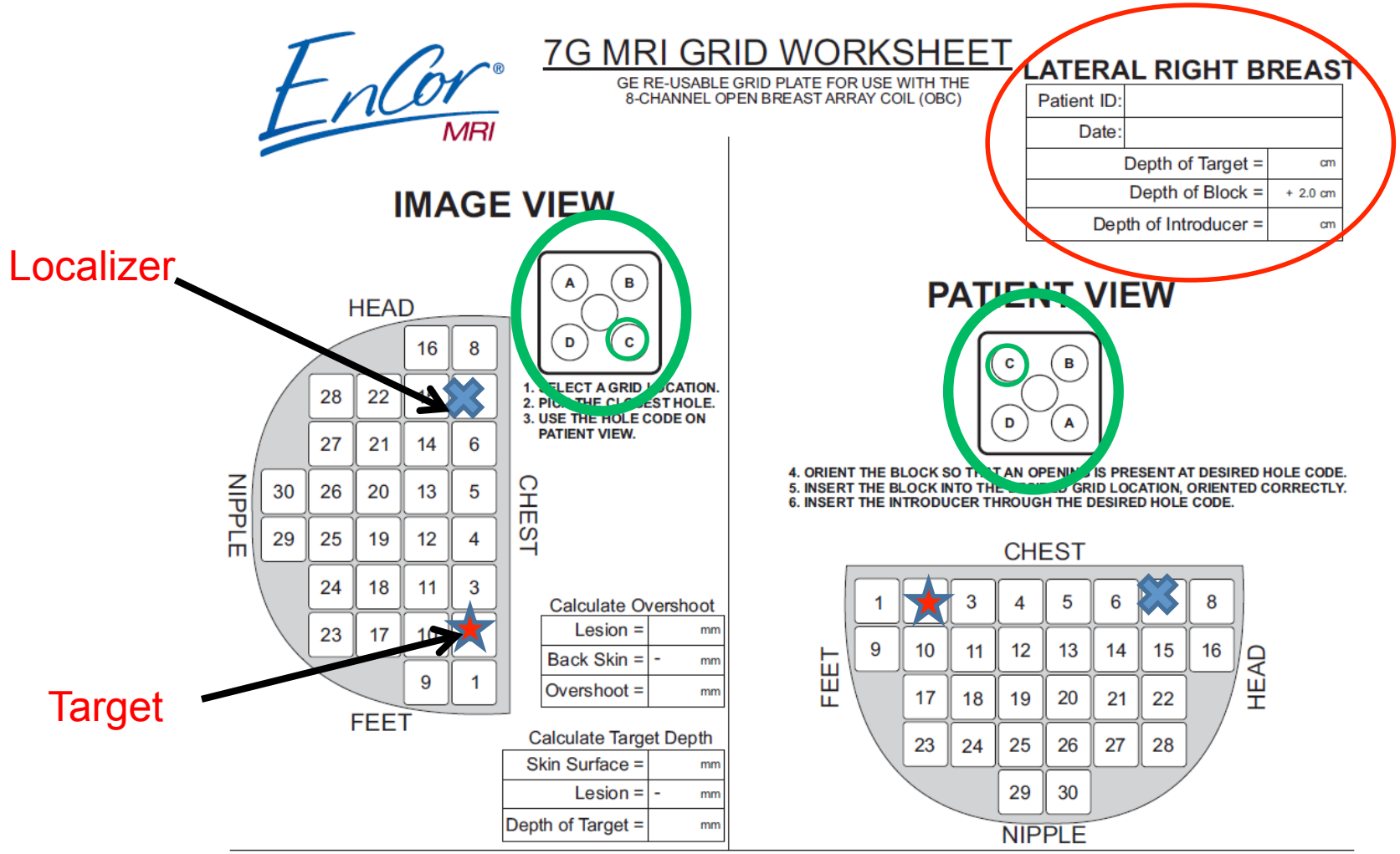
Ph3-Ph1
Axial

Ph3-Ph1
en Sagittal

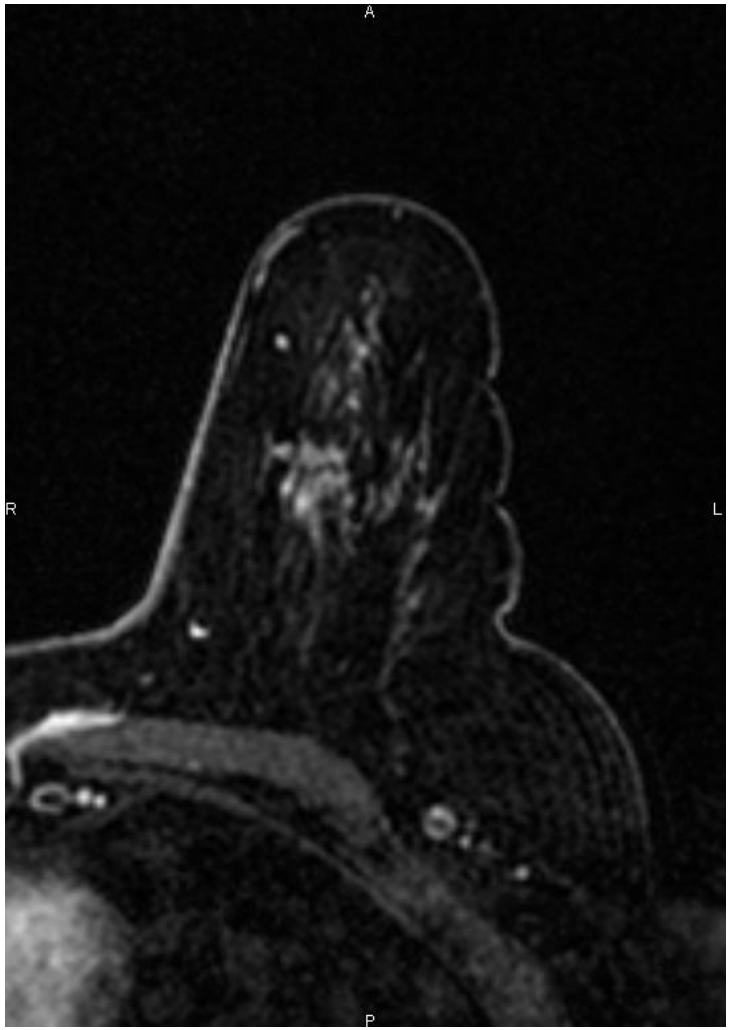
Procedure : target location - Naval Warfare

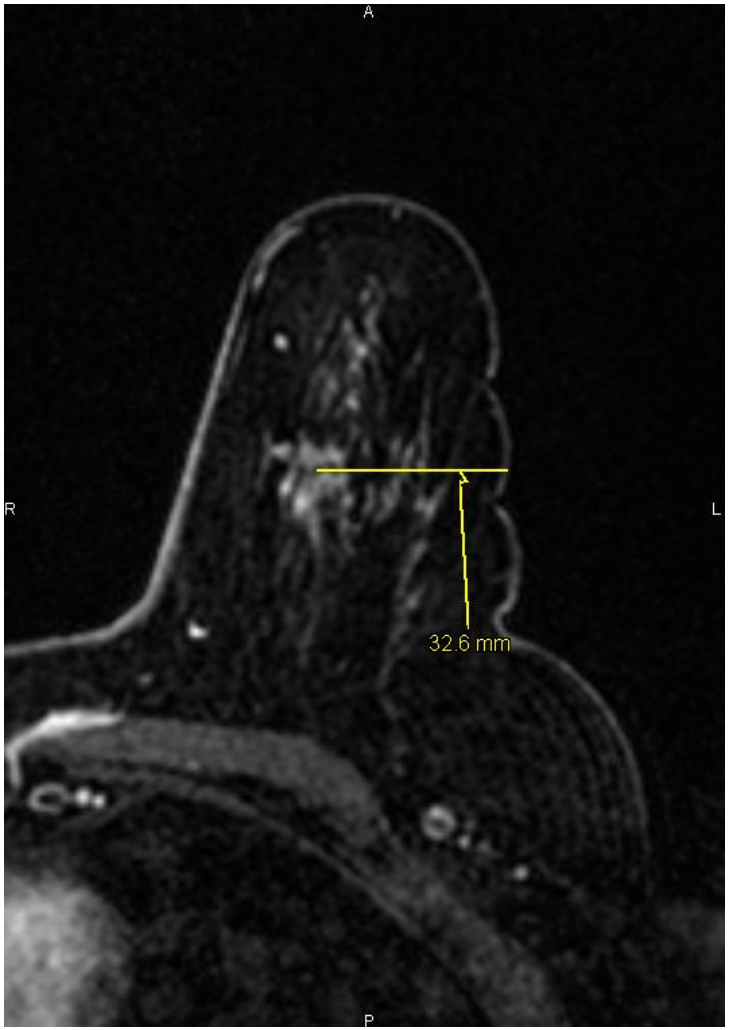


Procedure : target location - Naval Warfare

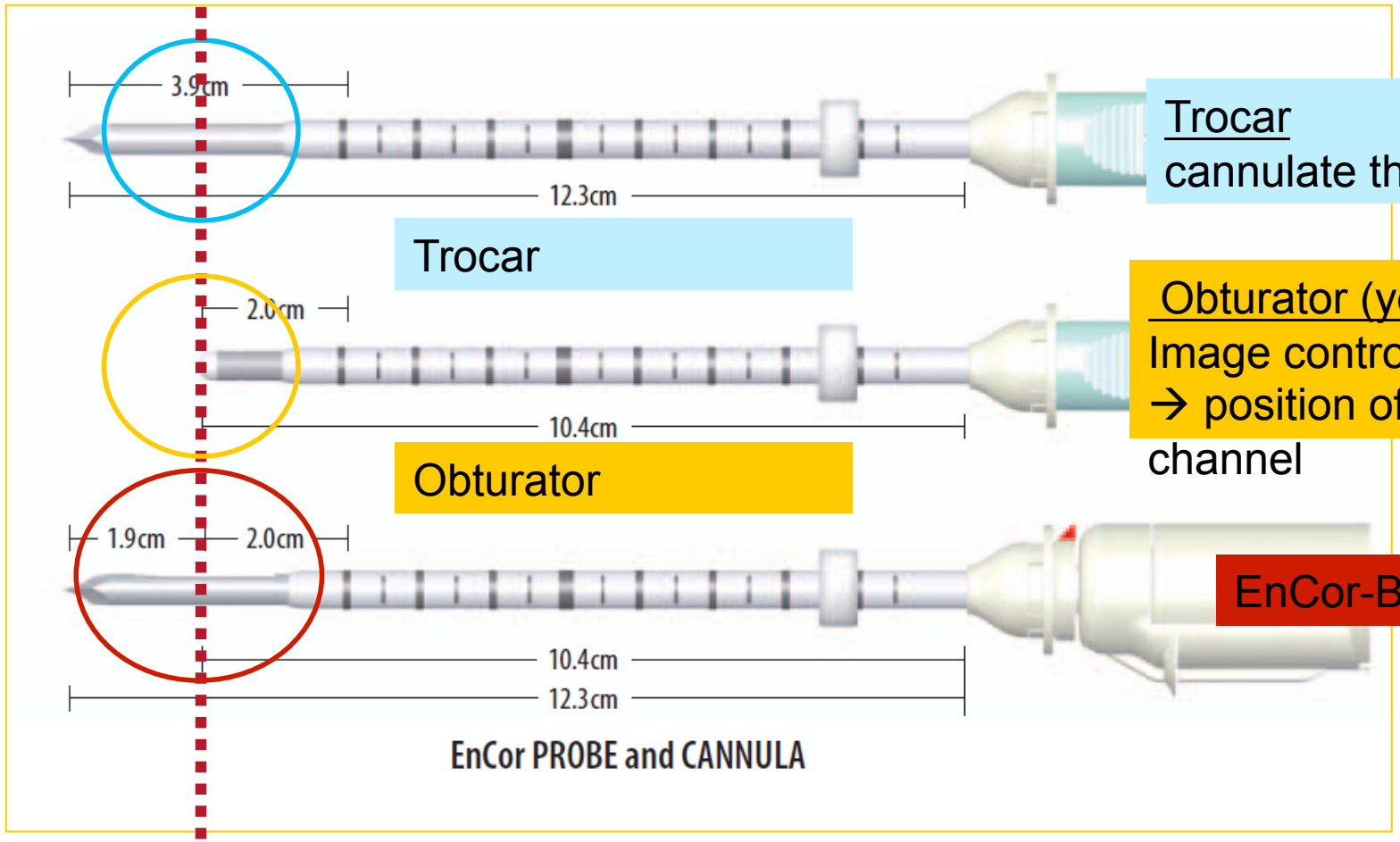


Procedure : Choosing right needle





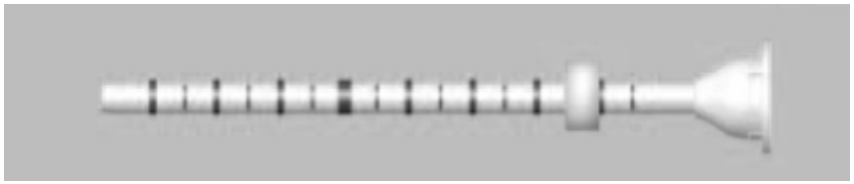
Introducer Set



Trocar
cannulate the biopsy channel

Obturator (yellow stick)
Image control;
→ position of biopsy channel

EnCor-Biopsy needle



Coaxial Cannula

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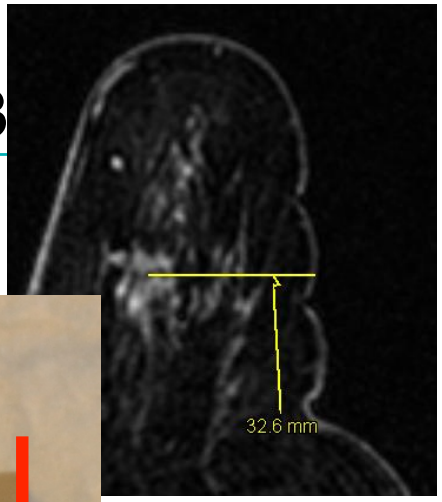
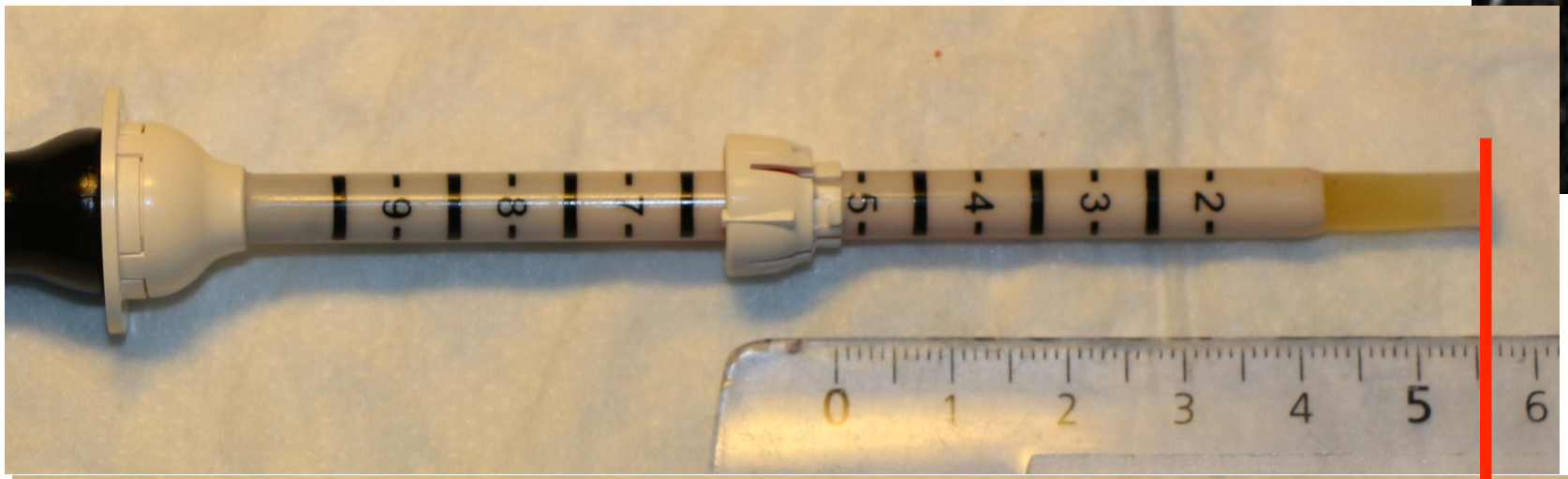
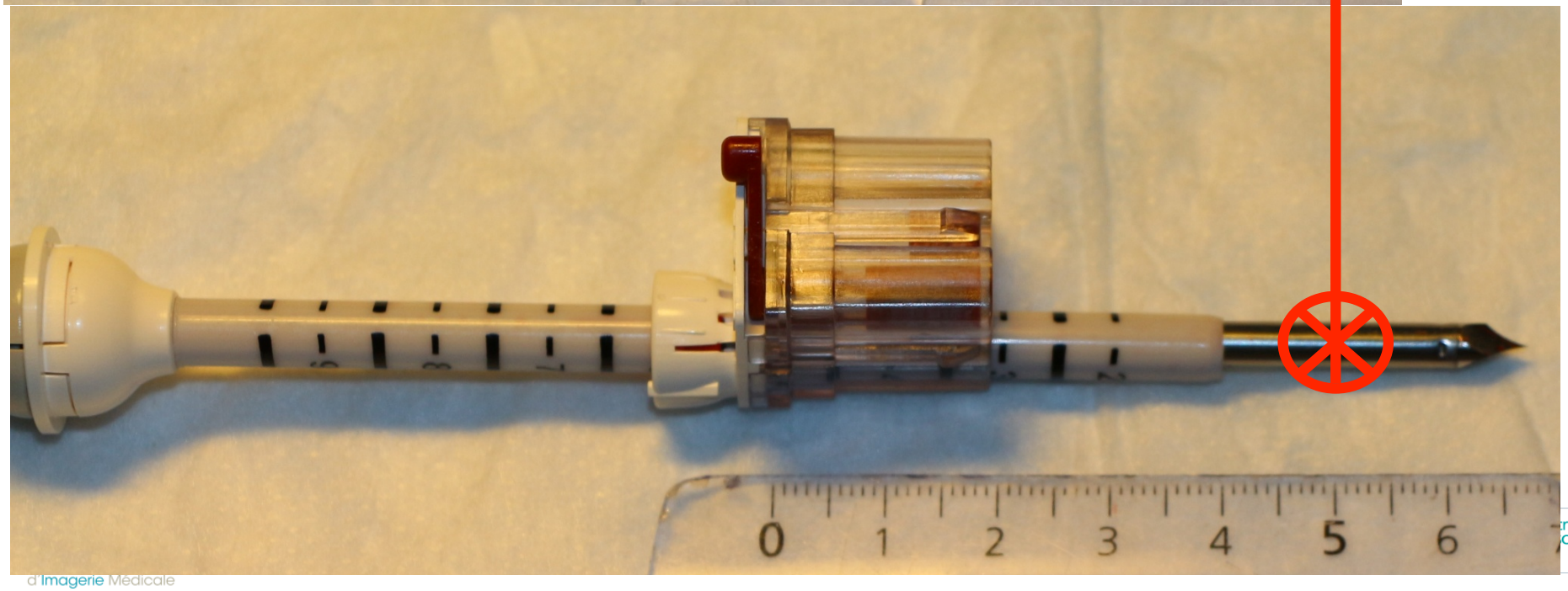
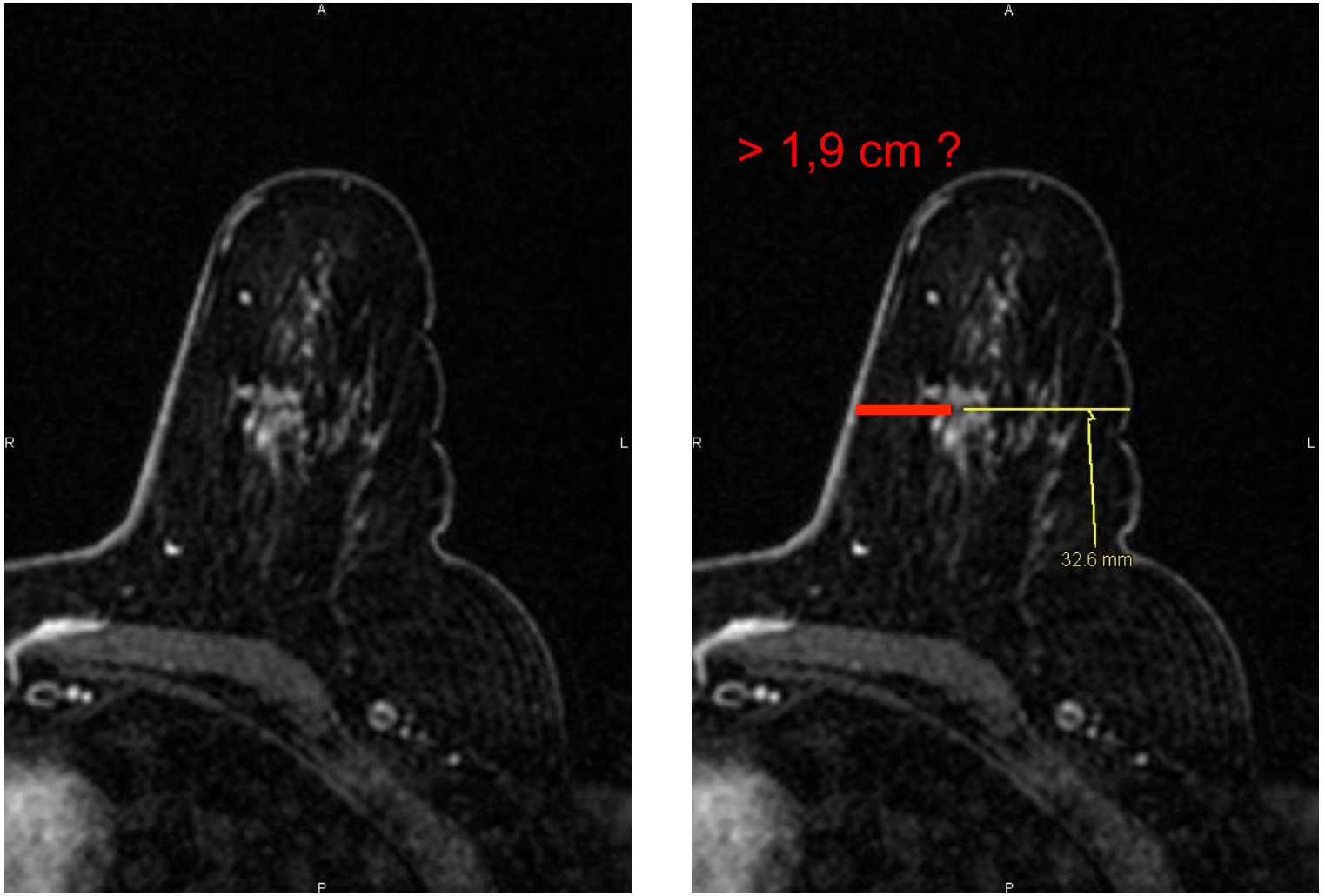
Skin to target : 3,3 + Localizer : 2 = 5,3 cm







Procedure : Choosing right needle

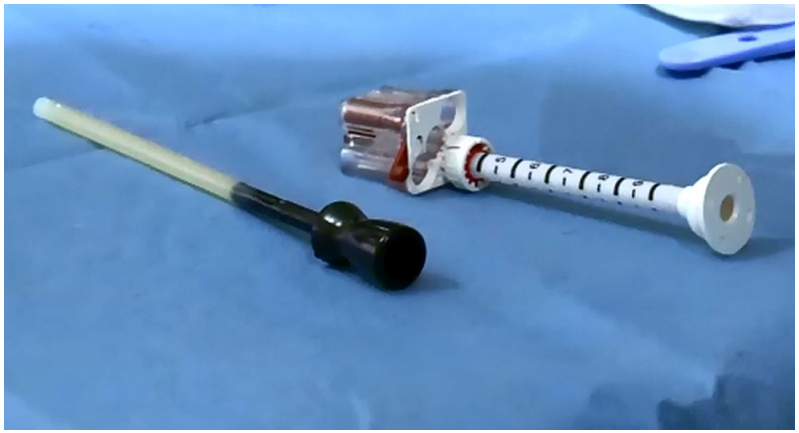


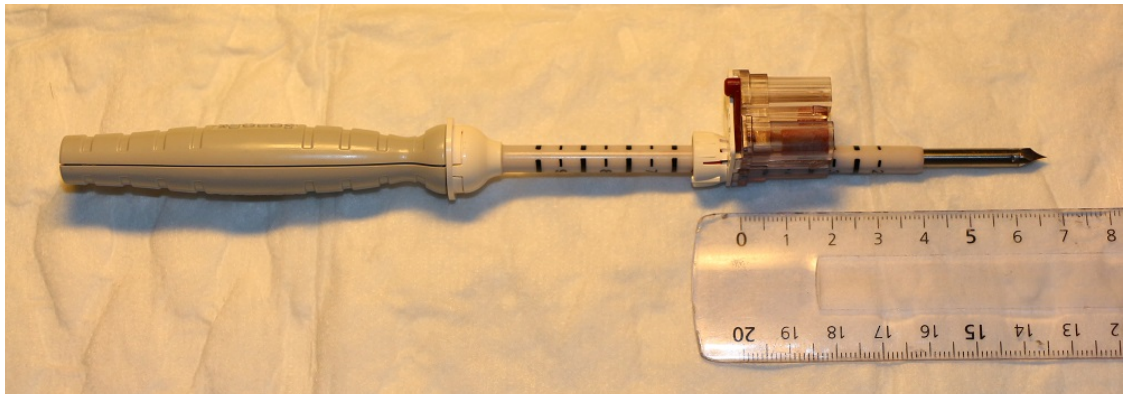
- If the opposite side is less than 1.9 cm, be sure to anesthetize opposite skin

Procedure : Implementation of Visiloc

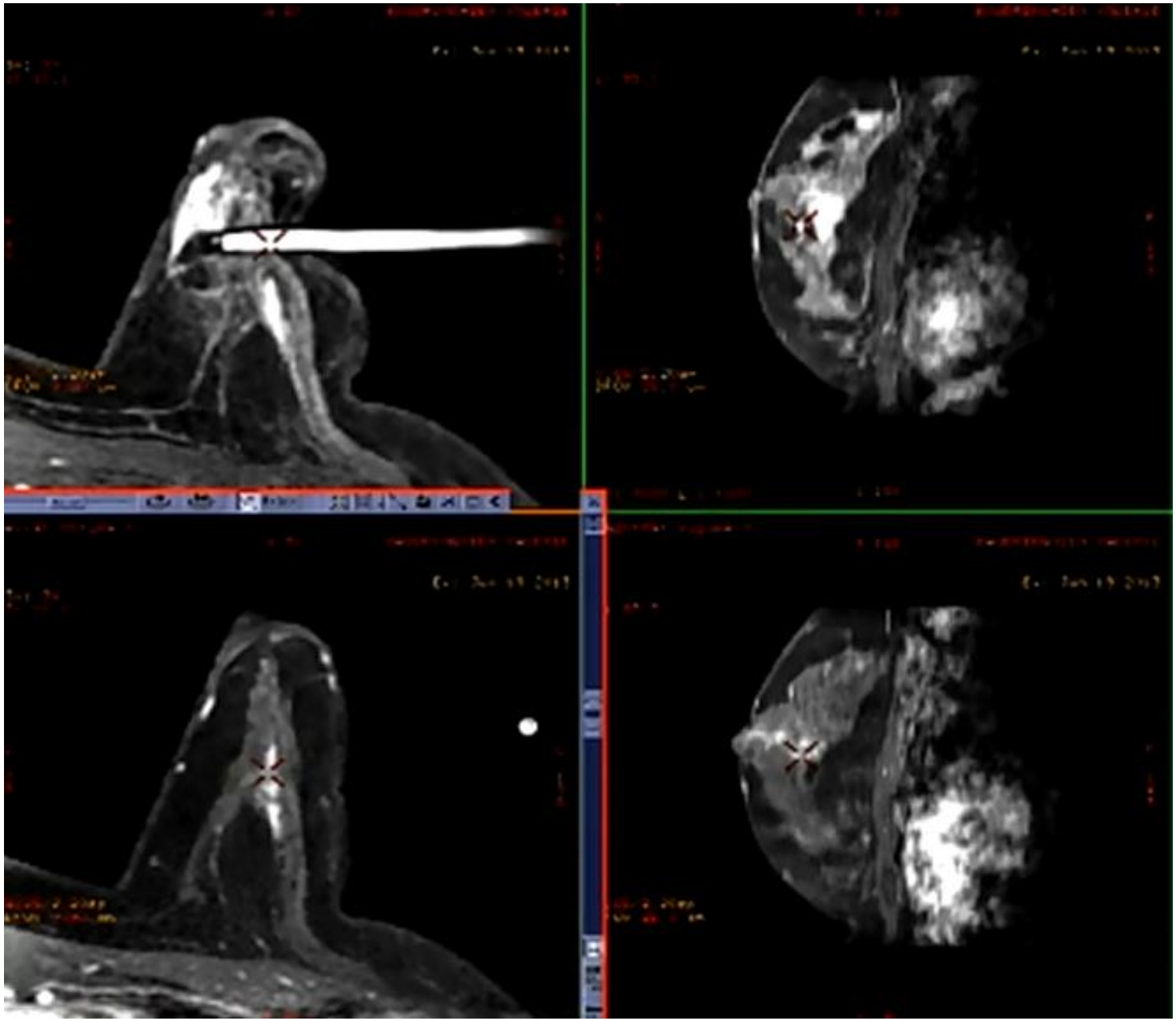
- Disinfection of the selected square
- Local anesthesia, technician puts his hand on the patient for two goals: Reassure the patient and prevent movement in response to pain.

Procedure : Implementation of Visiloc

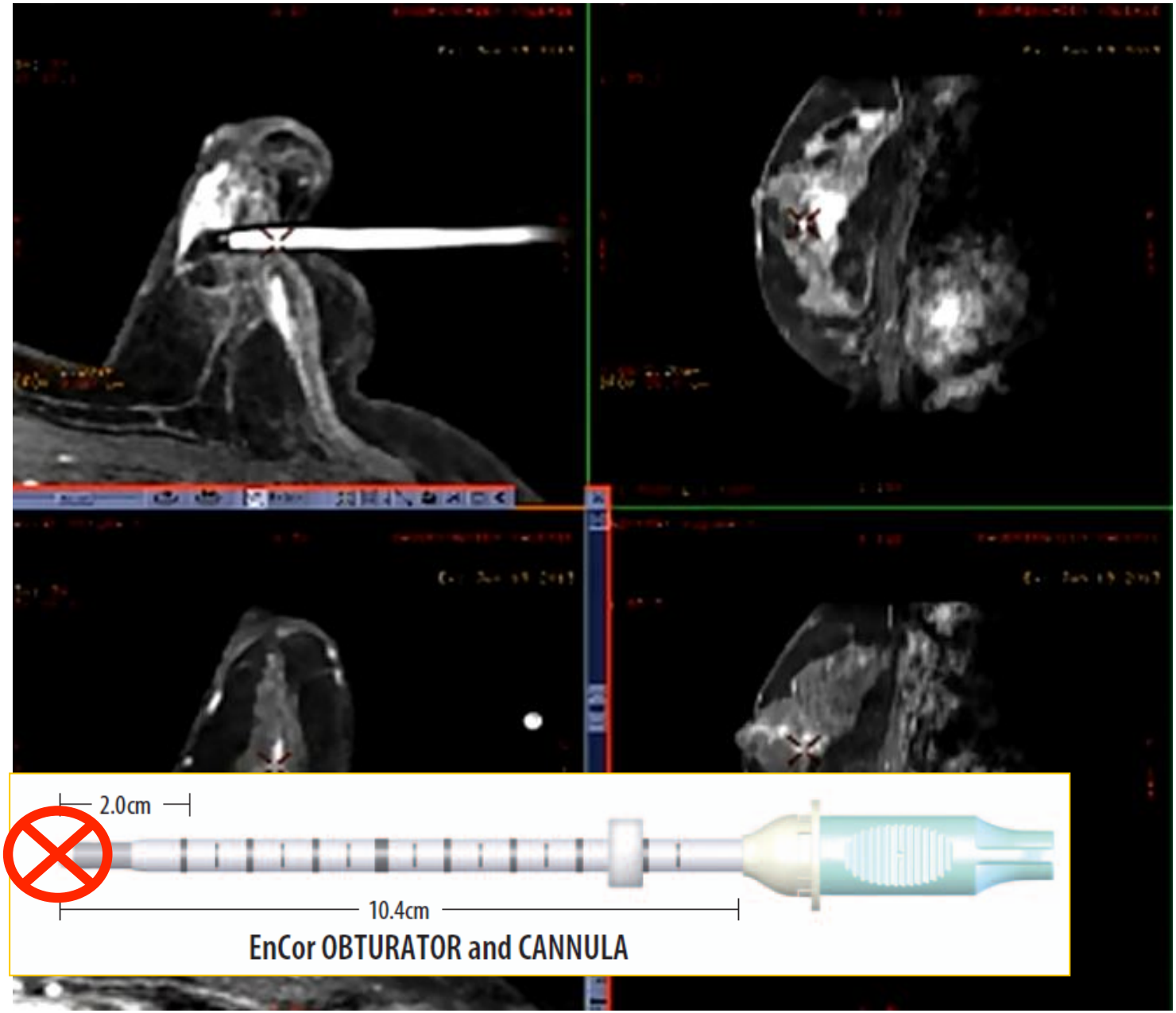




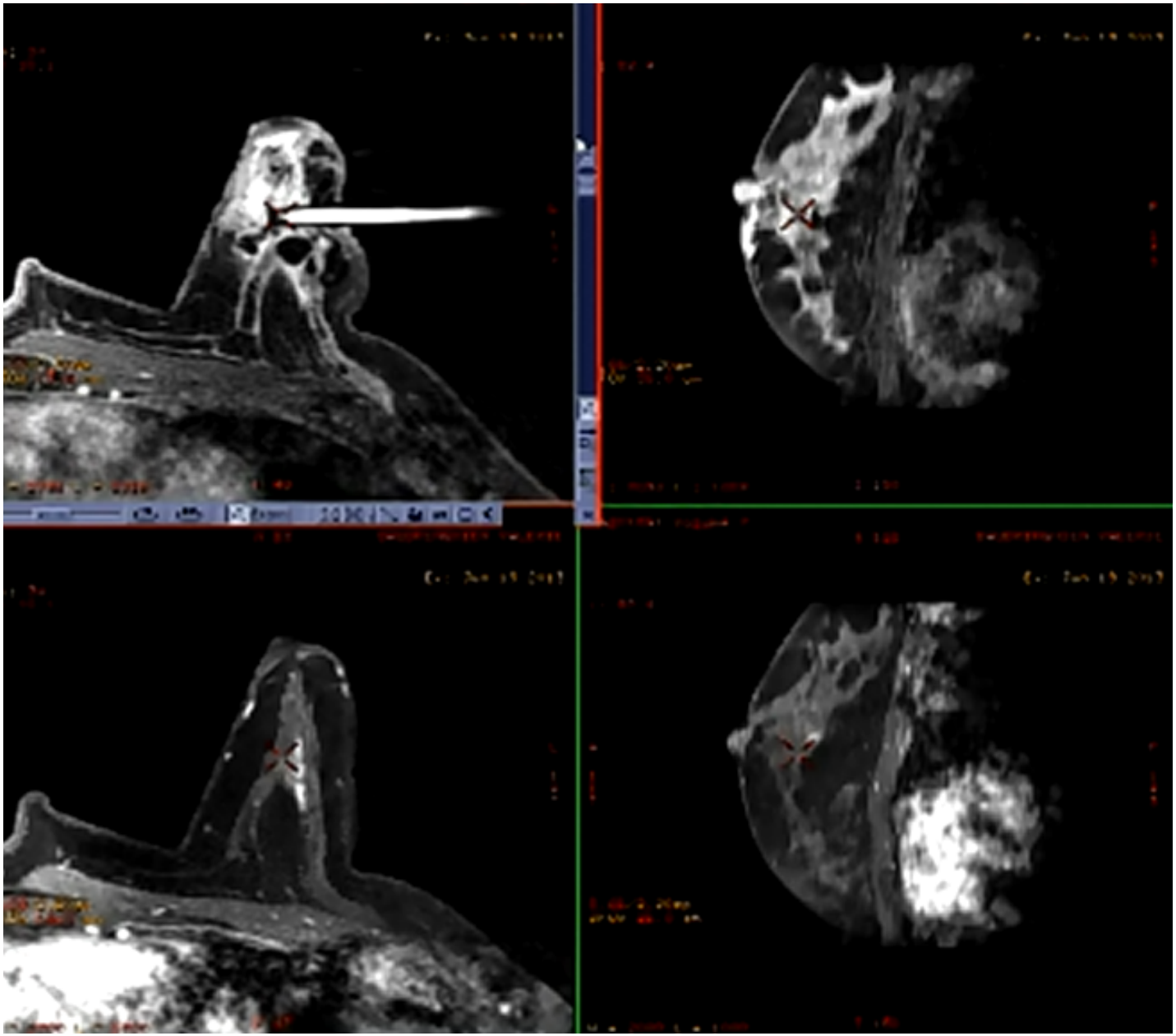
Coaxial control acquisition



Coaxial control acquisition



Coaxial control acquisition



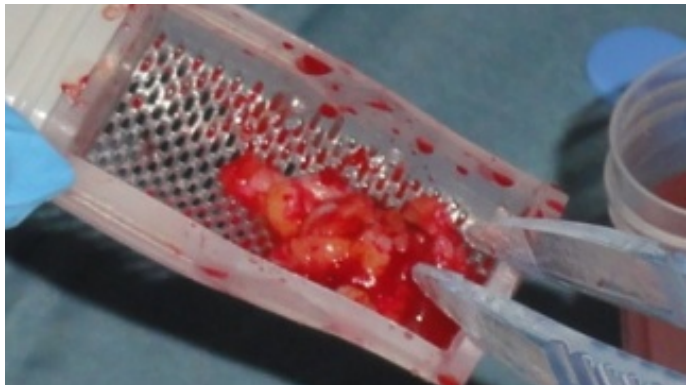
Ok

OUTSIDE MRI ROOM PROCESS (2 MRI beds)

MRI room exit

Samples out the Room

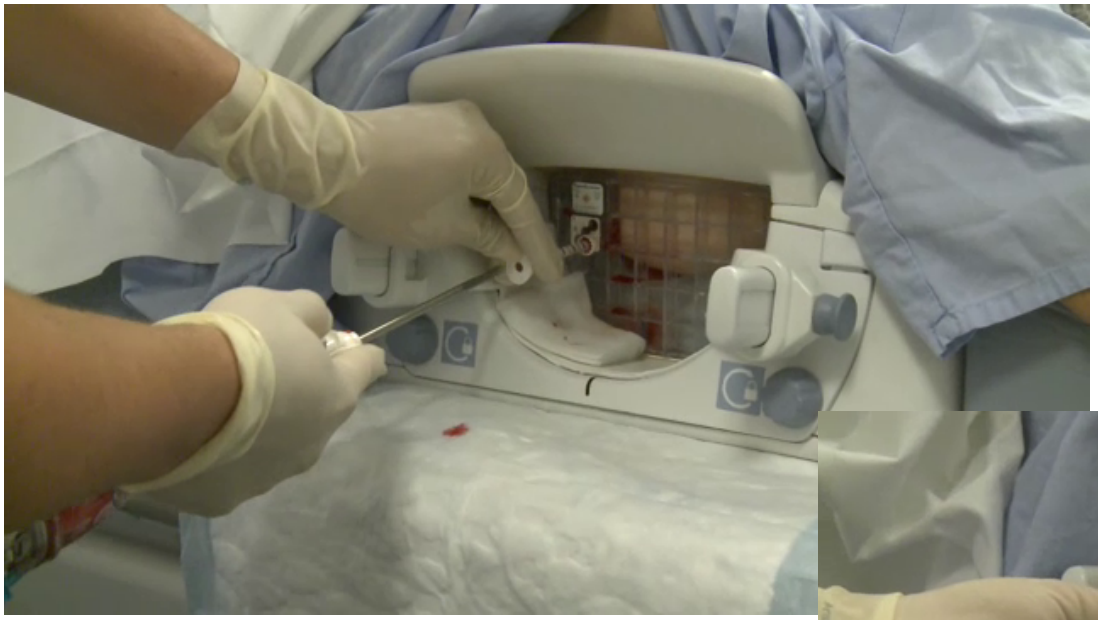
- In general, two rounds of samples are taken so **12 samples.**
- Suction is performed to 360° after each round

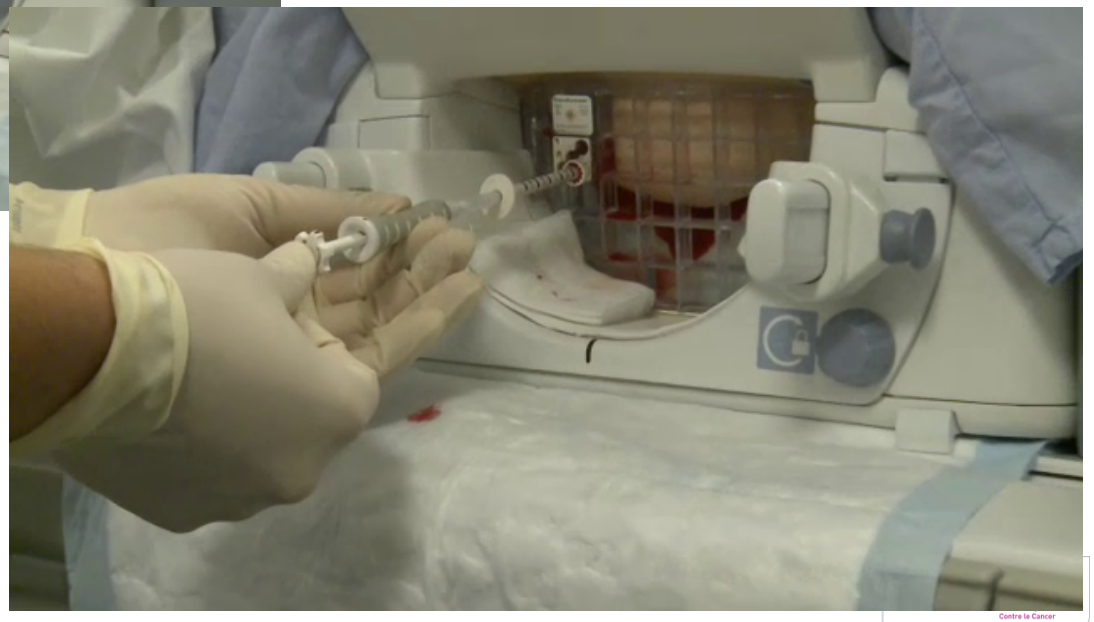


What else ?

!! Clip marking !!

- Remove the knife
- Release the clip through the coaxial





!! Clip marking !!

- **When ? : Always !!!**

  - Lesions BI-RADS 4, 5 : further surgery
  - Lesions BI-RADS 3 : follow-up
  - And if lesion seen on MMG or US : same lesion ?

End of procedure

- Replacing the visiloc

- Devices removal

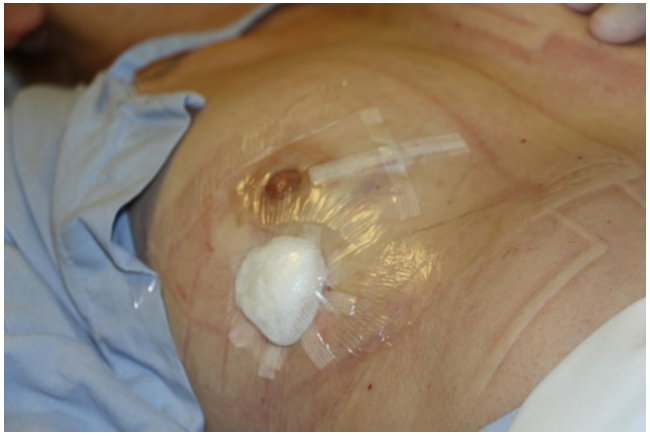
- Patient in her bed

End of procedure

- Compression

Time compression : > 5-10 mn with ice packing

- Dressing



Before home return

- 1 gram paracetamol PO
- Snack (Water / fruit juice and biscuits)

- Advices :
  - ✓ No sport or physical activities for 2 Days
  - ✓ Remove white bandage at day 3
  - ✓ Showers possible with hydrophobe sticking

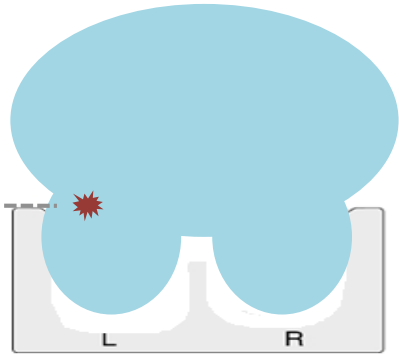
- The patient leaves the MRI with :
  - ✓ Instruction letter
  - ✓ Service phone number
  - ✓ Appointment for D8 control MRI and mammography

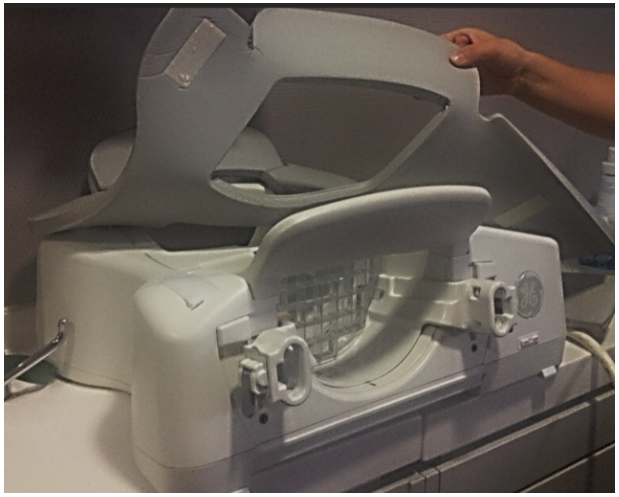
Tips and tricks

1. Positioning
2. Multiple procedure
3. Clip releasing

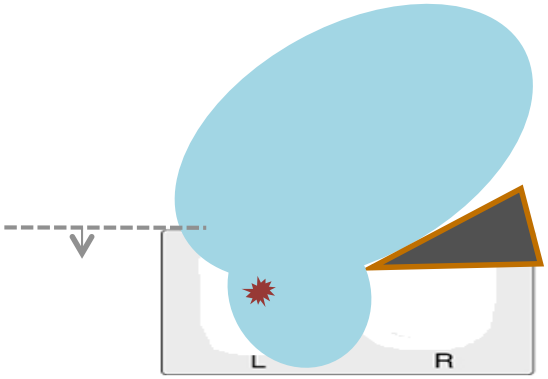
Pre-pectoral target

Target lesion near the chest wall





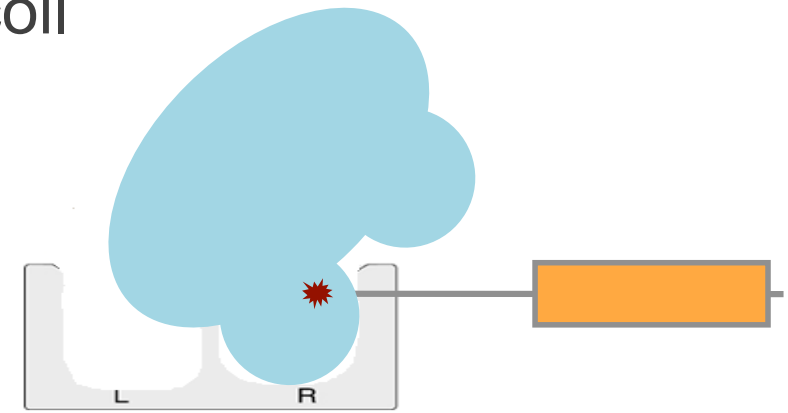
Ipsilateral rotation



Inner quadrant target

1. Positioning in contralateral coil

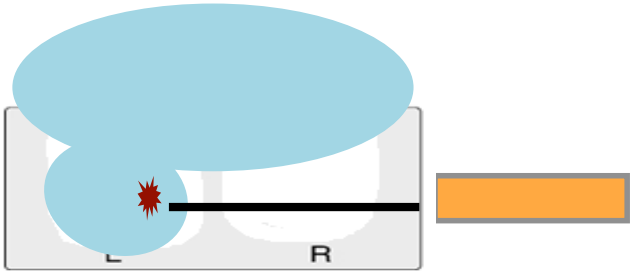
Instability
Very thin women



Biopsy in angulation

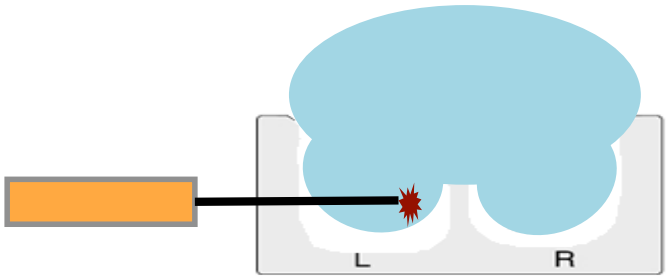
2. Medial access

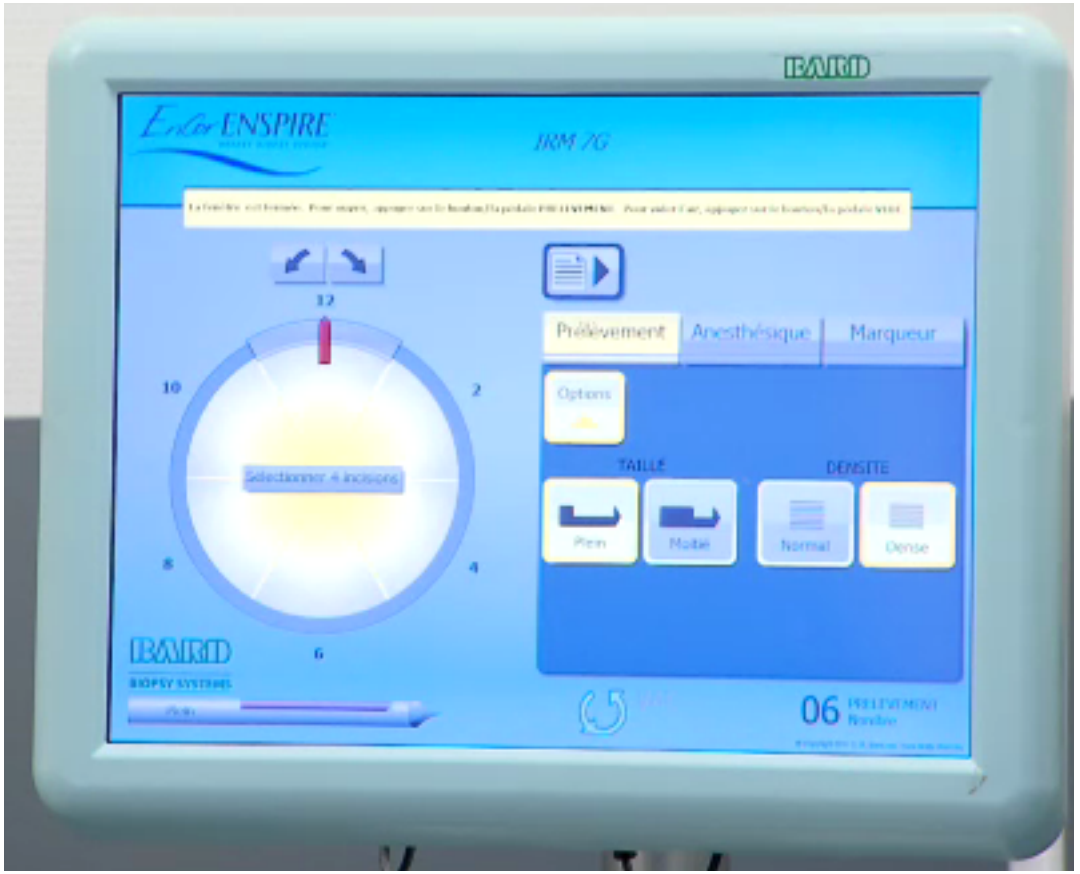
Disadvantage :
- longer way of access
- worse visibility



Inner quadrant target

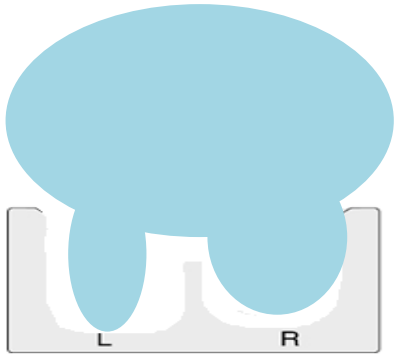
- More easy : Normal lateral acess with anesthetize opposite skin

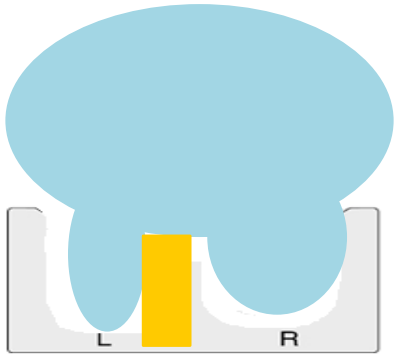




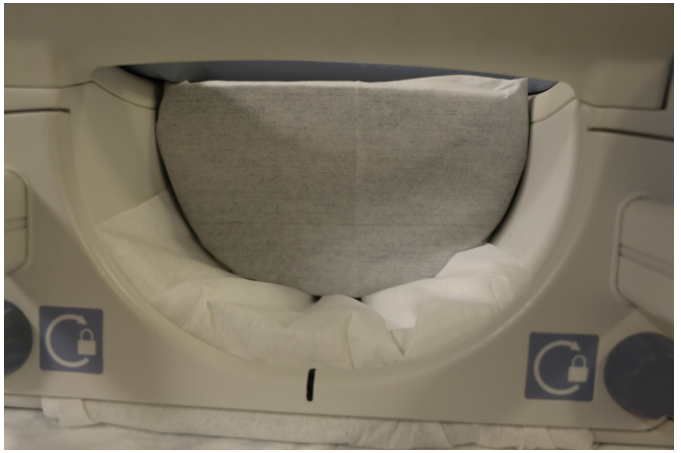
Small breast

- Always smaller than expected after compression





- Insert soft foam in compression's opposite side



Procedure : positioning

The most important thing…….

You have just one chance of correct positioning

→ **To avoid mistakes: think twice + act fast !!**

Multiple lesions

- 2 or 3 simultaneous procedures are possible
  - Same or opposite breast
  - Need 1 Visiloc kit and 1 probe per target
  - Need to use 2 grids if opposite biopsy site

- Do the targeting of all lesions at the same time :
  - Enhancement wash out can occurs very quickly
  - No need to reinject
  - Time sparing

- Do the coaxial location control in one-time acq
  - Homo or contralateral breast biopsy site
  - If OK proceed for each lesion as for unique VABB

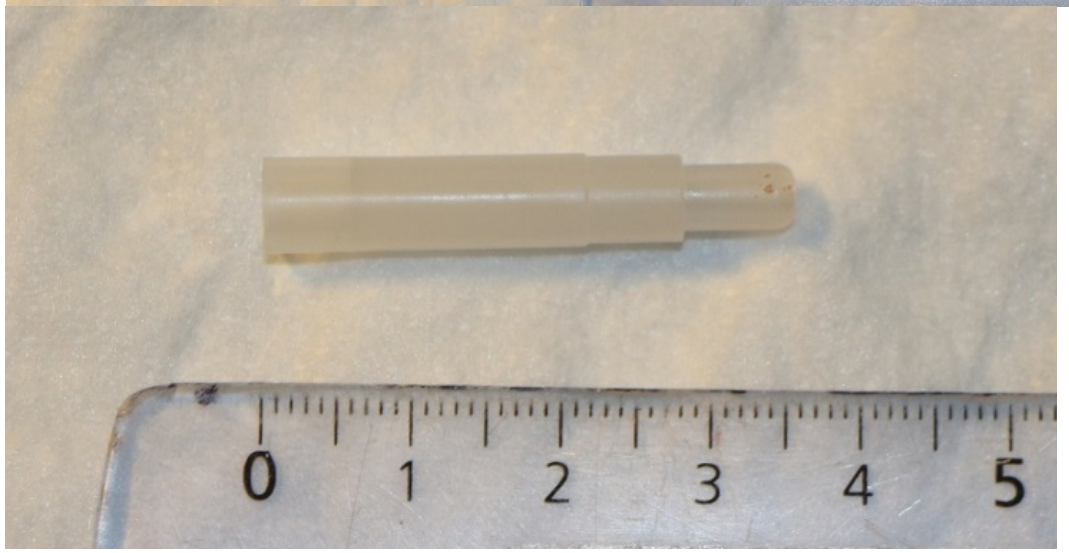
Clip releasing

Easy but not so easy……

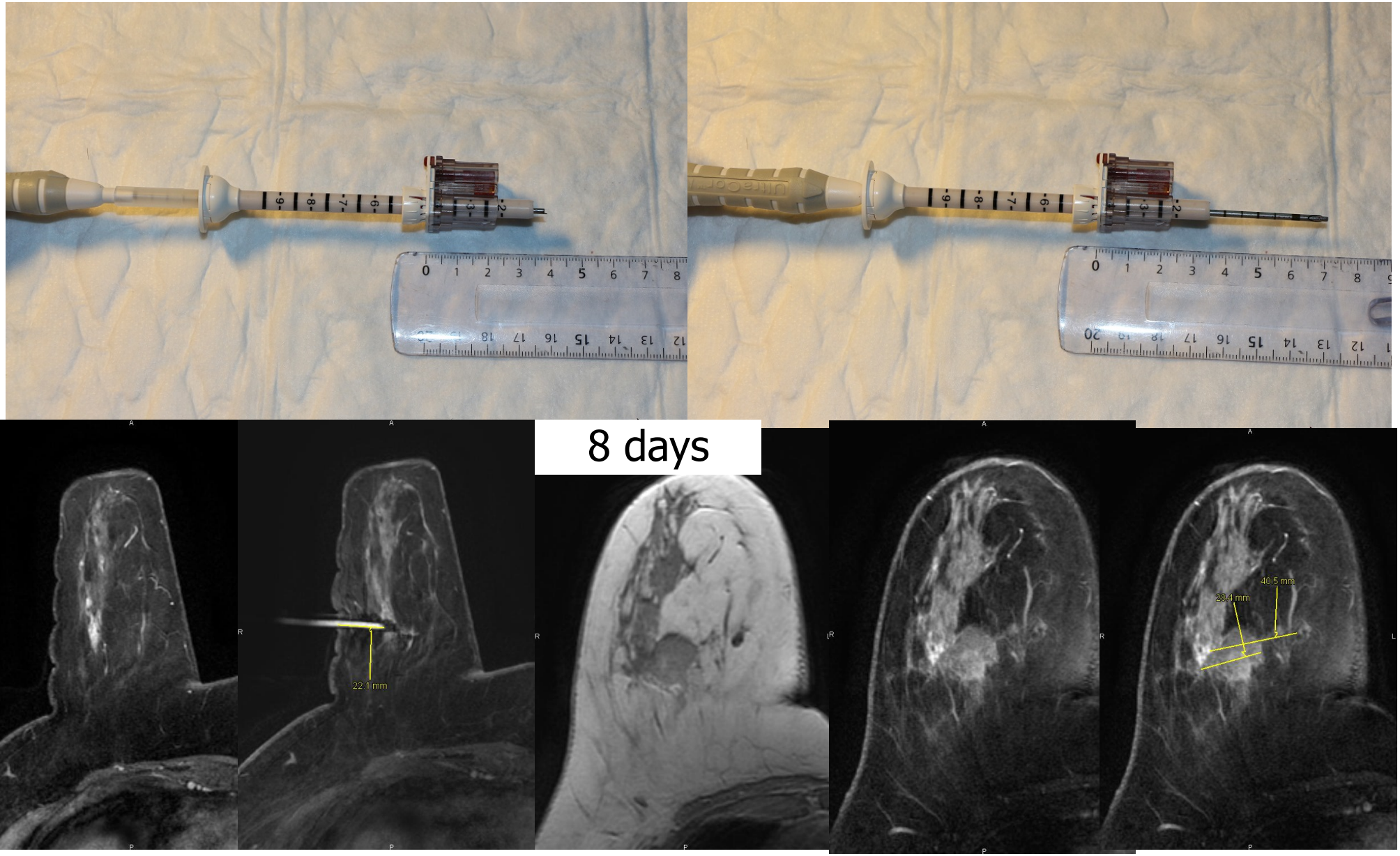
Always aspire biopsy cavity with special program before clip releasing

Clip implementation

Don’t remove the plastic adapter before clip insertion



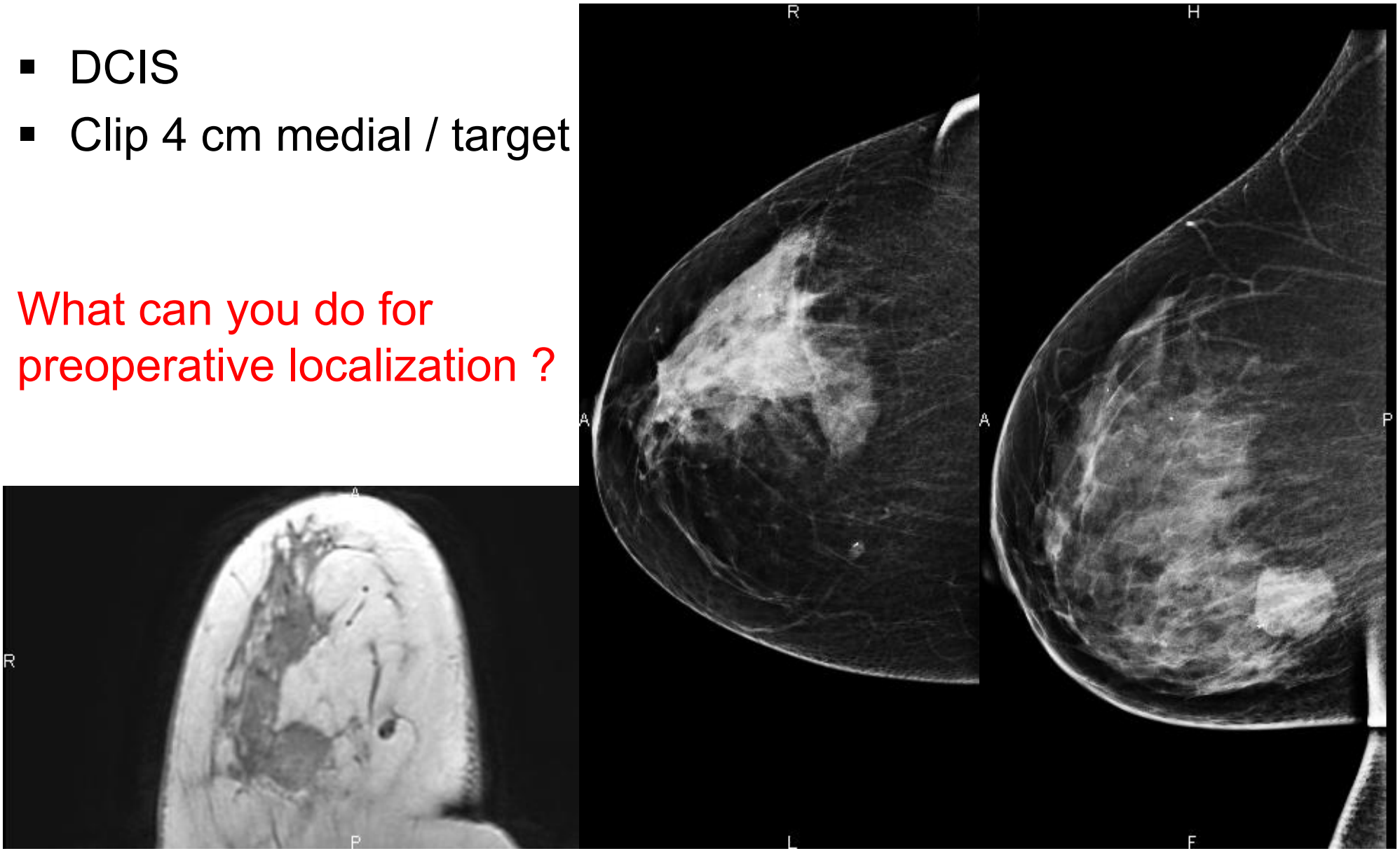
Clip releasing



MMG/IRM

- DCIS
- Clip 4 cm medial / target

What can you do for preoperative localization ?



New clip

Put a new clip in hematoma at Day 8

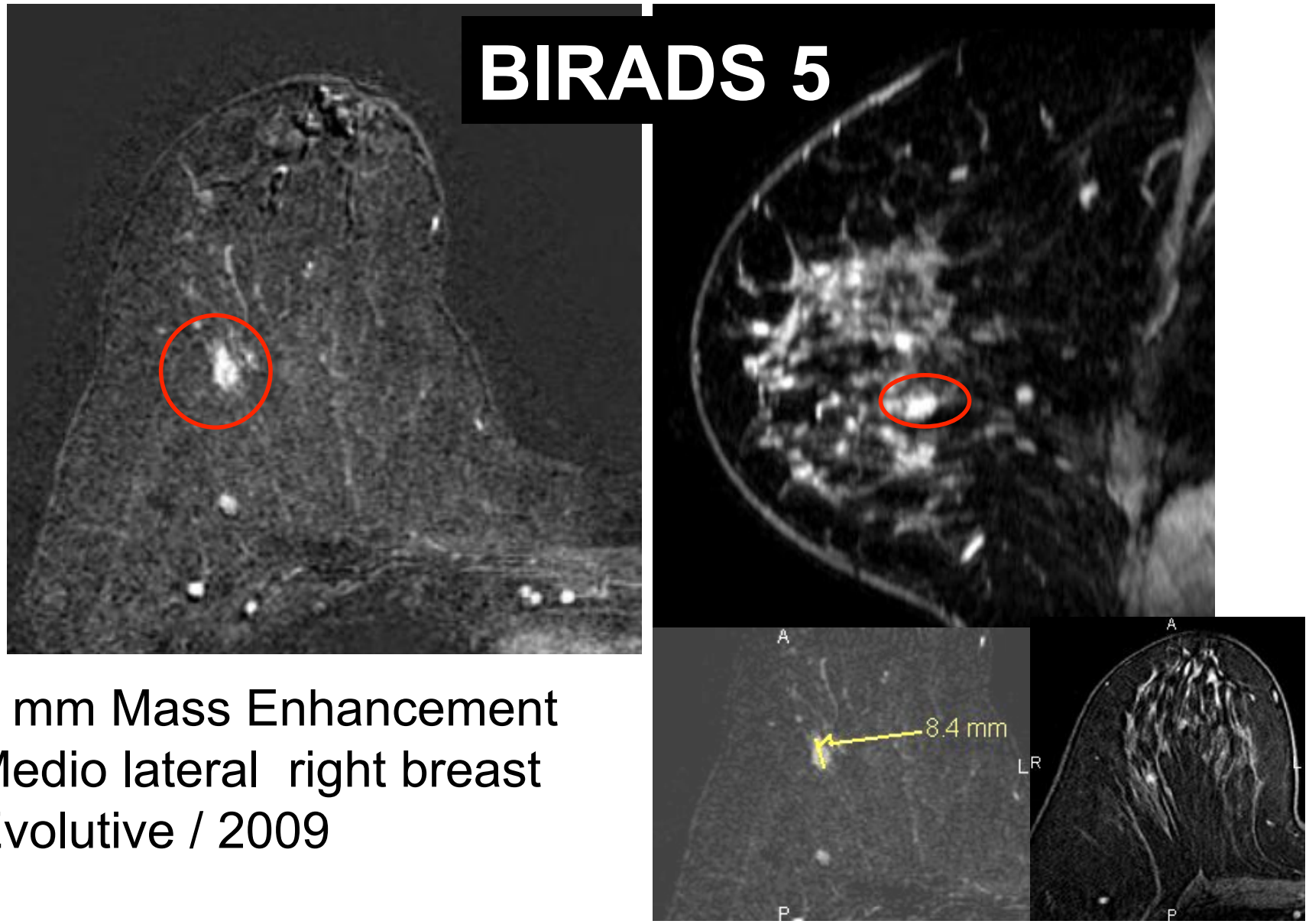
…before it disappears

Procedure and Clip position control

- Guidelines :
  - New sequence after biopsy
  - MMG : CC + P

- We propose to do it at day 8

Mrs D. BRAC1, 32 years-old, 11.2010



8 mm Mass Enhancement
Medio lateral right breast
Evolutive / 2009

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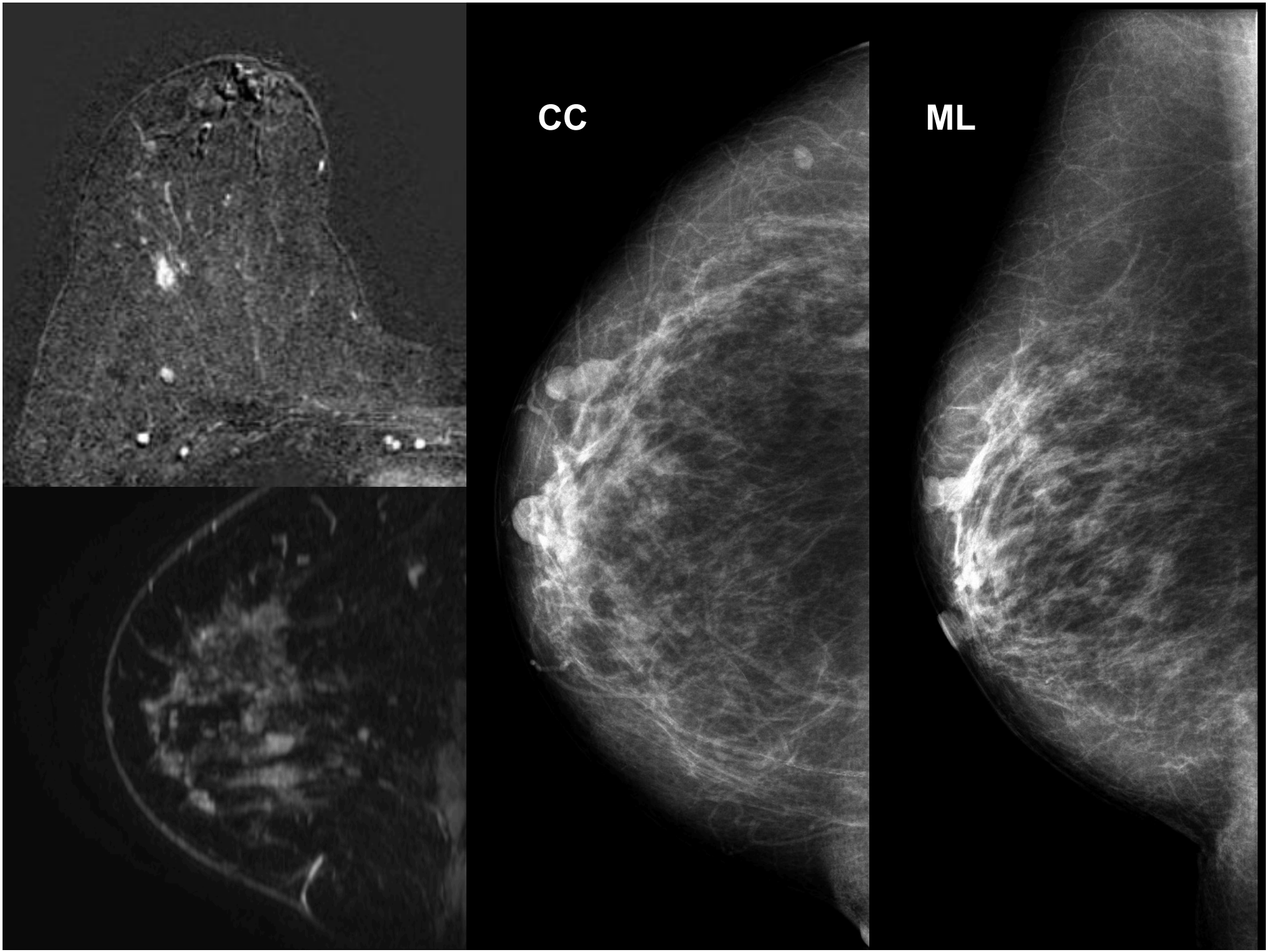
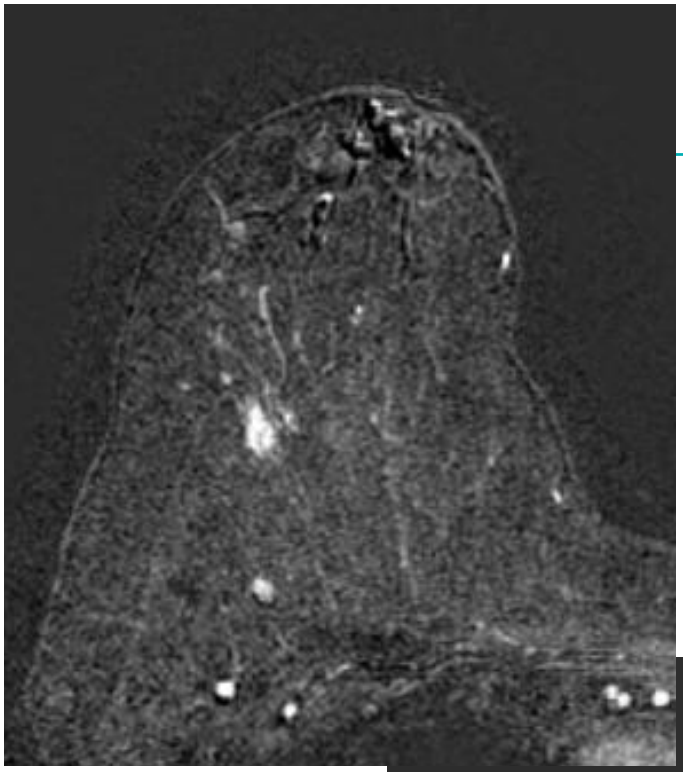
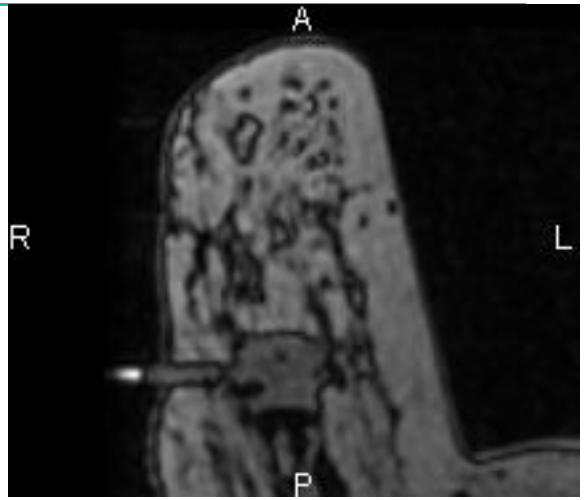
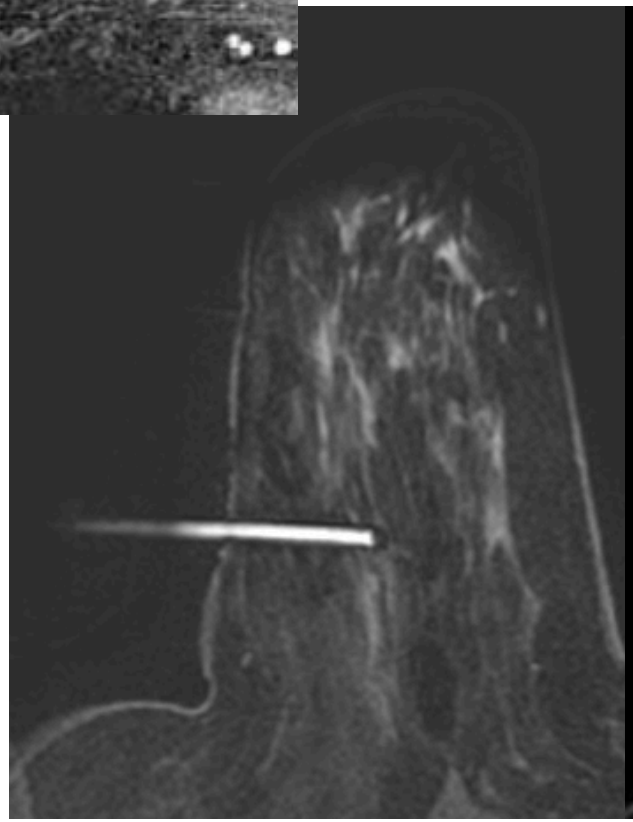
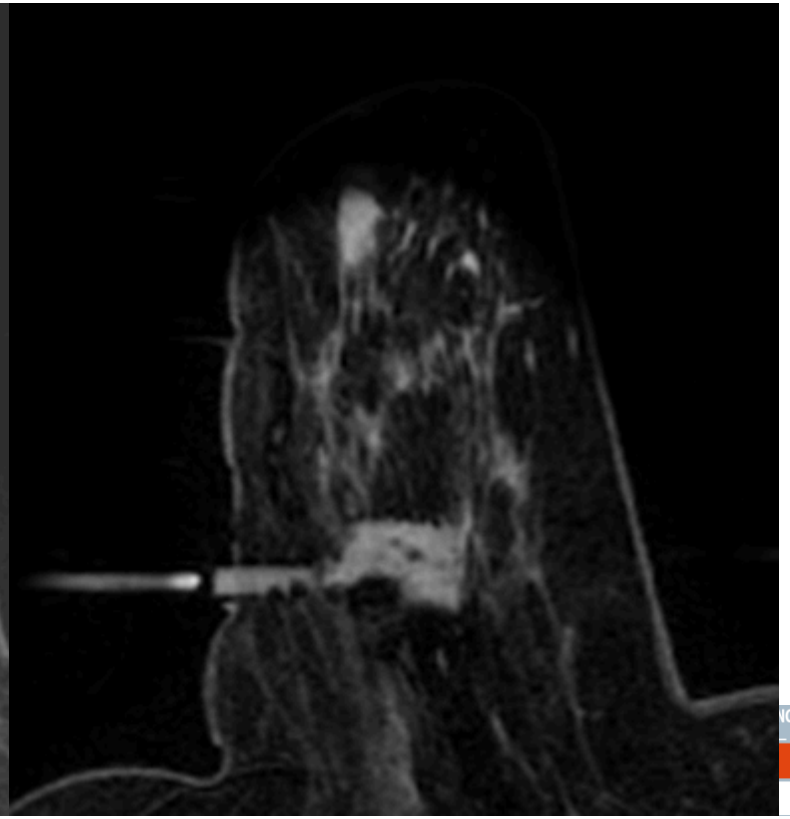

CC
ML

01-2011 : Breast MRI VAB



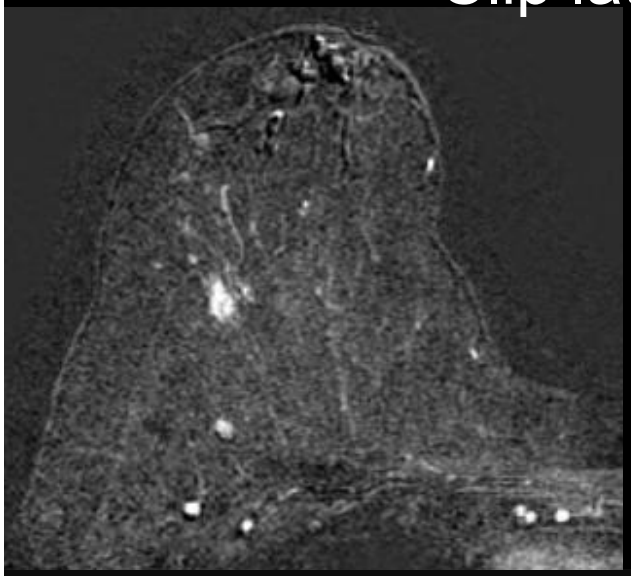


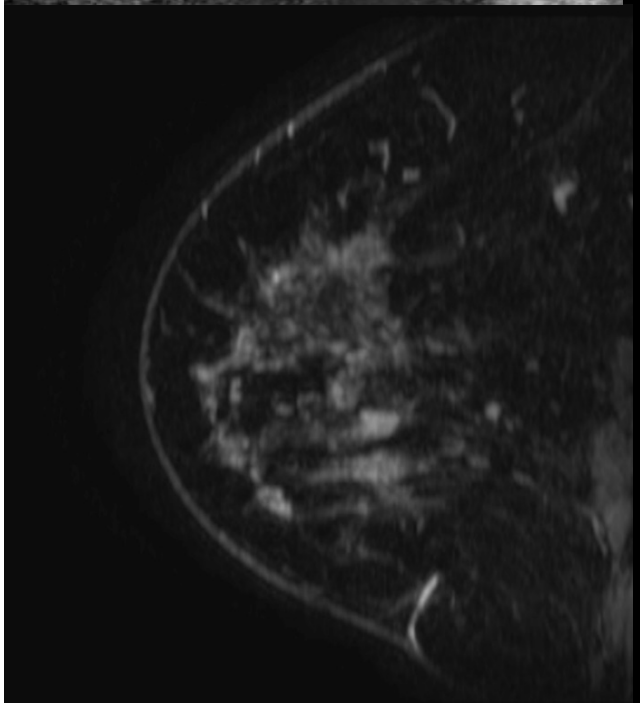


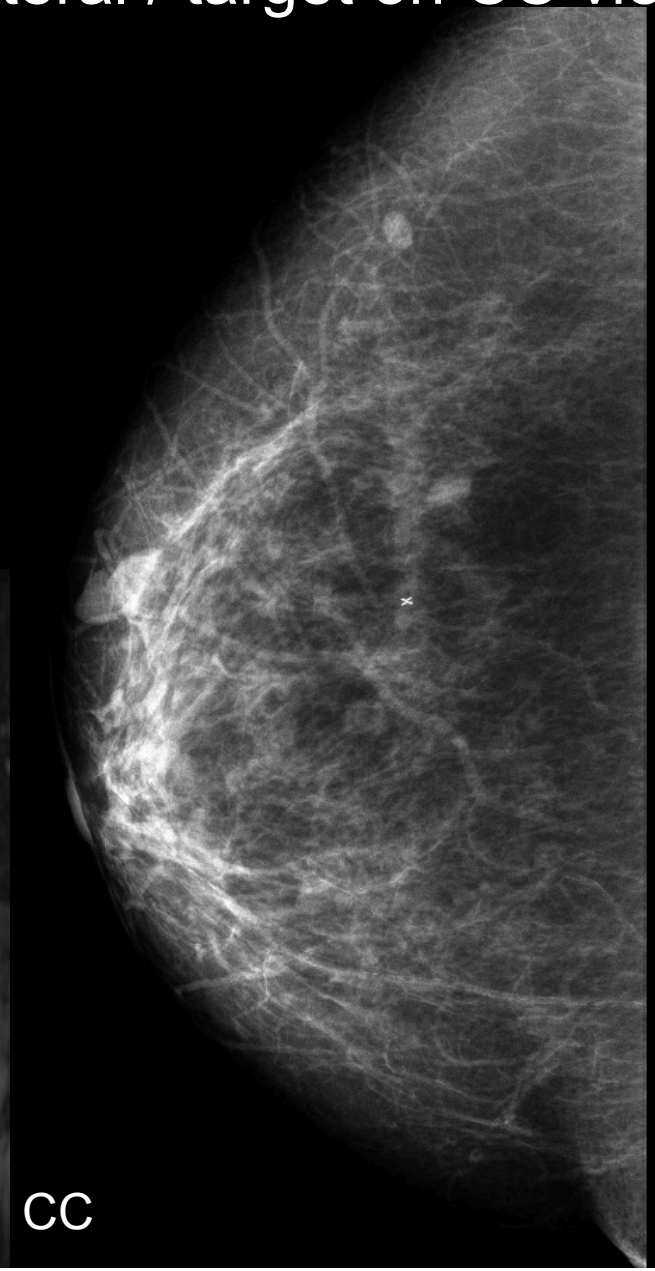


MRI/ MMG Correlation

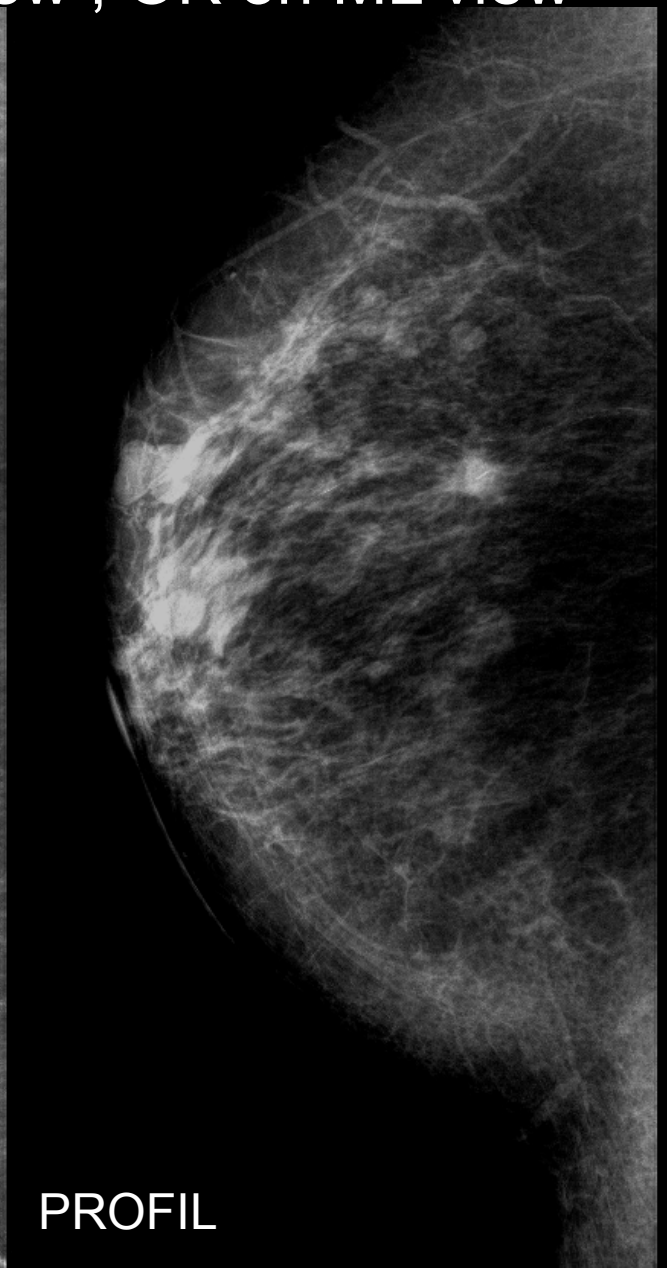
Clip lateral / target on CC view , OK on ML view







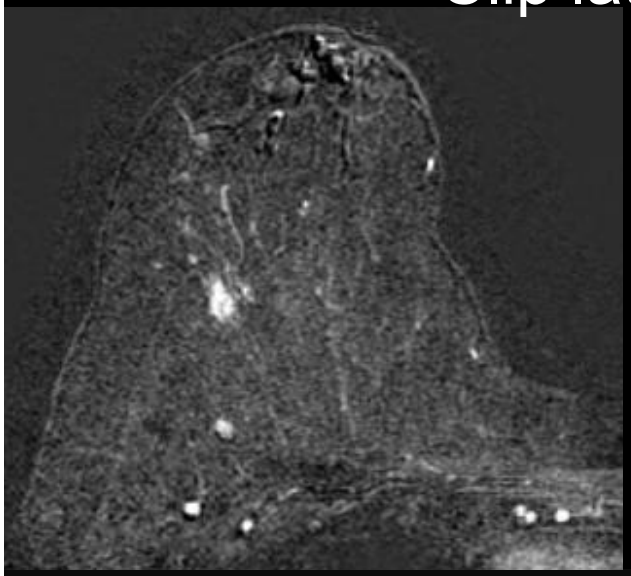
CC

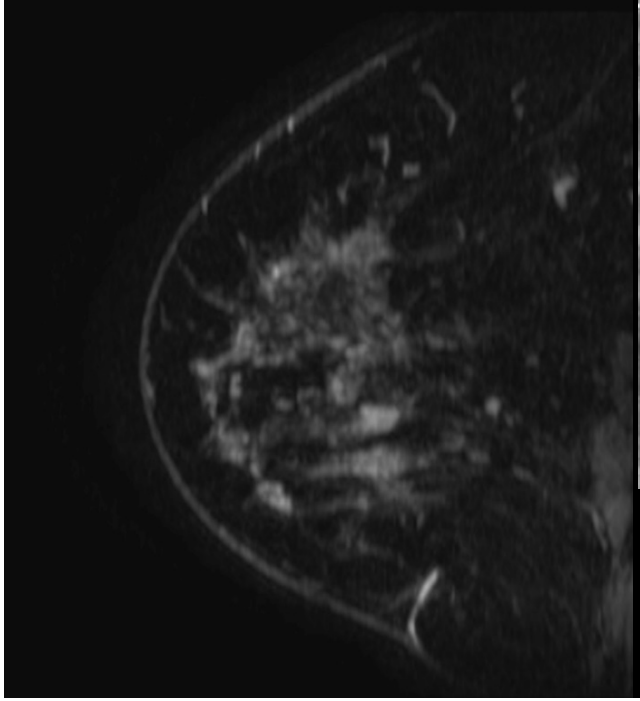


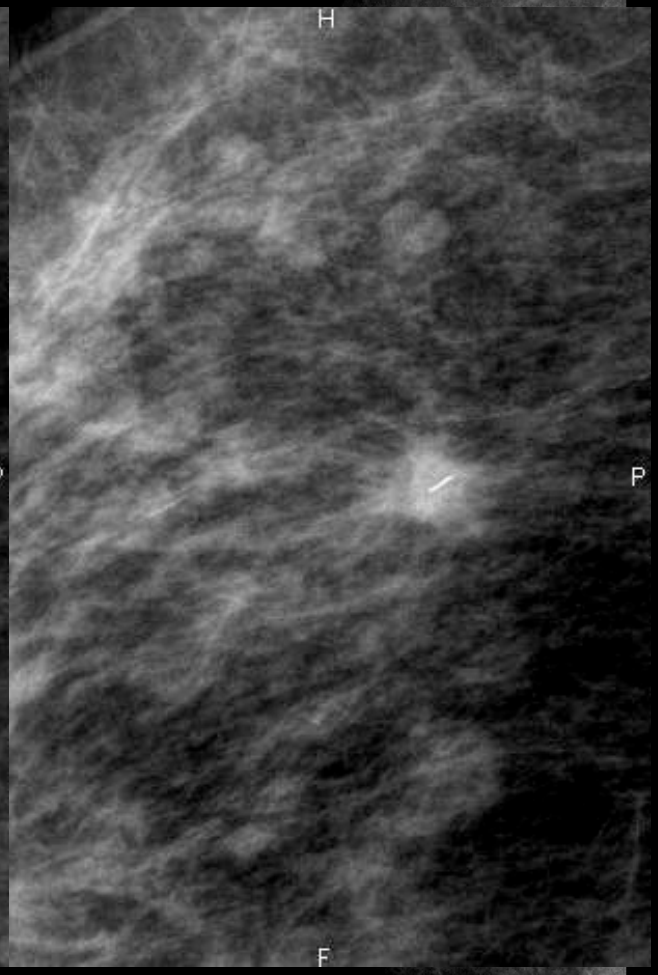
PROFIL

MRI/ MMG Correlation

Clip lateral / target on CC view , OK on ML view







CC

PROFIL

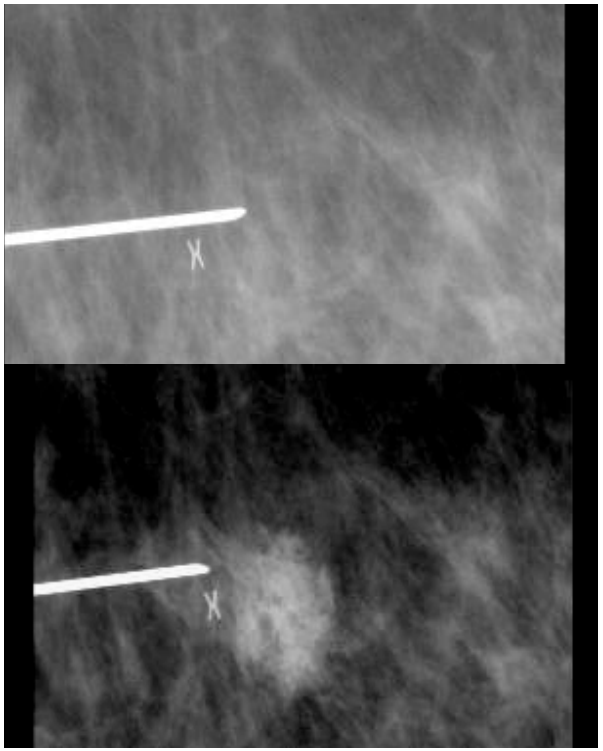
Mrs D

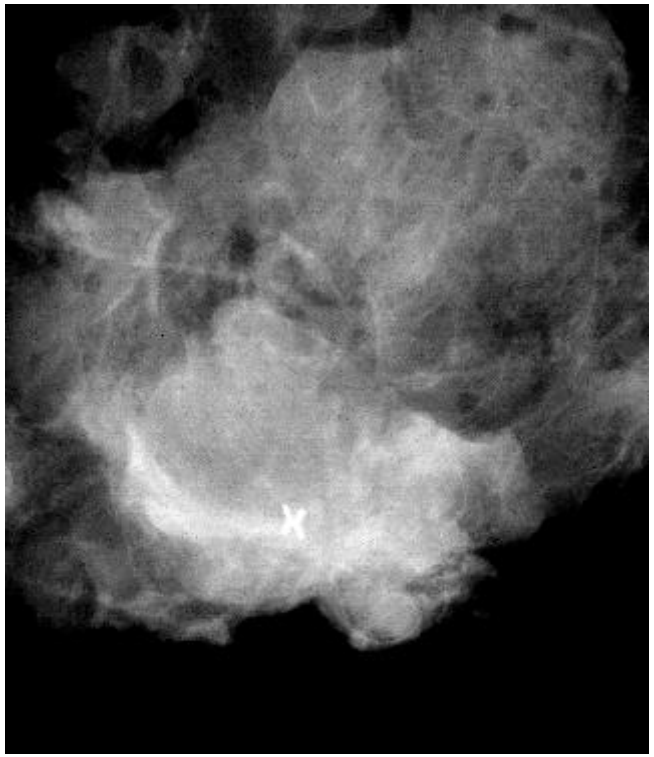
- VABB Pathology report:
  - 2 samples with ADH lesions.
  - No invasive or DCIS lesions

Mrs D – 03/2011

Surgery, Pathology :

- HCA
- No malignancy
- Post VABB scar

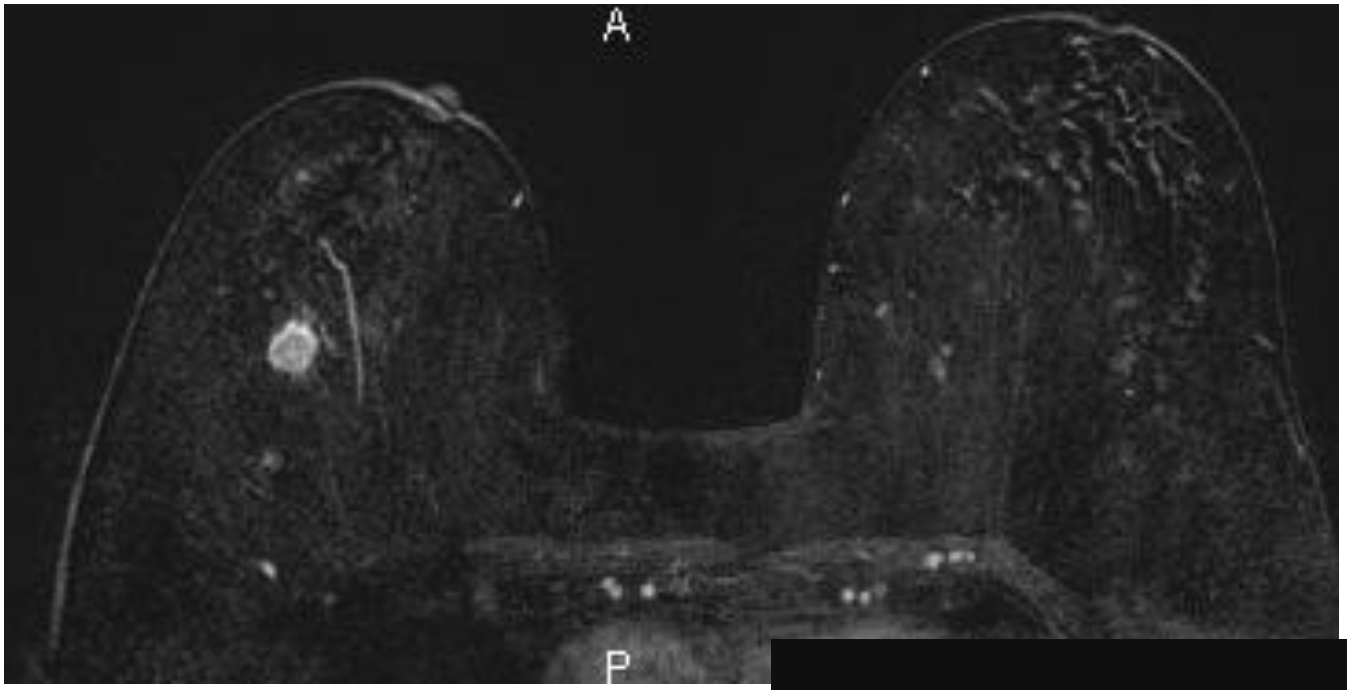




No discordance

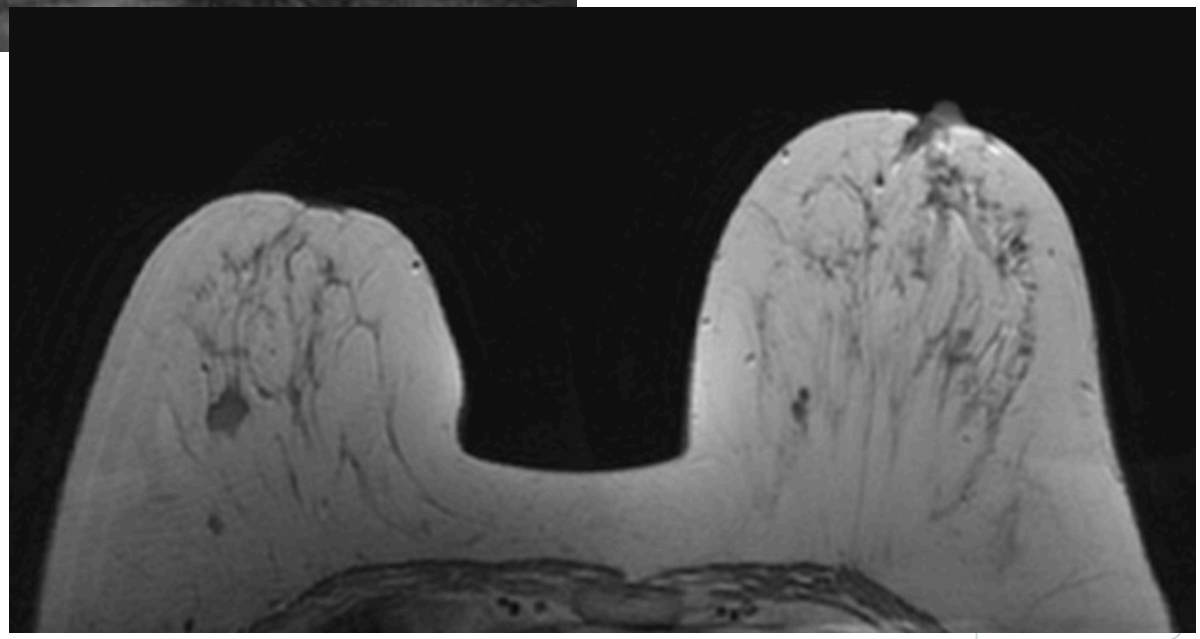
Next screening in 6 months

MRI 11-2011

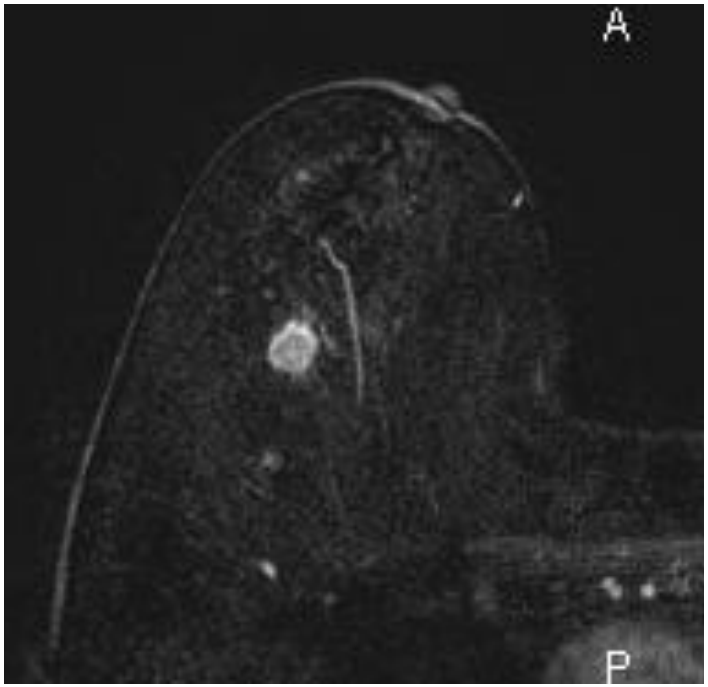


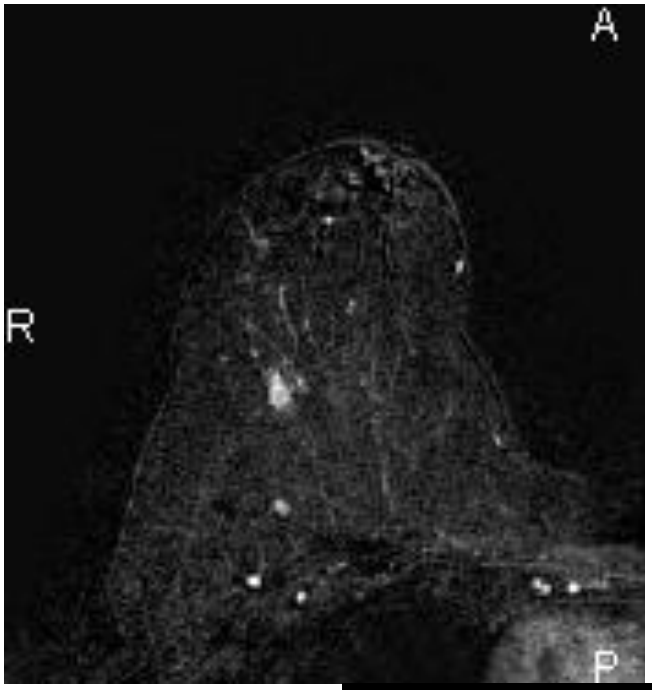
Masse enhancement
13 mm Right SE breast

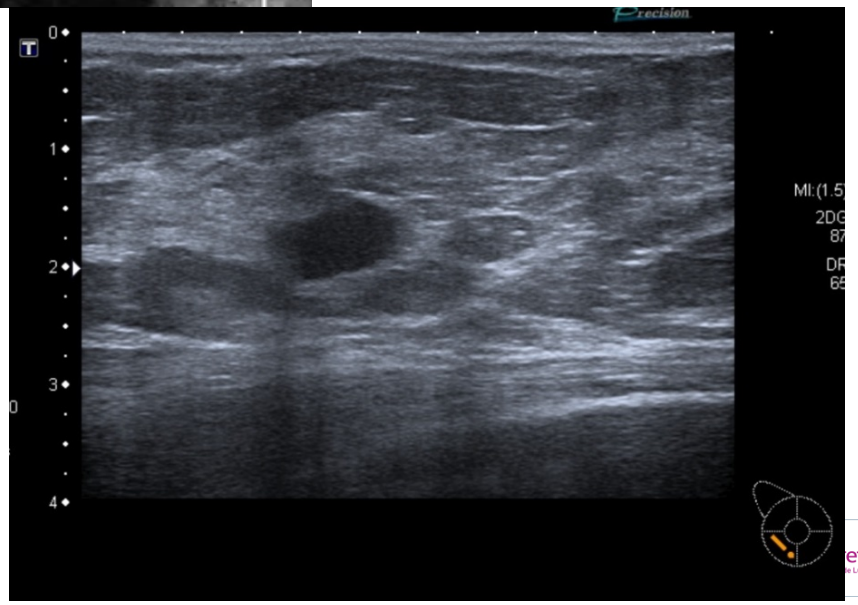
BIRADS 5



MRI 11-2011



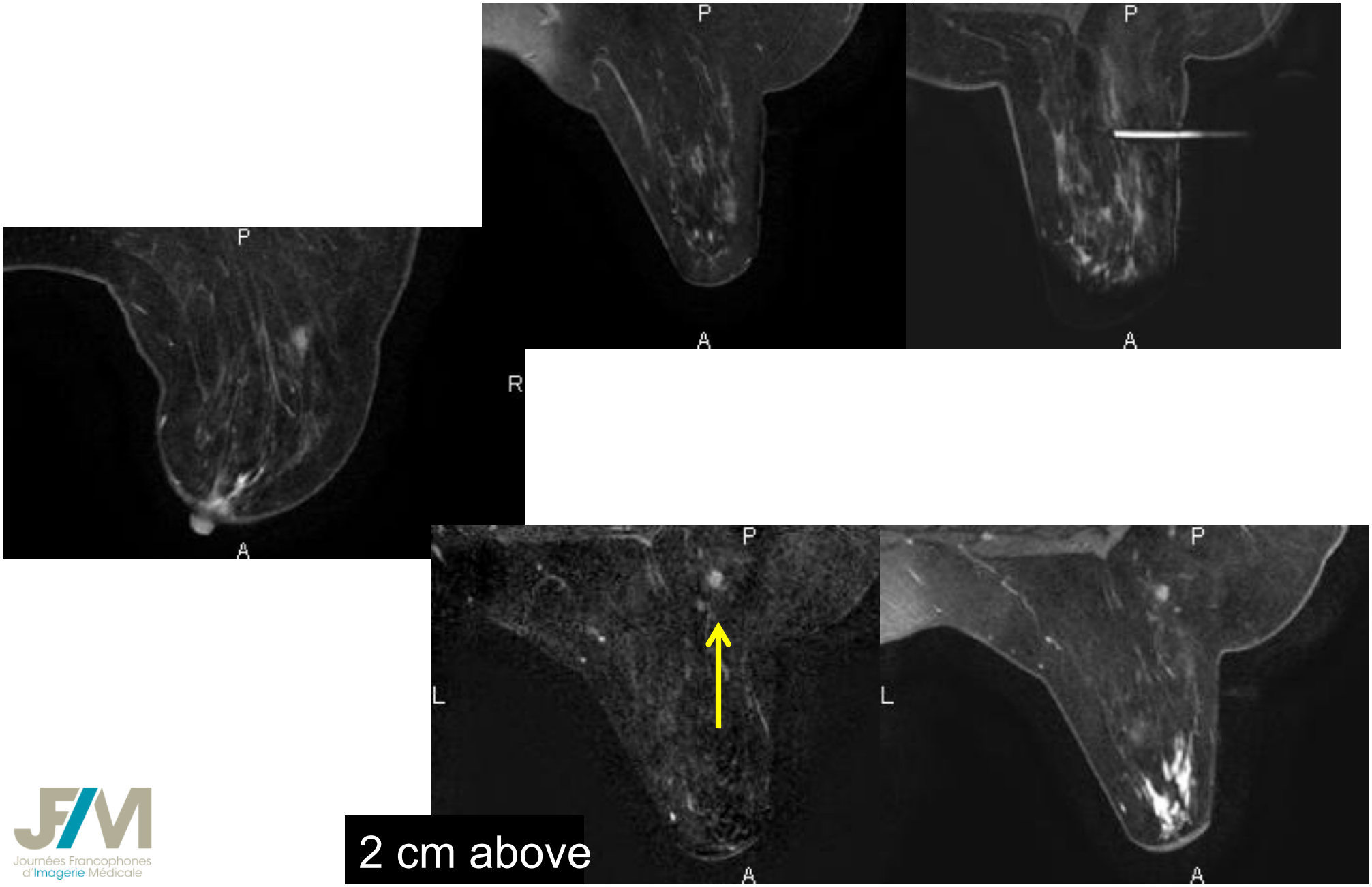




BIRADS 5
Biopsy : IDC
Surgery : 12mm IDC, 1N
+

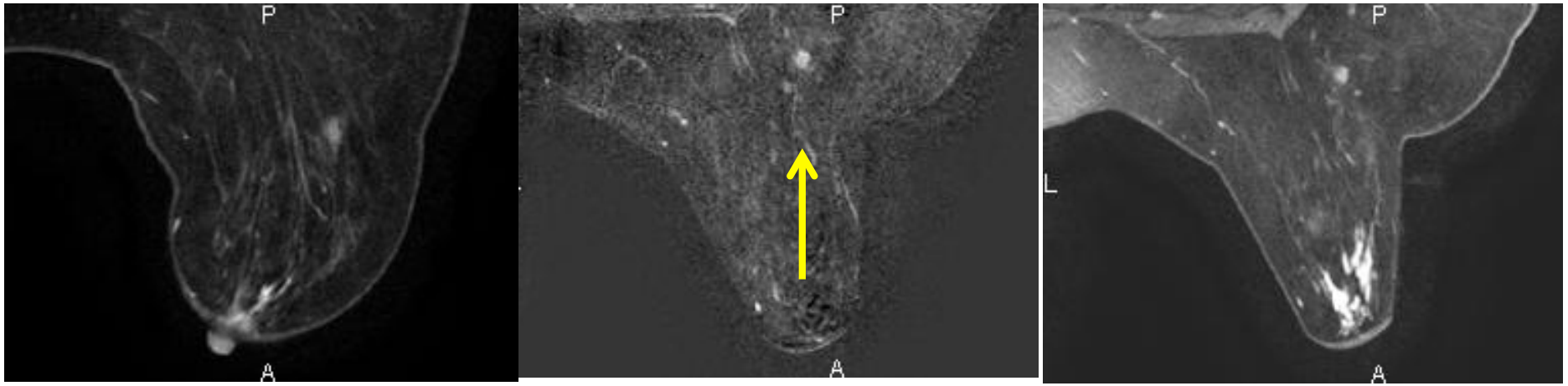
Journées Francophones d'Imagerie Médicale

What happened ?



2 cm above

Frequent event



- Especially with large breast !!

We change our process

- Perform biopsy outside MRI romm (20mn occupancy / 60mn) with no immediat clip control

Day 8 :

- Fast Breast MRI : EGT1, One dynamic axial sequence in 3 phases
  - Clip ?
  - All lesion removed ? Persistant lesion ?
  - Hematoma size

- MMG : CC & P
- US if you need another clip in hematoma

- Results announcement

Before announcement

- **Discussion with results : always !!**
  - Borderline lesion or carcinoma = surgery
  - Benign L with image concordant : Repeat MRI at 4 to 6 m
  - **Discrepancy between MRI and histological results : Repeat biopsy**

Our experience -2010-2014

Ô block, tell me I'm the best!

- 3 T GEMS MRI-guided biopsy procedure
- 2010 – 2014 : 154 patients,
  - High risk : 25 %
  - Lobular carcinoma : 16%
  - Problem solving : 22%
  - Nipple discharge : 3%
  - DCIS study (IRCIS) : 5%
  - Other 29 %

Results

10 / 154 patients not done at 1st exam

- 1/10 : refusal – follow-up : BIRADS 2
- 2/10 : stop / bleeding, pain → clip & surgery : BL
- 7/10 lesions not seen → short (4-6 months) MRI follow-up : 1 carcinoma

163 biopsies in 144 patients – 20 mn in MRI room & 40 mn outside

- Type : ME : 31%, NME : 69%

→ BIRADS 3 : 19%, BIRADS 4 : 72 %, BIRADS 5 : 9%

- Size 4 – 45mm (13mm)
- 12 tissue cores minimum

Results

- MRI-guided VABB results (163) :
  - ML : 58 (36%) — *26-72%*
  - High risk : 10 (6%) — *1-21%*
  - BL : 95 (58%) — *18-74%*

- Histopathological results following surgery (74) :
  - Concordant : 64 (87%), but 1FN
  - Underestimation : 6 (8%)
  - Overestimation : 0

4 neoadjuvant chemotherapy

Take home messages

1. Before : need for complete breast imaging
2. Consultation before
3. Clip always
4. Contrôle clip and process Day 8 : short MRI sequences and MMG
5. **Discussion with results : always !!**
6. Short MRI follow – up : 4-6 months for all BL