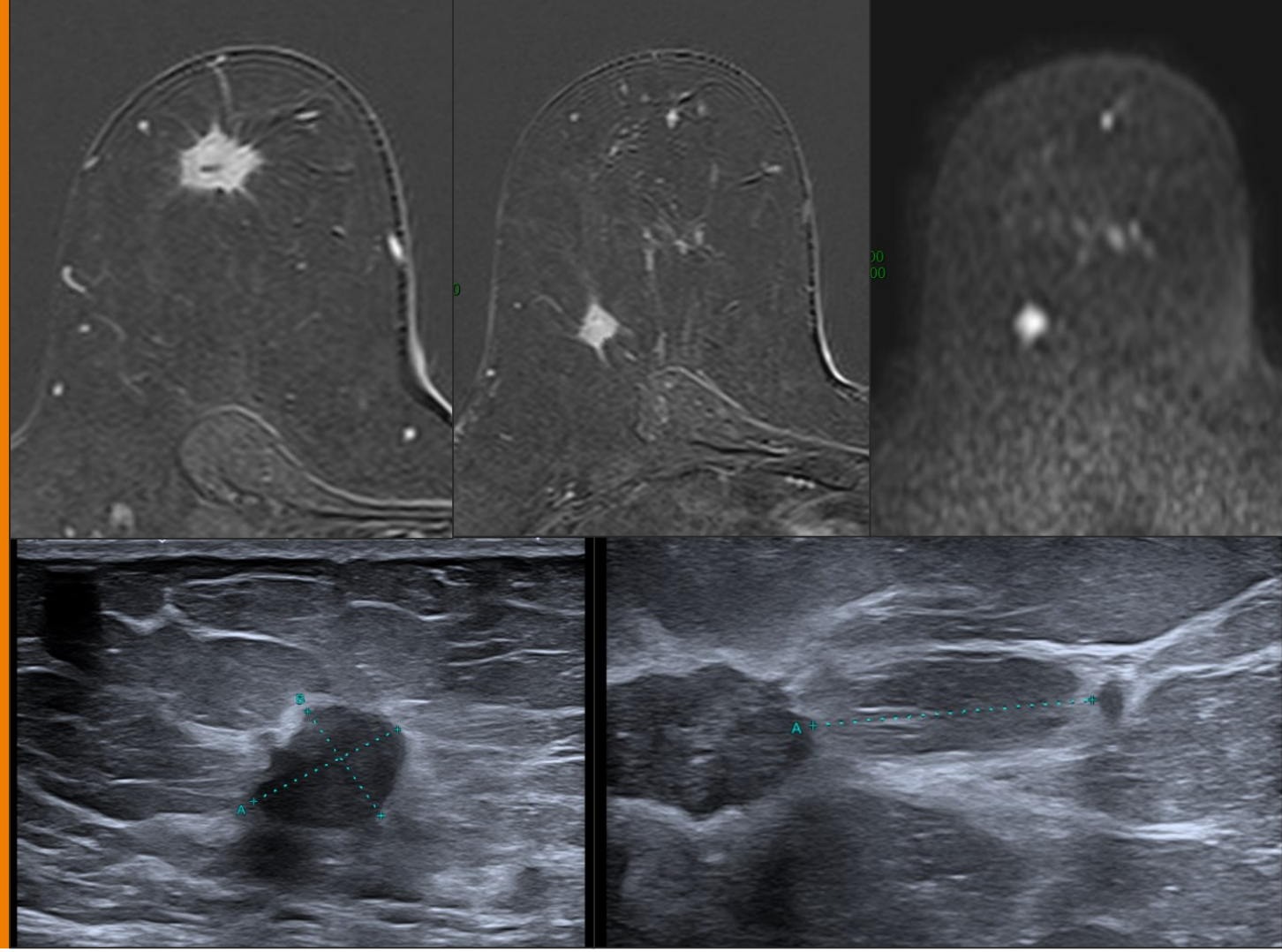
Caroline Malhaire
SIFEM 2024

Bilan pré-thérapeutique: IRM pour toutes ?



ENSEMBLE, PRENONS LE CANCER DE VITESSE

- Je n’ai pas de conflit d’intérêt à déclarer

Recommendations INCa 2021

- Bilan d'extension locale : mammographie bilatérale + échographie mammaire et axillaire bilatérale (+/- tomosynthèse)
- IRM, ou angiomammographie :
  - Femmes à haut risque
  - Discordance clinique / mammo / echo
  - Difficulté d'évaluation de la taille tumorale
  - Difficulté d'évaluation du nombre de lésions si TC
  - Atteinte axillaire isolée
- Pas d'indication d'IRM sur données seules :
  - Type histologique (Lobulaire)
  - Oncoplastie
  - Densité mammaire

IRM pré-thérapeutique

- Détection de lésions additionnelles sans impact démontré sur le long terme

Tableau 13 : Impact de l'IRM préopératoire sur le taux de récidive et la survie sans récidive

Référence	Type d'étude ; effectif ; caractéristiques du cancer	Taux de récidive locale			Survie sans récidive (estimation à 8 ans) HR (IRM *vs* pas d'IRM)
		Avec IRM	Sans IRM	p	
HOUSSAMI2014 (NP2)	Méta-analyse ; n = 3 169 patientes (carcinomes infiltrants> 89 %)		à 2,9 ans		- locale : 0,88 [0,52-1,51], p = 0,65
		1,8 %	2,2 %	-	- à distance : 1,18 [0,76-2,27], p = 0,48
HILL2017 (NP4)	Etude rétrospective ; n = 1 030 patientes (carcinomes infiltrants)		à 8 ans		-
		4,2 %	7,3 %	0,28	
GERVAIS2017 (NP4)	Etude rétrospective ; n = 470 CCS pour carcinomes infiltrants		à 10 ans		-
		1,6 %	4,2 %	0,37	

CCS : chirurgie conservatrice : HR : hazard ratio

- Etudes anciennes
- Apport des séquences ultrarapides et de la diffusion ?
  - Comparaison au protocole standard IRM
  - Pas de nouvelle étude d'impact clinique ou pronostique

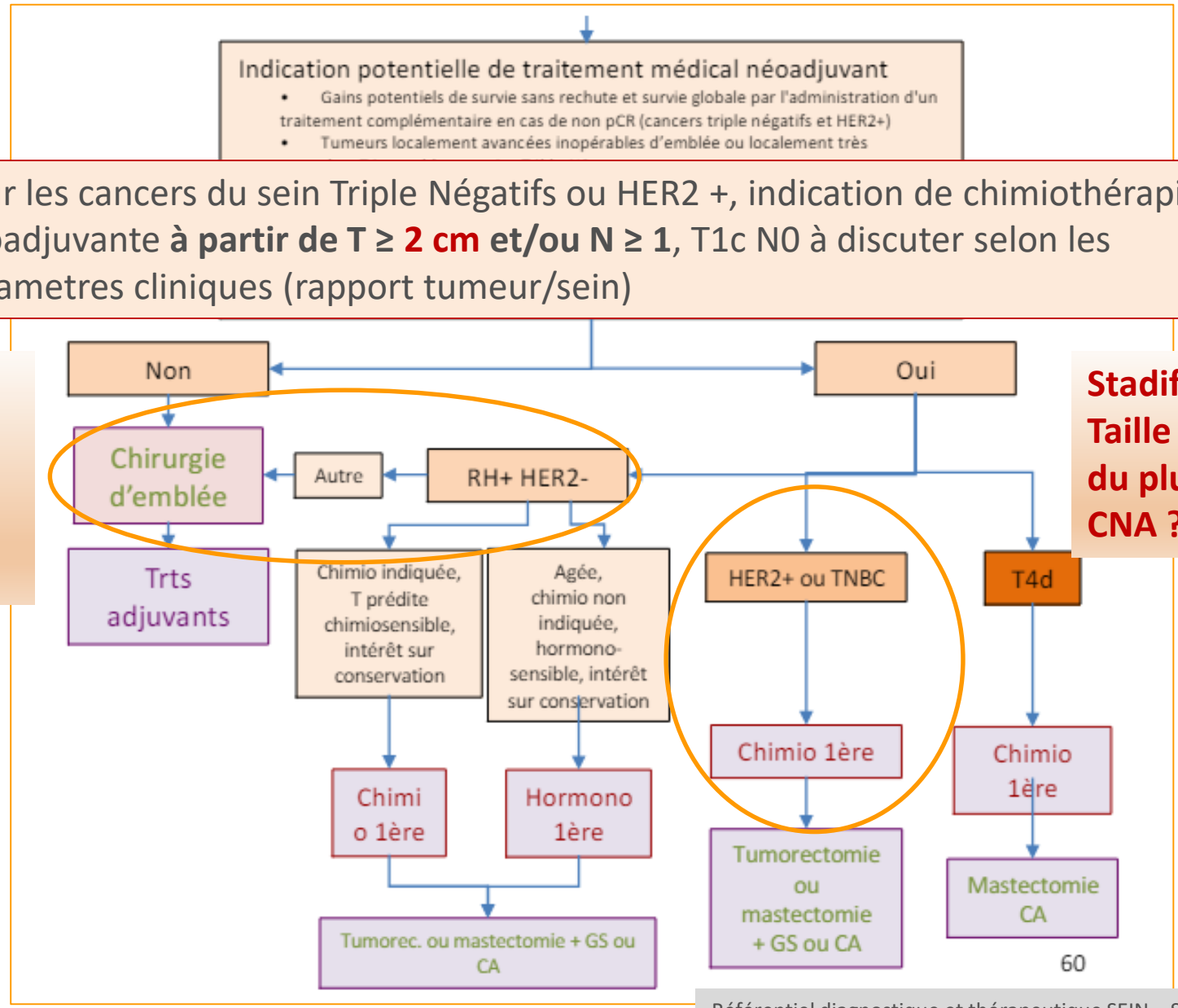
Traitements locorégionaux des cancers du sein infiltrants non métastatiques, Kuhl et al. Radiology 2024

IRM et Carcinome Canalaire in Situ Pur

- IRM non validée par les recommandations
- Sous ou surestimation de la taille tumorale
- Essai prospectif IRCIS : pas d'impact sur la qualité de l'exérèse chirurgicale
- MIPA study :
  - Analyse appariée pour compenser le biais de recours à l'IRM
  - Taux de mastectomie : 20,1 dans le groupe IRM vs 11,0 % dans le groupe sans MRI
  - Taux de reprise : 10,0 % dans le groupe IRM vs 22,0 % dans le groupe sans MRI
- European Commission Initiative on Breast Cancer (ECIBC)
  - Peu ou pas de modification du risque de réintervention, de taux de MT
  - Change le ttt initial dans 17% des cas, mais avec peu ou pas d'effet sur les récidives locorégionales

Balleyguier et al. J Clin Oncol. 2019, 10.1200/JCO.18.00595
Cozzi et al. Eur Radiol 2023, 10.1007/s00330-023-10409-5
Canelo-Aybar et al. Eur Radiol, 10.1007/s00330-021-08489-2

Evolutions des Stratégies Thérapeutiques



Pour les cancers du sein Triple Négatifs ou HER2 +, indication de chimiothérapie néoadjuvante **à partir de T ≥ 2 cm et/ou N ≥ 1**, T1c N0 à discuter selon les parametres cliniques (rapport tumeur/sein)

Bilan pré-opératoire :
Multifocalité
Taille Tumorale combinée de l'ensemble des lésions
Résection en bloc in sano

Stadification TNM :
Taille Tumorale
du plus large foyer infiltrant
CNA ?

Référentiel diagnostique et thérapeutique SEIN – SENORIF 2021-2023

IRM et Multifocalité

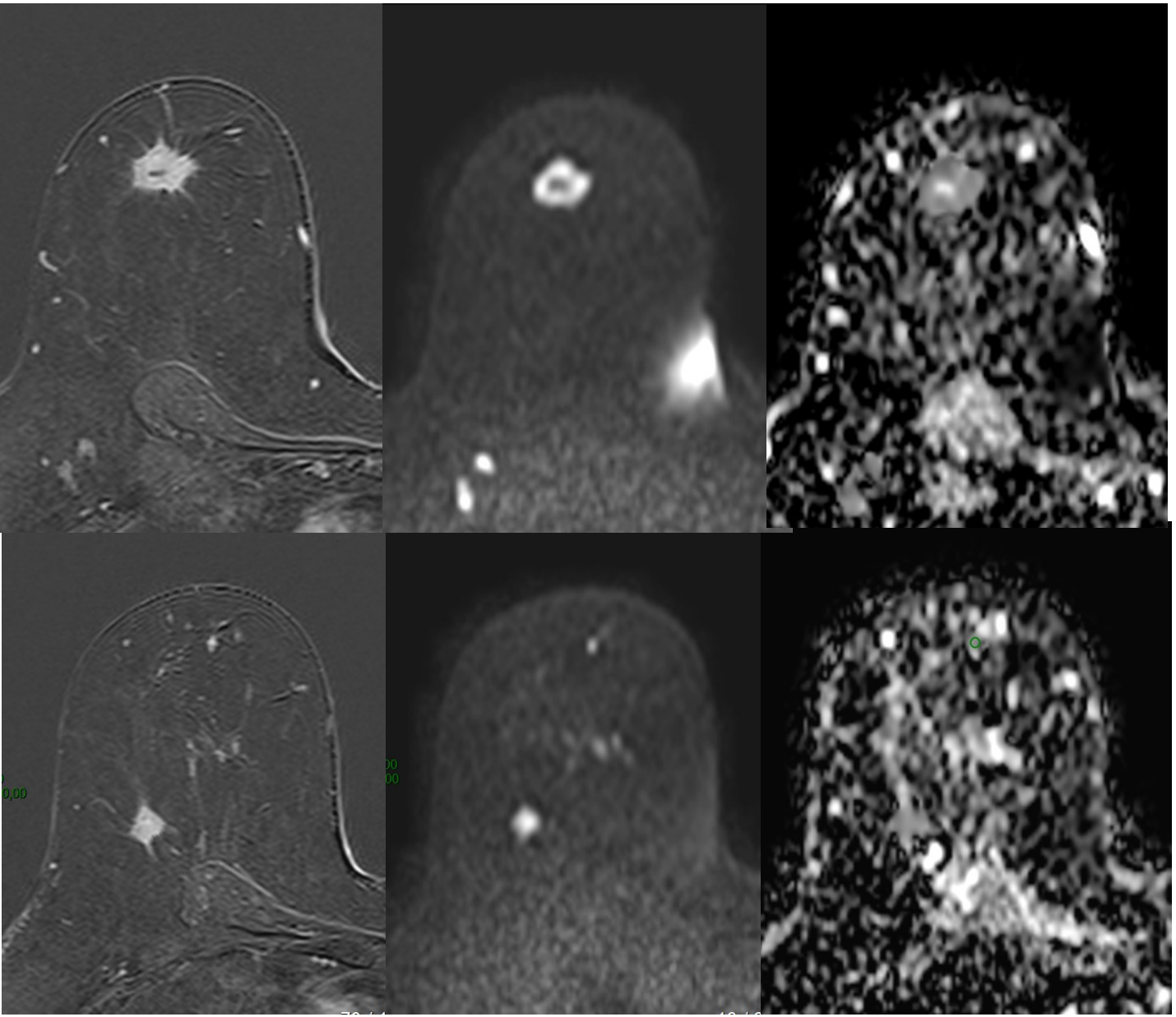
- Essai prospectif ACOSOG Z11102

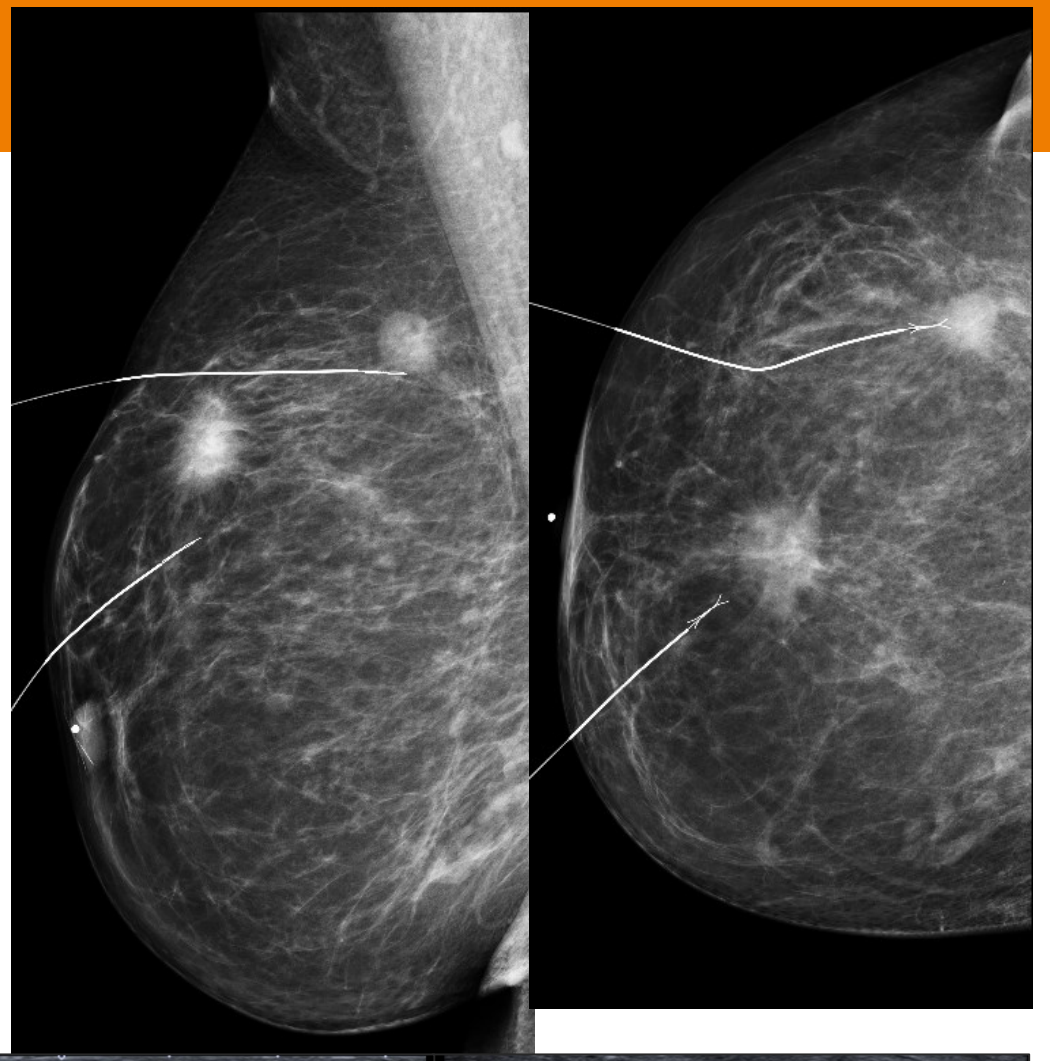
- Femmes de > 40 ans, avec atteinte multifocale
- Analyse à 5 ans des récidives locales

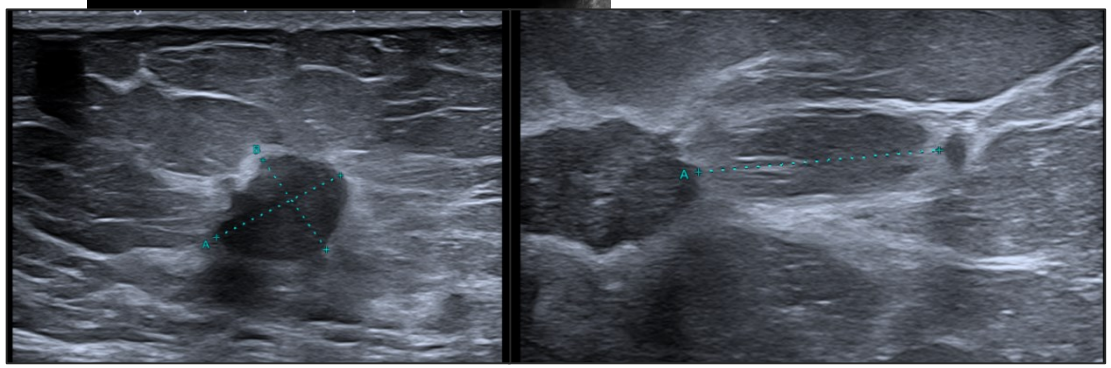
- Incidence cumulée de RL à 5 ans : 3%
- Significativement associée à la réalisation d'une IRM pré-opératoire
  - SANS IRM 22.6 %
  - comparé à 1.7 % des patientes AVEC IRM pré-opératoire

Boughey J, et al. JCO 2023 ; 10.1200/JCO.22. 02553
Di Lena E. et al. EJSO 2024 ; 10.1016/j.ejso.2024.108266

Chirurgie Première

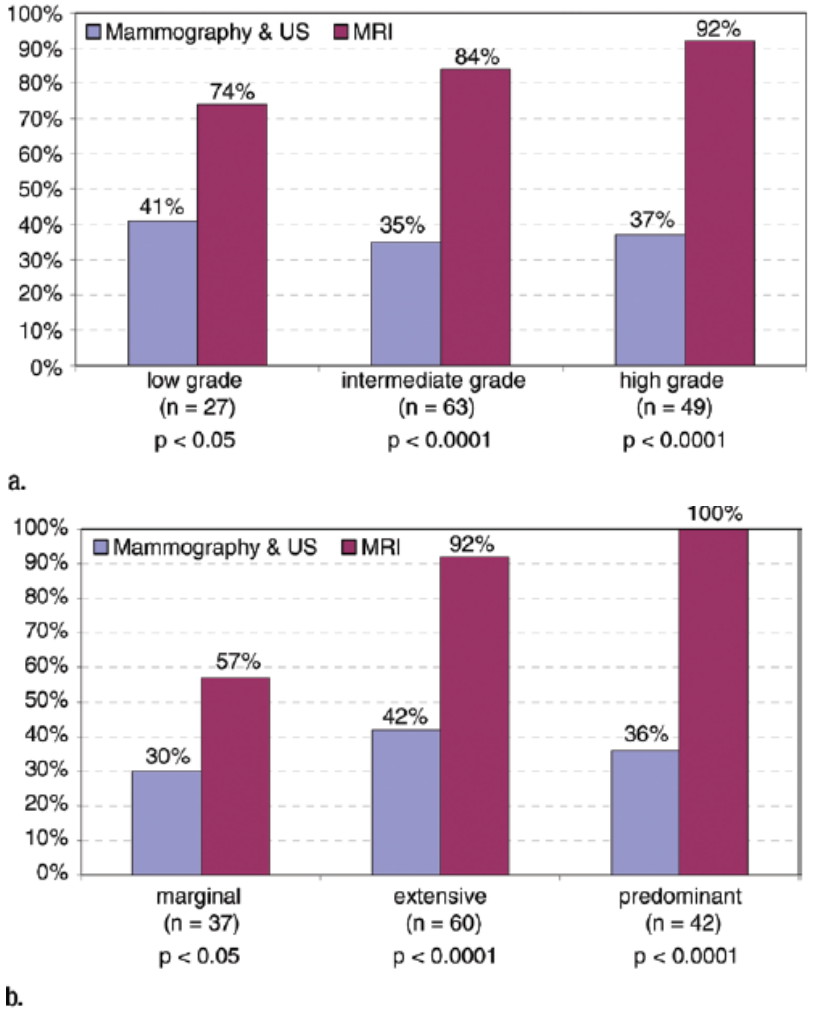






Composante infiltrante / in situ

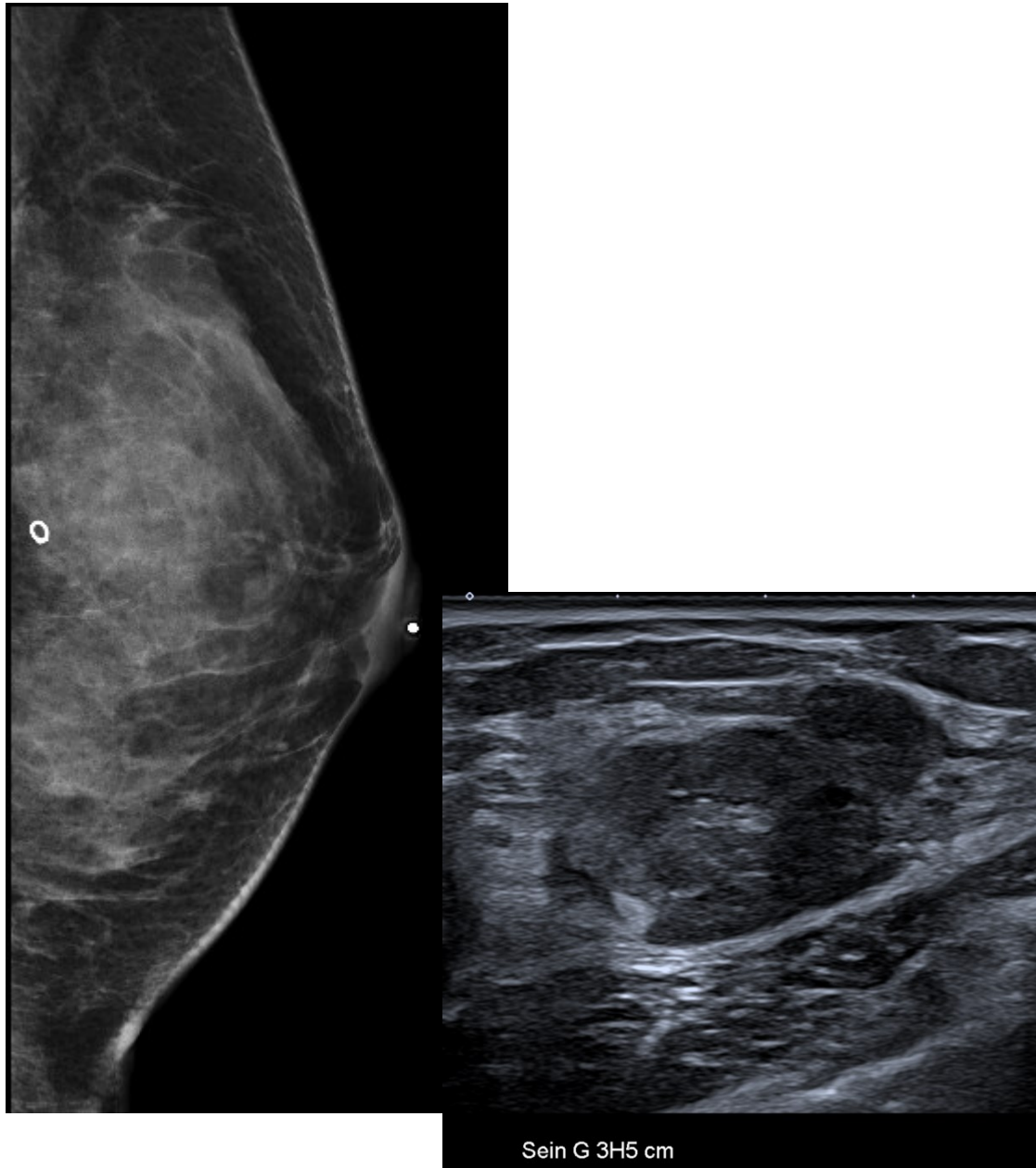
- Etude prospective multicentrique
- Détection et la prise en charge de la composante in situ associée à un carcinome invasif
  - Recours à l'IRM interventionnelle
- Sensibilité supérieure pour la détection de la composante in situ
  - 84.9% vs 36.7% en imagerie conventionnelle
- La moitié des CCIS diagnostiqués seulement par IRM
  - Particulièrement des CCIS larges
  - Quelle que soit la densité
- Taux d'atteinte des berges faible
  - équivalent à ceux des patientes sans CCIS
- Taux de mastectomies total équivalent



Kuhl et al. Radiology 2017, 10.1148/radiol.2017161449

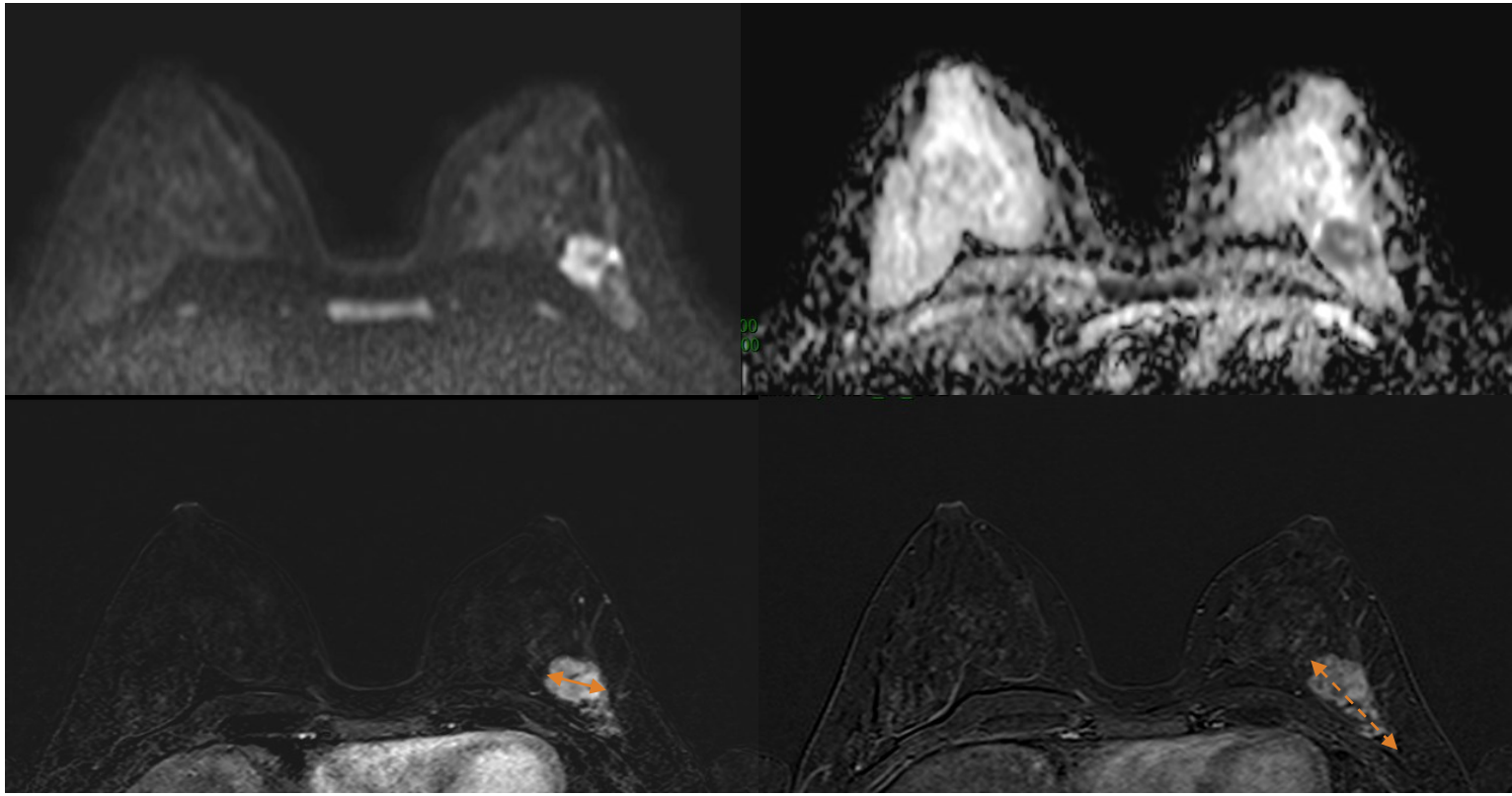
Composante infiltrante / in situ

- 39 ans, nodule palpable de l'UQE, centimétrique
- Bilan mammo/écho :
  - masse du QSE gauche
- Microbiopsies sein gauche en ville :
  - CI TNS grade II, RH-, HER2+
  - Ki67 40%
  - + CCIS de haut grade associé



Composante infiltrante / in situ

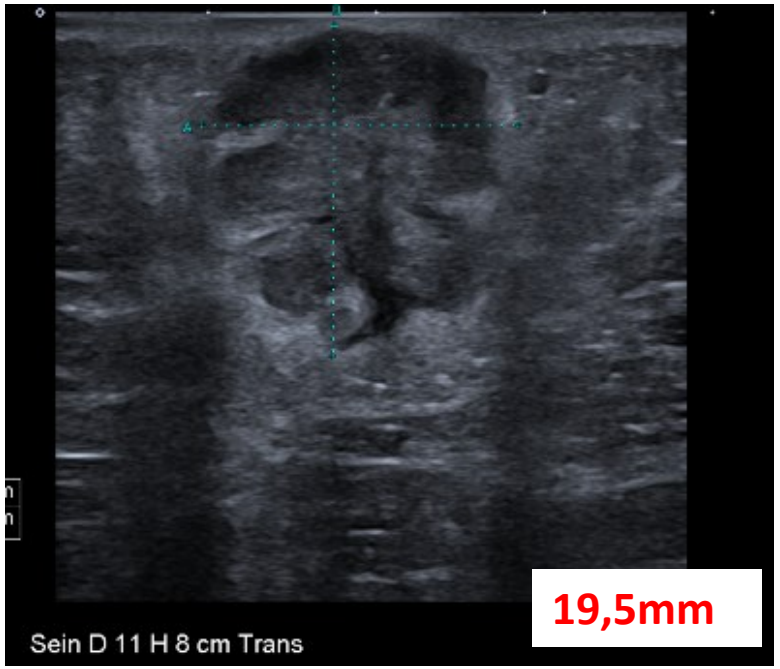
- Masse unifocale ACR 6 de 28mm
- RNM au contact ACR 5
- Elargissant l'ensemble lésionnel
- Composante infiltrante vs in situ :
  - Apport de la diffusion et de l'ultrafast



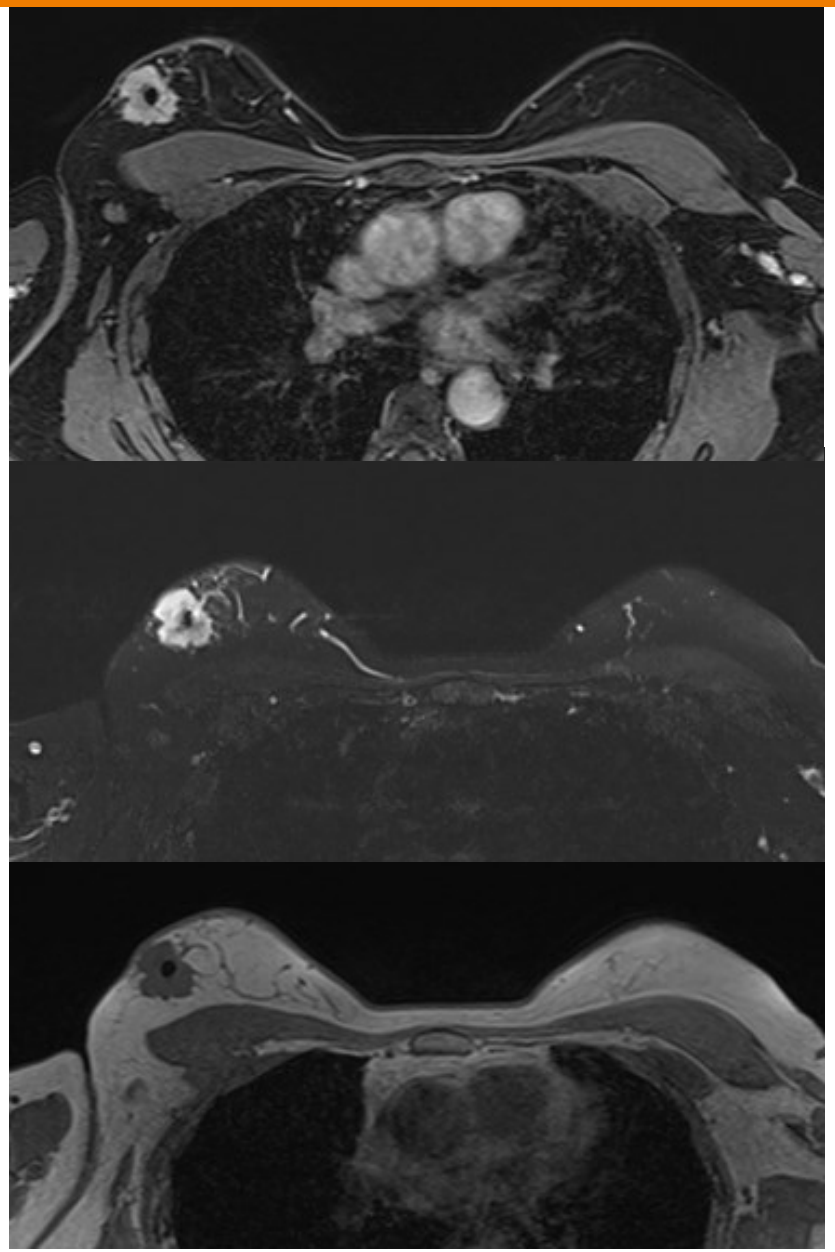
La mesure TNM prend en compte la taille du foyer invasif le plus large
Pas d'addition des lésions

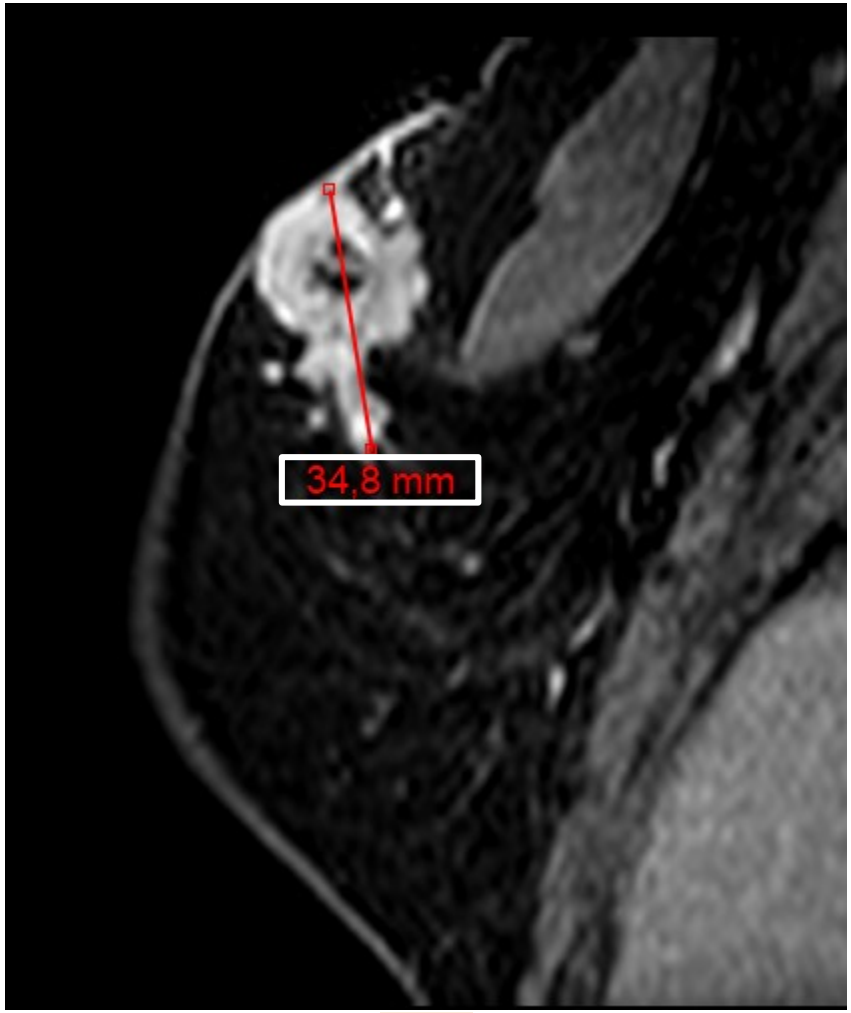
Stadification : Taille tumorale

Carcinome Infiltrant
- Grade 3
- RE+, RP-, HER2 positif, Ki67 60 %



T1





T2

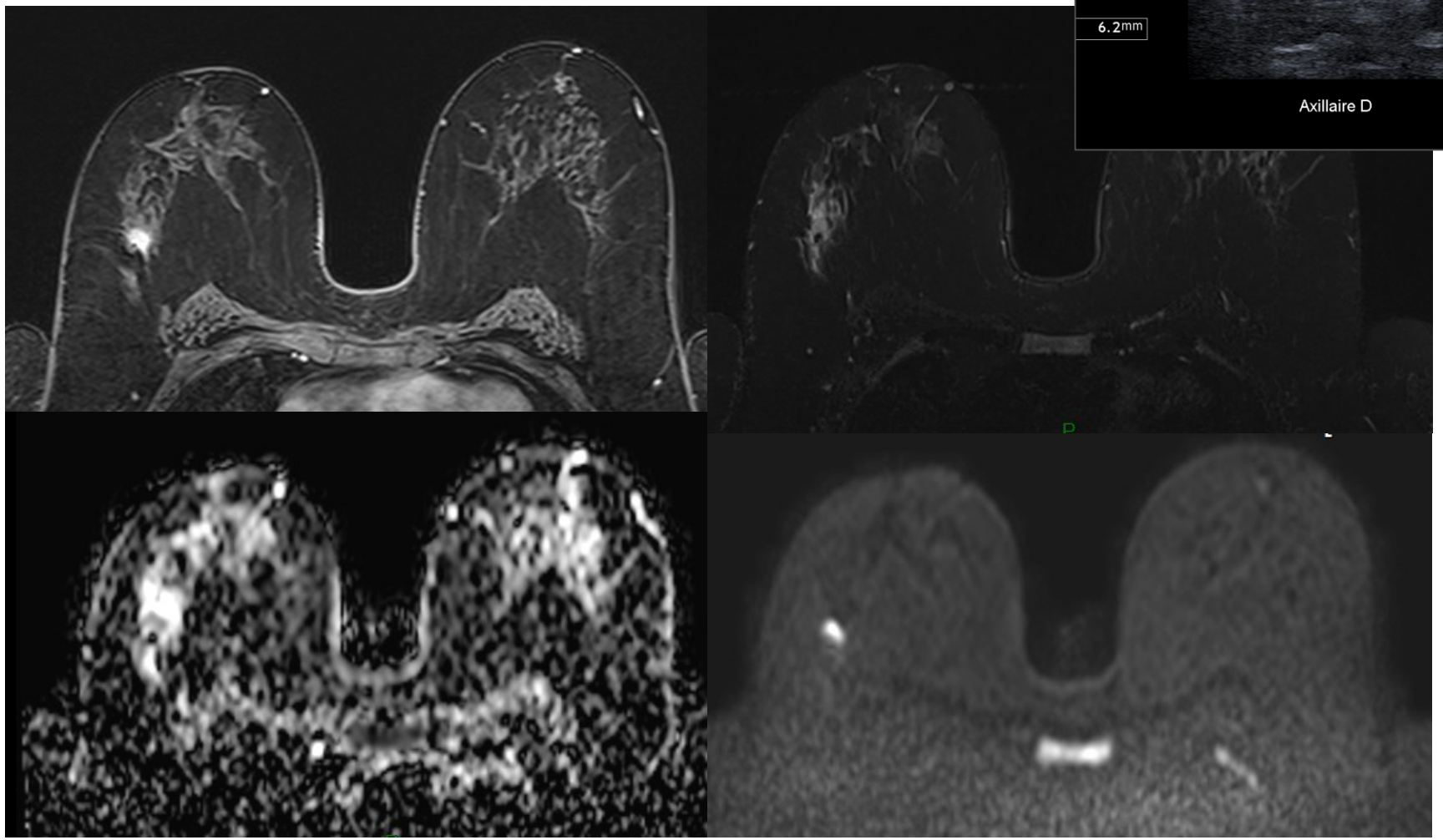
Prise en Charge Néoadjuvante

- **Recommendations INCa 2024**
- CNA ≠ une indication d'IRM ou angiomammographie systématique
- En fin de CNA : déterminer la taille résiduelle de la lésion index et le type de réponse (concentrique ou fragmentée) afin de proposer une prise en charge chirurgicale adaptée
- Mammographie / échographie recommandées et un examen avec injection de produit de contraste (IRM/angiomammographie) peut être proposé en complément s'il a été réalisé initialement

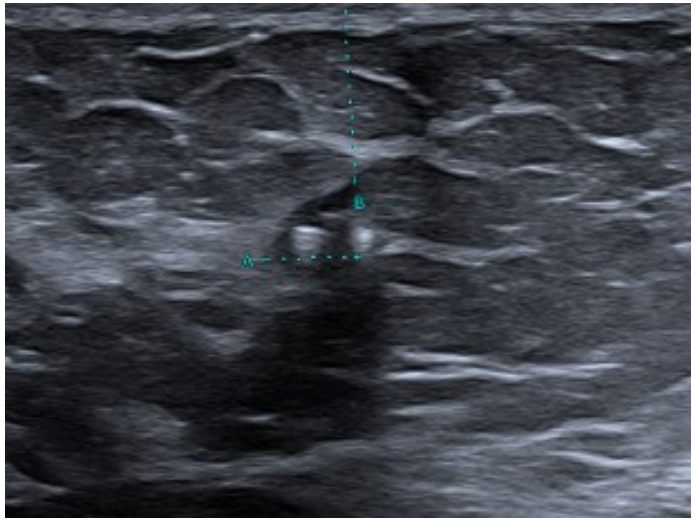
Prise en Charge Neoadjuvante

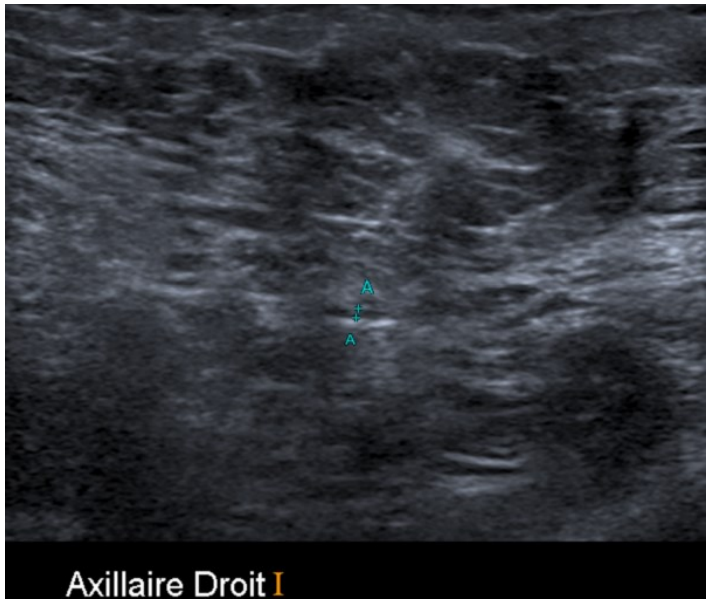
60 ans, masse palpable
HER2 + Luminal
KI67 23 %
18 mm
1 N+
T1 N1

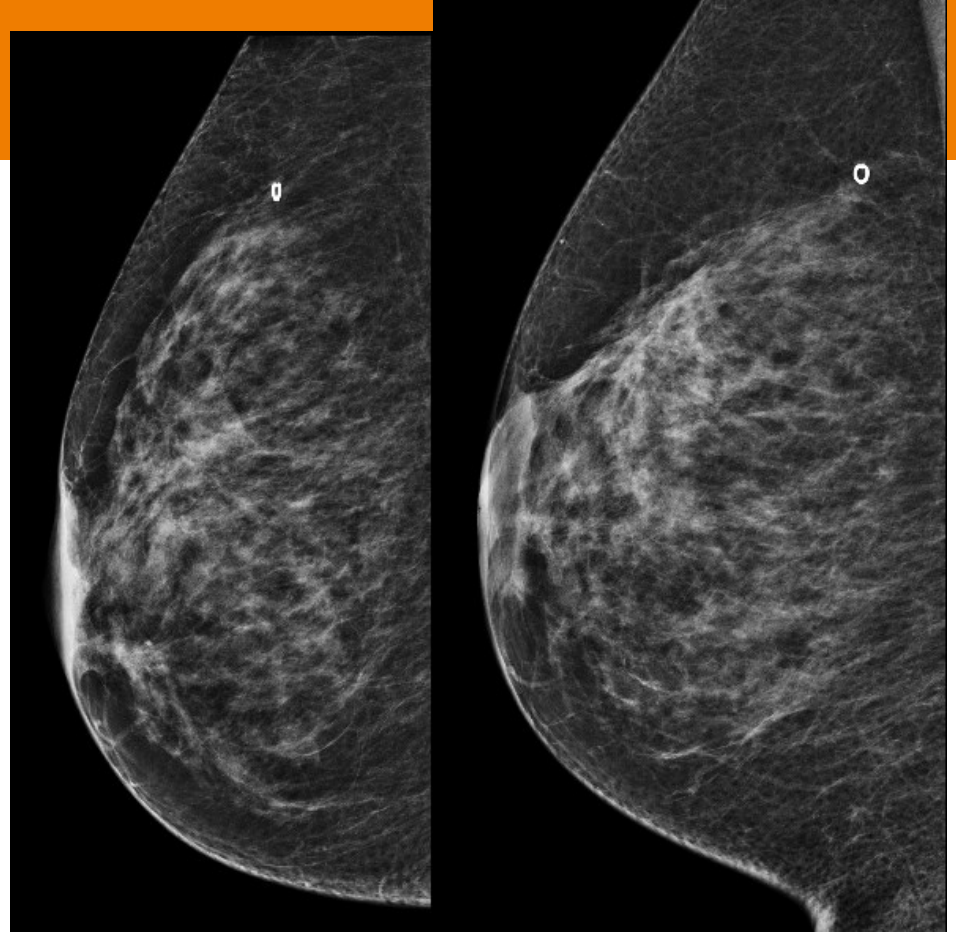
→ **NEOADJUVANT**

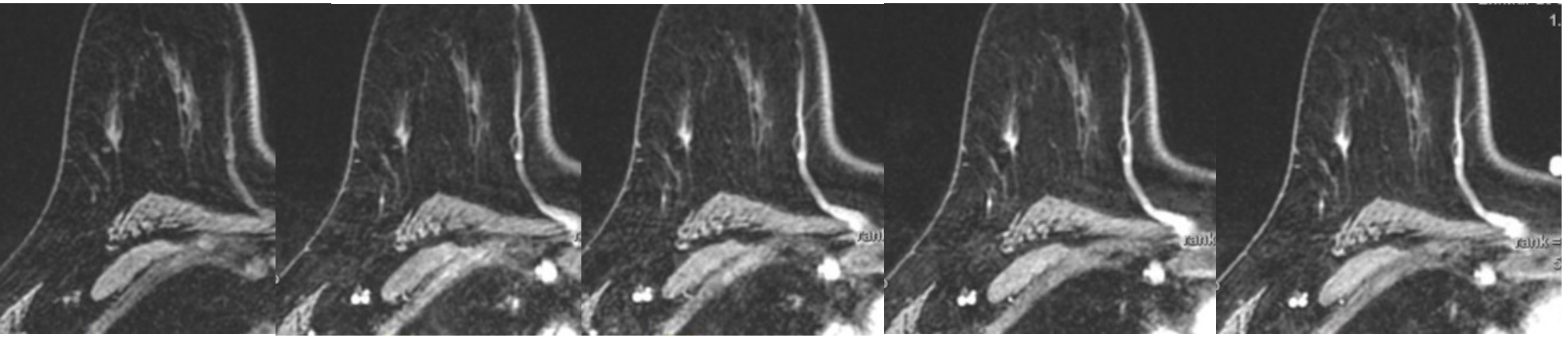


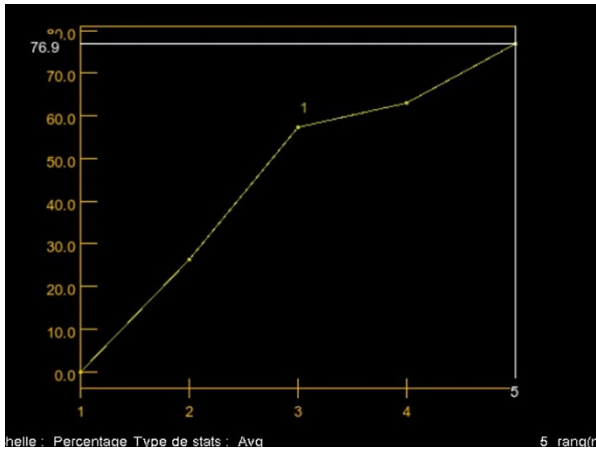
En fin de Traitement





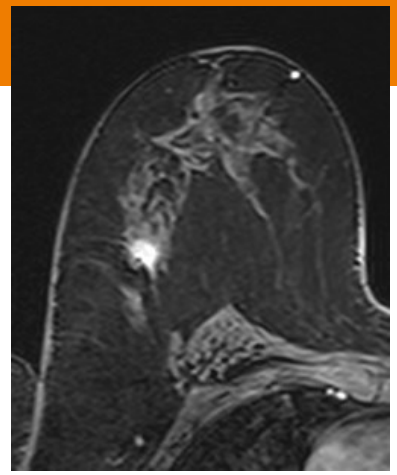


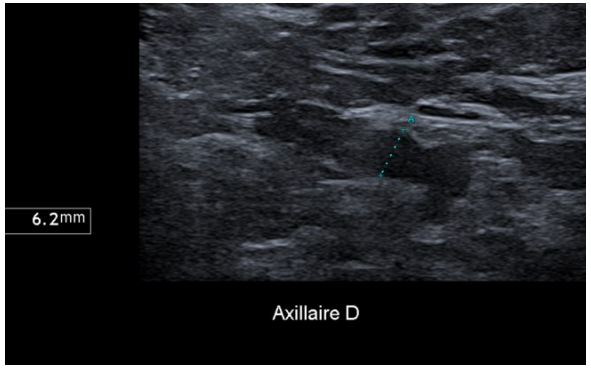


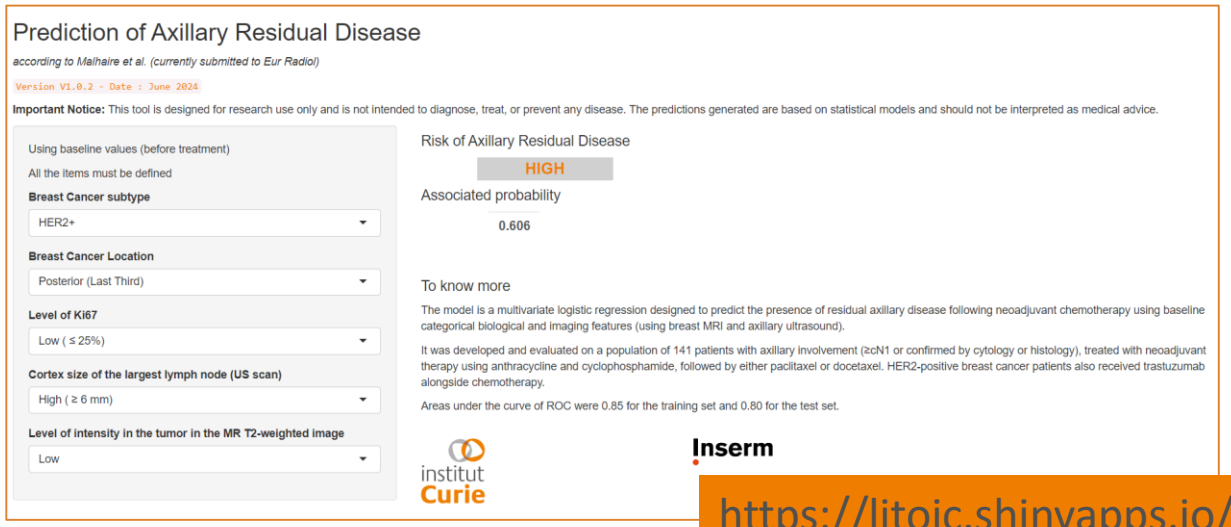


Prise en Charge Neoadjuvante

- Mastectomie partielle droite + GS : Lésion résiduelle mammaire de 6 mm,
- Micrometastase ganglionnaire résiduelle
- Résidu modéré RCB II
- Indication à un **traitement d'escalade** en post opératoire (TDM1)

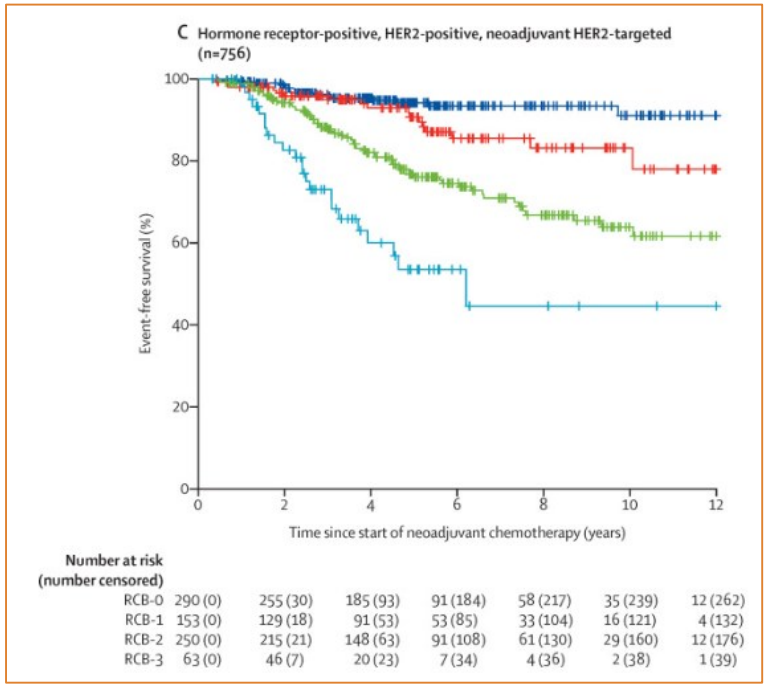






Soumis à European Radiology

https://litoic.shinyapps.io/LNPred_Apps/



Yau et al. Lancet Oncology 2021

Evaluation en Cours de Thérapie Néoadjuvante

- L’évaluation par IRM en milieu de traitement est limitée aux études cliniques

Radiology

ORIGINAL RESEARCH • BREAST IMAGIN

Prospective Evaluation of Ultrafast Breast MRI for Predicting Pathologic Response after Neoadjuvant Therapies

Toulsie Ramtohul, MD • Clara Tescher, MD • Pauline Vaflard, MD • Joanna Cyrta, MD, PhD • Noémie Girard, MD • Caroline Malhaire, MD • Anne Tardivon, MD

From the Departments of Radiology (T.R., C.T., C.M., A.T.), Medical Oncology (P.V.), Diagnostic and Theranostic Medicine – Pathology (J.C.), and Surgical Oncology (N.G.), Institut Curie, PSL Research University, 26 rue d'Ulm, Paris 75005, France. Received February 17, 2022; revision requested April 1; revision received May 11; accepted May 26. **Address correspondence to** T.R. (email: *toulsie.ramtohul@curie.fr*).

Supported by Institut Curie.

Conflicts of interest are listed at the end of this article.

See also the editorial by Lee and Moy in this issue.

Radiology 2022; 305:565–574 • https://doi.org/10.1148/radiol.220389 • Content codes: BR MR

European Radiology
https://doi.org/10.1007/s00330-023-09797-5

European Radiology
ESR EUROPEAN SOCIETY OF RADIOLOGY

BREAST

Check for updates

Exploring the added value of pretherapeutic MR descriptors in predicting breast cancer pathologic complete response to neoadjuvant chemotherapy

Caroline Malhaire[1,2] · Fatine Selhane[3] · Marie-Judith Saint-Martin[2] · Vincent Cockenpot[4] · Pia Akl[5] · Enora Laas[6] · Audrey Bellesoeur[7] · Catherine Ala Eddine[1] · Melodie Bereby-Kahane[1] · Julie Manceau[1] · Delphine Sebbag-Sfez[1] · Jean-Yves Pierga[7] · Fabien Reyal[6] · Anne Vincent-Salomon[8] · Herve Brisse[1] · Frederique Frouin[2]

Baseline MRI BI-RADS and breast oedema score features as predictors for axillary lymph node response to neoadjuvant chemotherapy in breast cancer

Caroline Malhaire, Paris / France

Author Block: C. Malhaire[1], O. Umay[1], F. Frouin[2]; [1]Paris/FR, [2]Orsay/FR

Meeting Abstract: 2024 ASCO Annual Meeting I

FREE ACCESS | Breast Cancer—Local/Regional/Adjuvant | May 29, 2024

Prediction of pCR with pretreatment MRI radiomics in triple negative breast cancer treated with neoadjuvant chemo-immunotherapy.

Authors: Toulsie Ramtohul, Victoire Lepagnay, Claire Bonneau, Maxime Jin, Emmanuelle Menet, Juliette Sauge, Enora Laas, ... SHOW ALL ..., and Anne Tardivon | AUTHORS INFO & AFFILIATIONS

- **En pratique**
- **Traitement commencé → à son terme**
- Sauf progression tumorale ou toxicité

Evaluation en Cours de Thérapie Néoadjuvante

- Essai adaptatif prospectif Train-3
- HER2+, Stades II-III
- Optimisation de la durée du traitement neoadjuvant
- Evaluation de la response tumorale par IRM, tous les 3 cycles
- Jusqu'à 9 cures max
- Réponse ganglionnaire contrôlée par cytoponction/microbiopsie

MRI-guided optimisation of neoadjuvant chemotherapy duration in stage II–III HER2-positive breast cancer (TRAIN-3): a multicentre, single-arm, phase 2 study

*Anna van der Voort, Fleur M Louis, Mette S van Ramshorst, Rob Kessels, Ingrid A Mandjes, Inge Kemper, Mariette J Agterof, Wim A van der Steeg, Joan B Heijns, Marlies L van Bekkum, Ester J Siemerink, Philomeen M Kuijer, Astrid Scholten, Jelle Wesseling, Marie-Jeanne T F D Vrancken Peeters, Ritse M Mann, Gabe S Sonke, on behalf of the Dutch Breast Cancer Research Group**

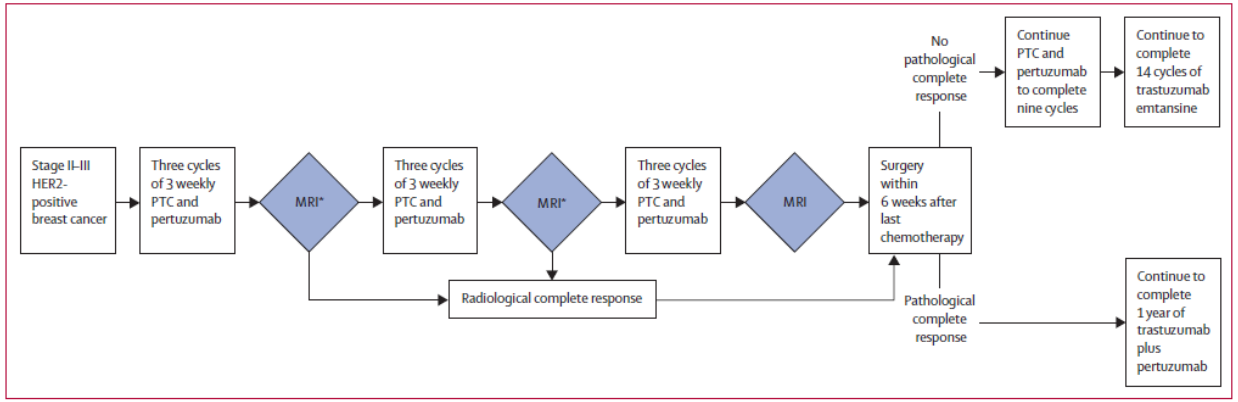


Figure 1: **Study procedure**
HER2=human epidermal growth factor 2. PTC=paclitaxel, trastuzumab, and carboplatin. *If a radiological complete remission on breast MRI was observed in patients with clinical lymph node-positive disease, a targeted biopsy of the at-baseline marked lymph node was warranted—ie, an ultrasound guided targeted biopsy (fine needle aspiration or core biopsy). In hormone receptor-positive disease, a non-PCR could also be detected using vacuum-assisted core biopsies.

Van Der Voort et al., Lancet Oncology 2024, 10.1016/S1470-2045(24)00104-9

Prise en Charge Néoadjuvante - Essai Train-3

- **HER2+ RH-** :
- Dès trois cycles, 1/3 cancers en réponse complete IRM
- Valeur predictive de l'IRM
  - rCR → 87 % pCR

- **HER2+ RH+ :**
- Taux de response et Performances inférieures de l'IRM
  - rCR → 53 % pCR
  - Traitements de rattrapage par excès

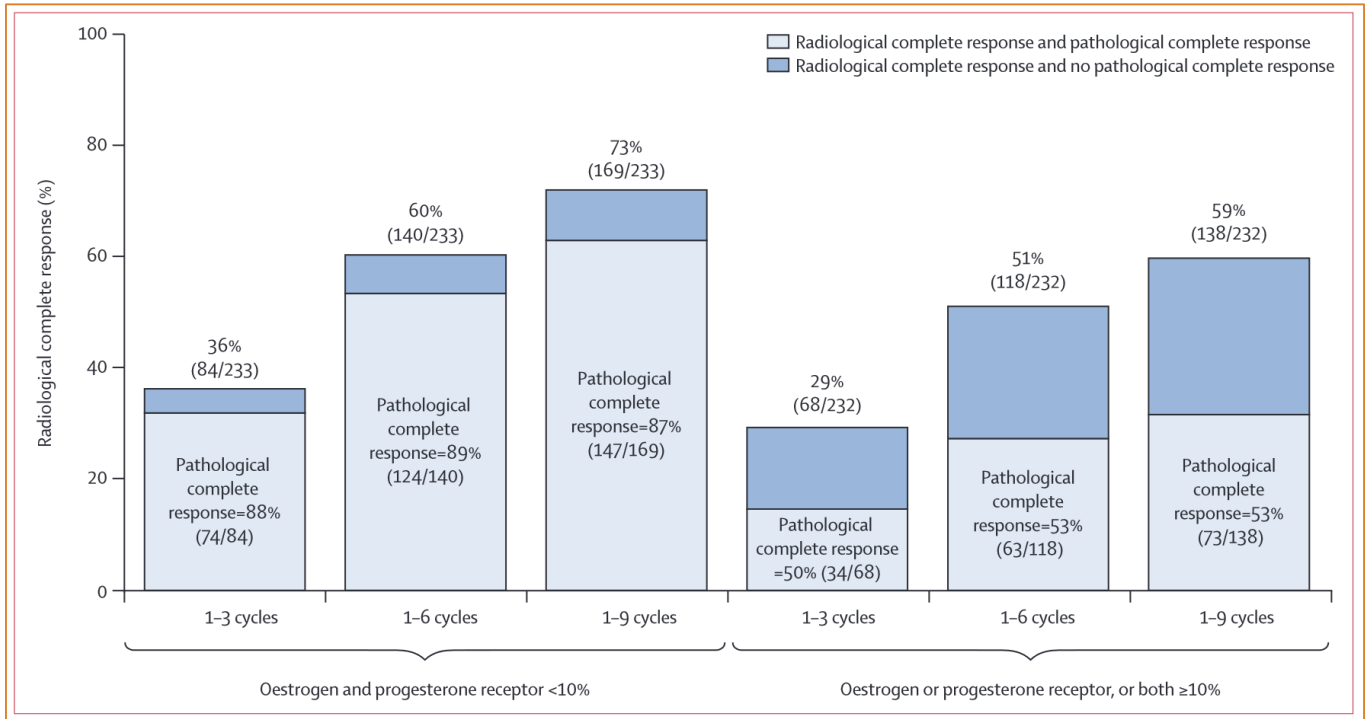


***Figure 3*: Cumulative response rates according to hormone receptor status**
Radiological complete response on MRI breast scan as concluded by local radiologist and targeted lymph node biopsy in the case of lymph node positive disease at baseline. Pathological complete response was defined as the absence of invasive tumour cells in the breast and axilla irrespective of the presence of in-situ lesions.

Conclusion

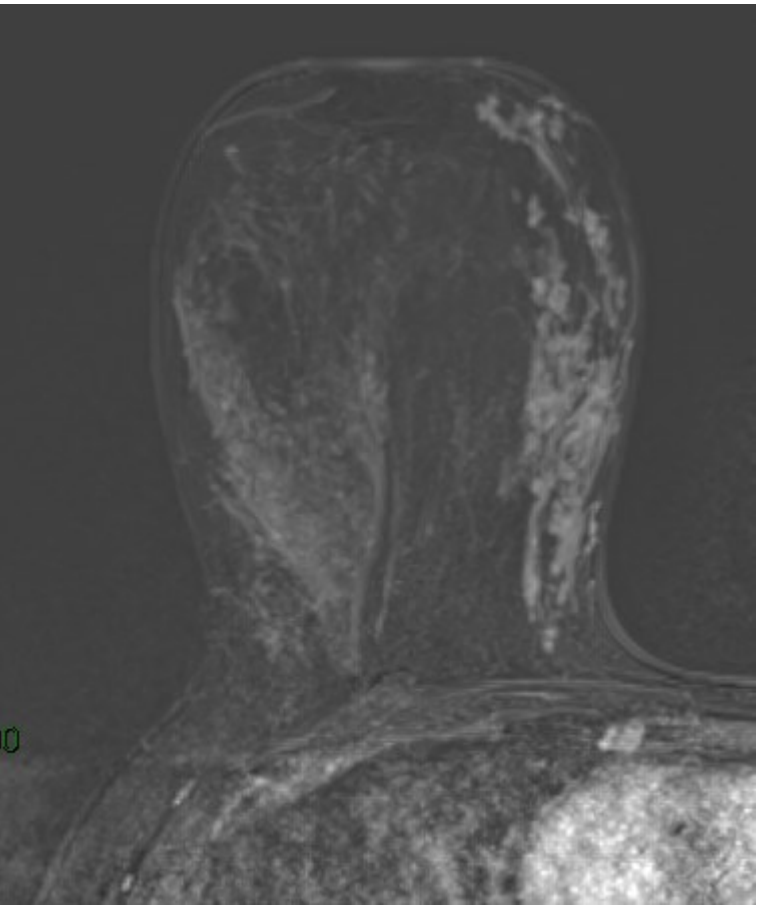
- **“ IRM pour toutes ? ”**

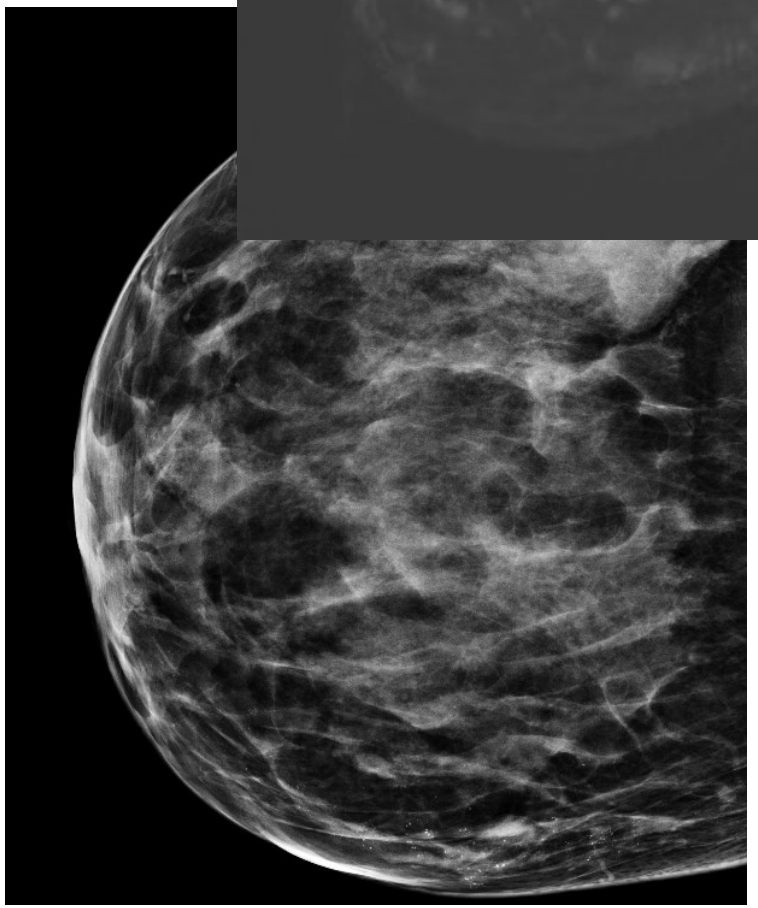
- Non, selon les recommendations pour les cas simples, chirurgie première
- Oui, si besoin pour cas complexes : discordance, estimation difficile de l’extension tumorale, du nombre de lésions
- Protocole optimisé
- Performances de l’IRM pour l’évaluation de la taille tumorale sont mises à profit pour guider la prise en charge thérapeutique
- Rôle à définir dans l’adaptation thérapeutique, pour minimiser les toxicités / identifier les non-répondeuses

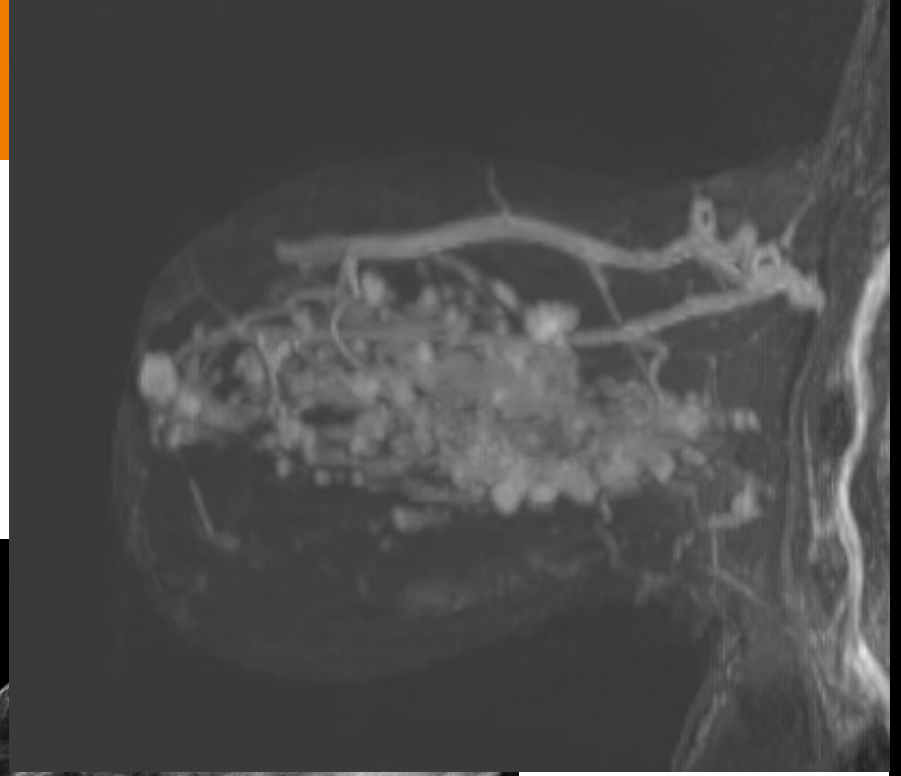
Save the Date !

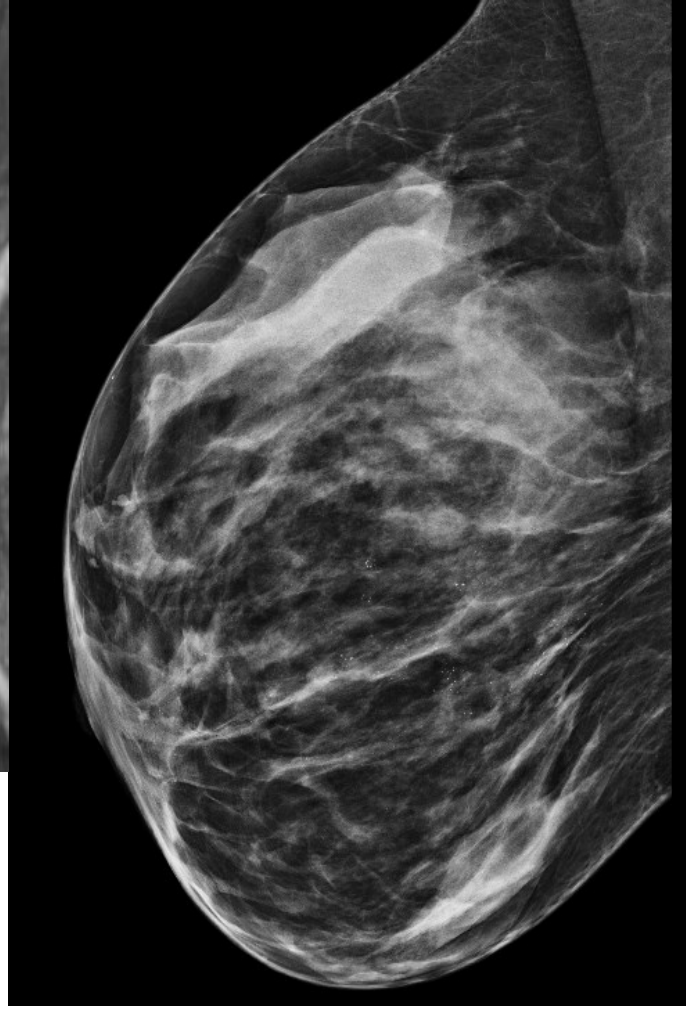
Institut des Cancers des Femmes

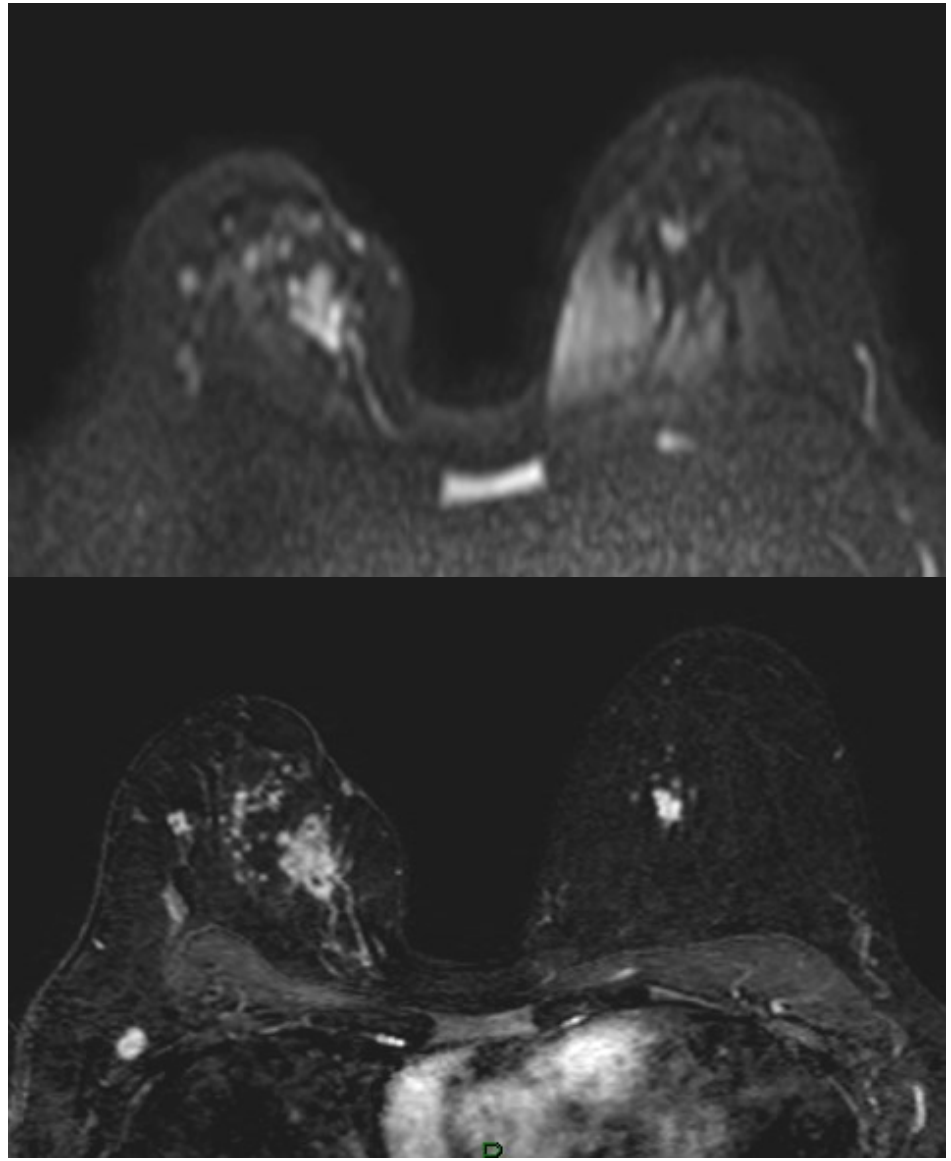
institut Curie

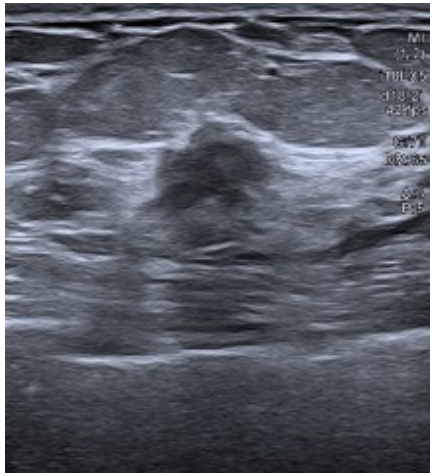












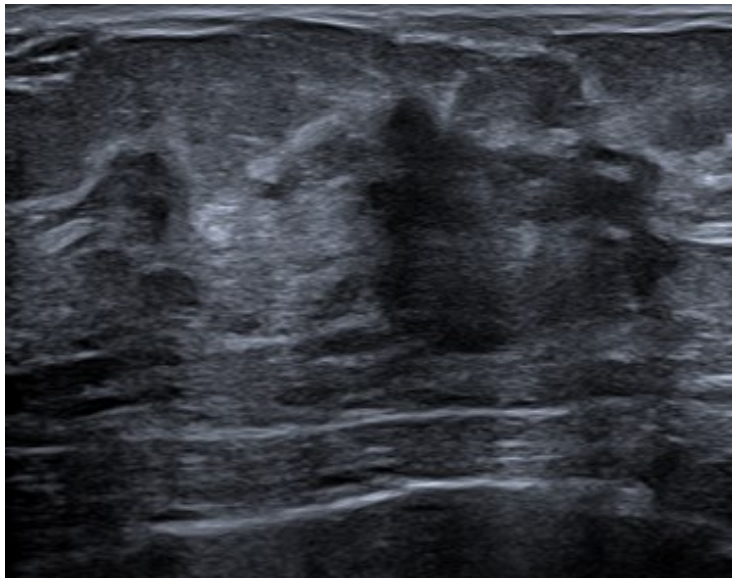
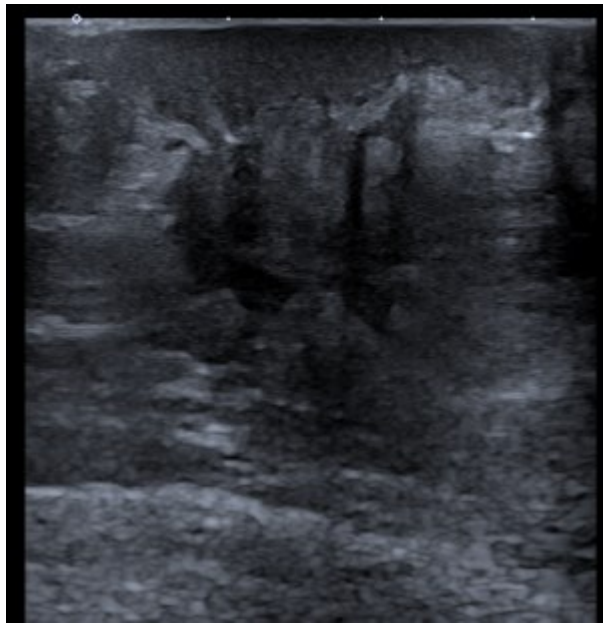


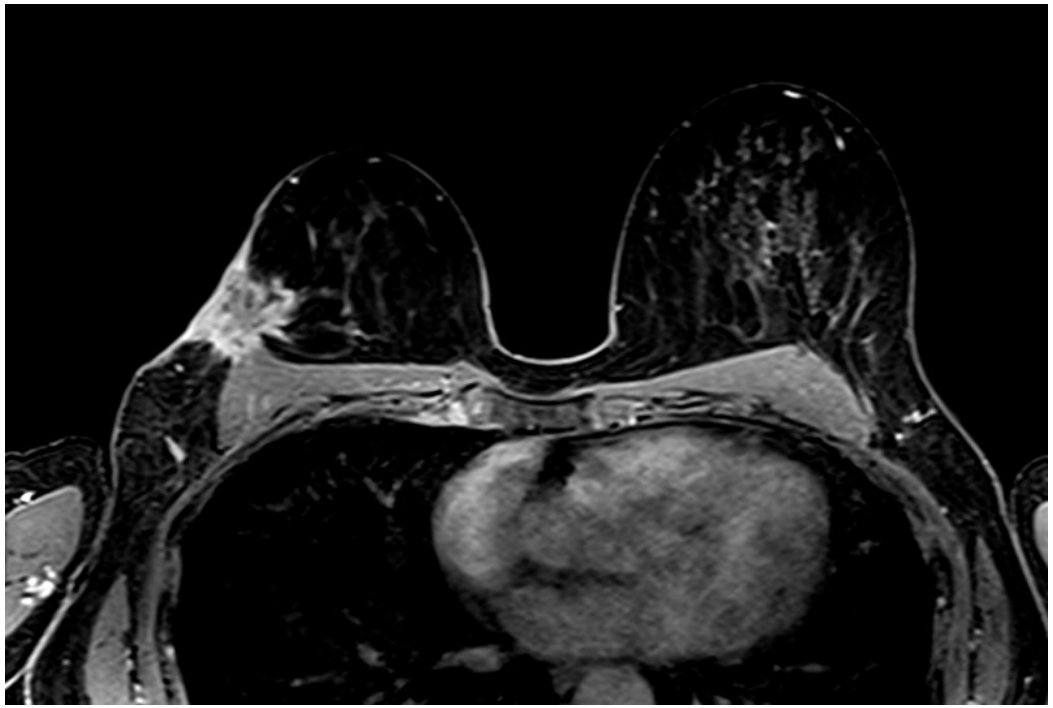
Table 2: Recommendations for Selecting Patients with Known Breast Cancer for Preoperative Evaluation with Breast MRI according to Various National and International Guidelines

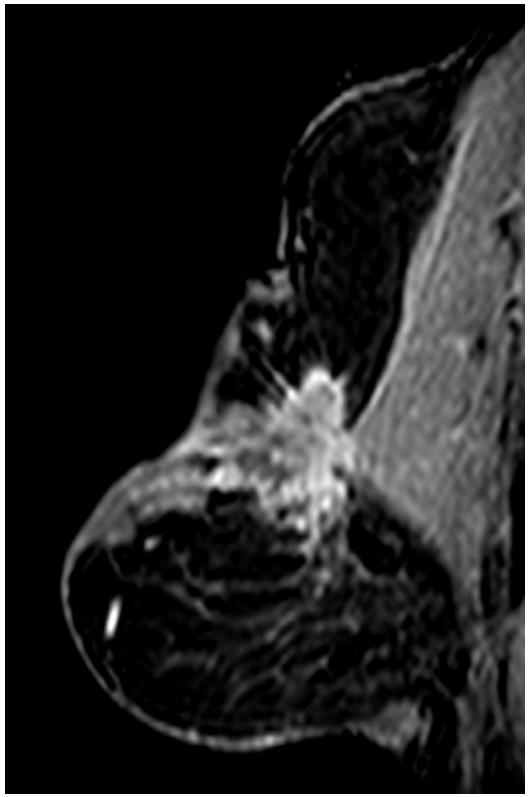
Guideline	Recommendation
EUSOBI (2008)	Dense breasts; invasive lobular carcinoma; screening of the contralateral breast (all patients)
EUSOMA (2010)	Invasive lobular carcinoma; patients at high risk; patients < 60 years with size discrepancy between mammography and US > 1 cm; patients eligible for partial breast irradiation
ACR practice guideline (2018)	No subgroups defined; MRI useful for determining extent of tumor, evaluation of the tumor's relation to the deep fascia, and screening of the contralateral breast
NCCN breast cancer guideline (2018)	No subgroups defined; MRI is optional
NICE breast cancer guideline (2018)	Discrepancy in clinical examination, mammography, and US; dense breasts precluding size assessment at mammography; invasive lobular carcinoma if breast-conserving therapy is planned
Dutch breast cancer guideline (2018)	Discrepancy in clinical examination, mammography, and US; invasive lobular carcinoma if breast-conserving therapy is planned; high-grade DCIS and uncertain extent; DCIS with microinvasion
AGO (German Gynecologic Oncology group) (2018)	MRI optional in dense breasts, nipple involvement, invasive lobular carcinoma, suspicion of multifocal disease, and patients at high risk

Note.—ACR = American College of Radiology, AGO = Association of Gynecological Oncology, DCIS = ductal carcinoma in situ, EUSOBI = European Society of Breast Imaging, EUSOMA = European Society of Breast Cancer Specialists, NCCN = National Comprehensive Cancer Network, NICE = National Institute for Health and Care Excellence.

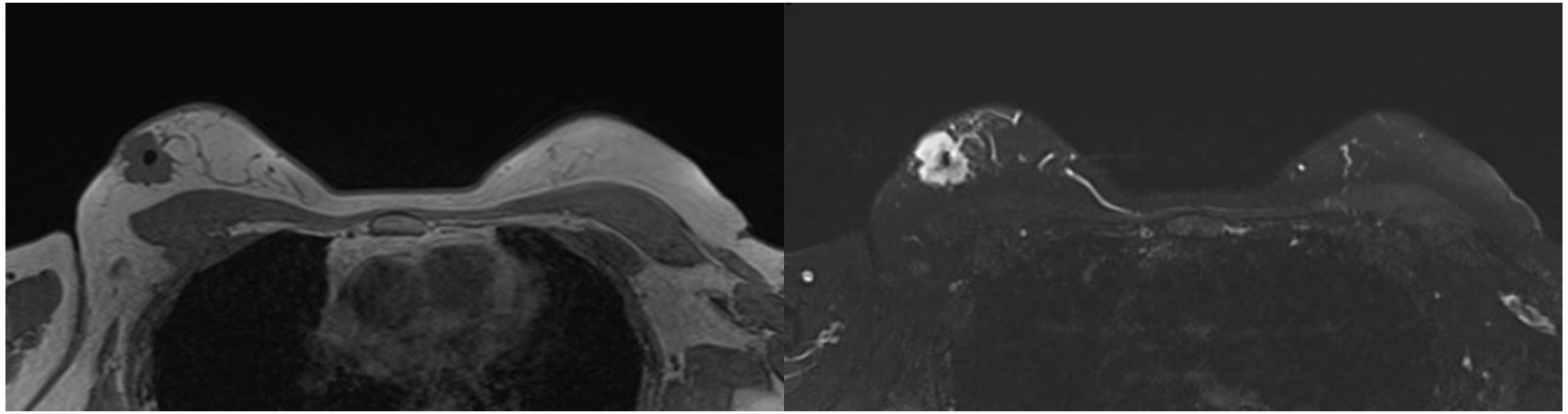
Paroi thoracique

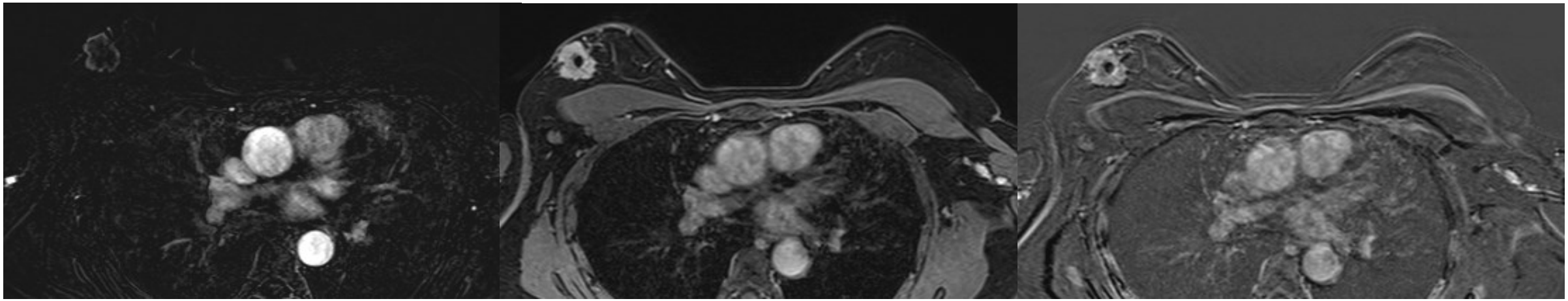


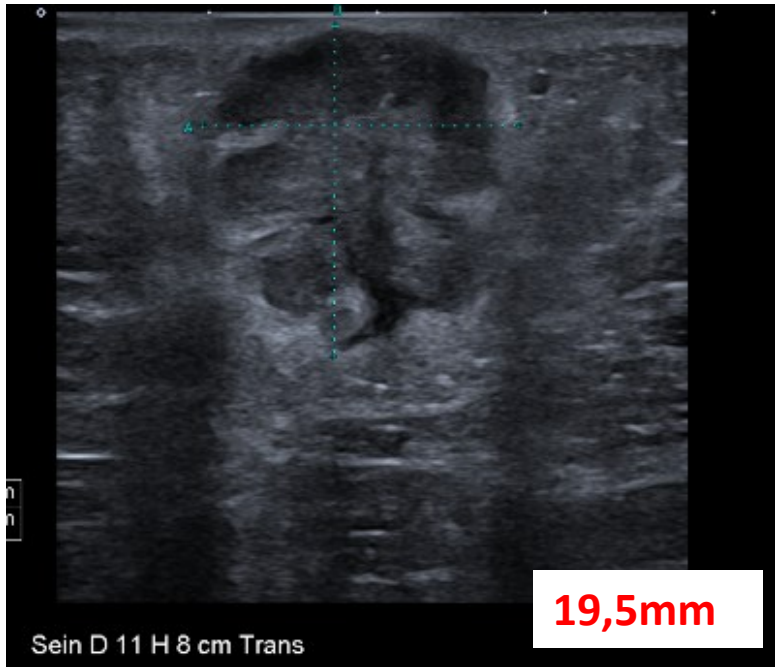


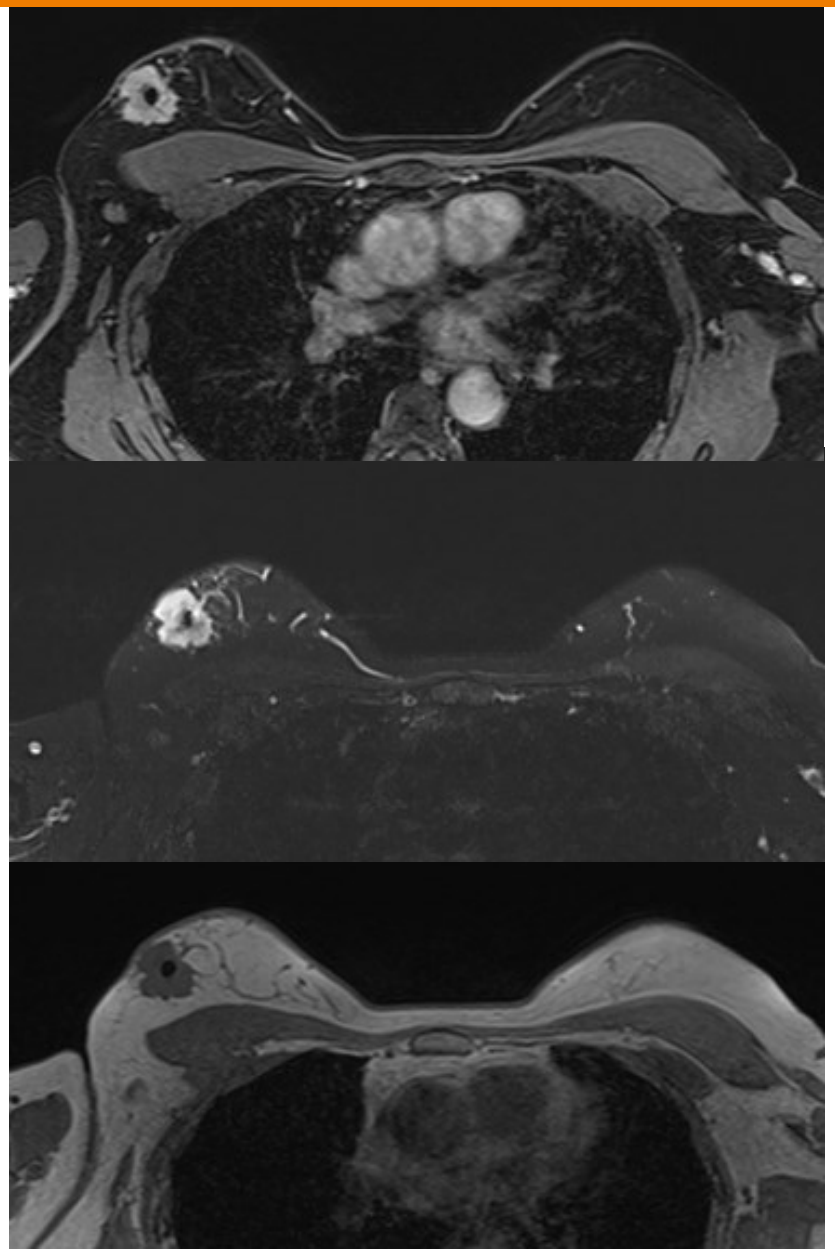


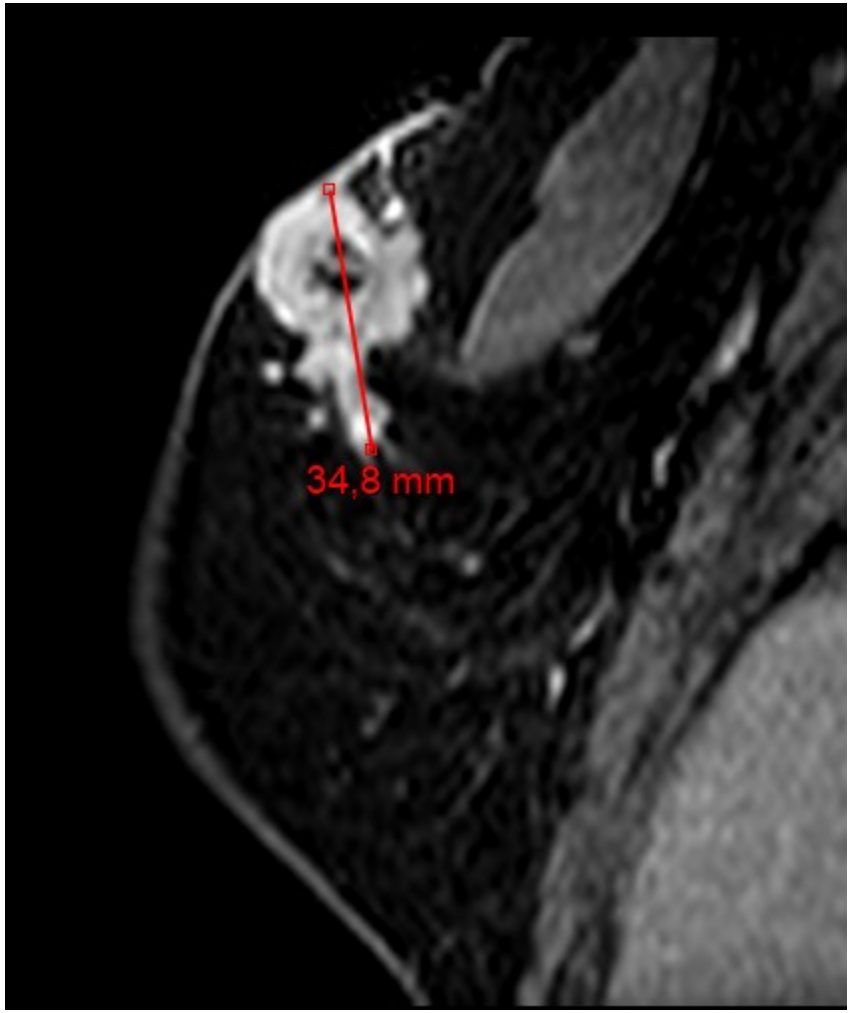
TNM IRM

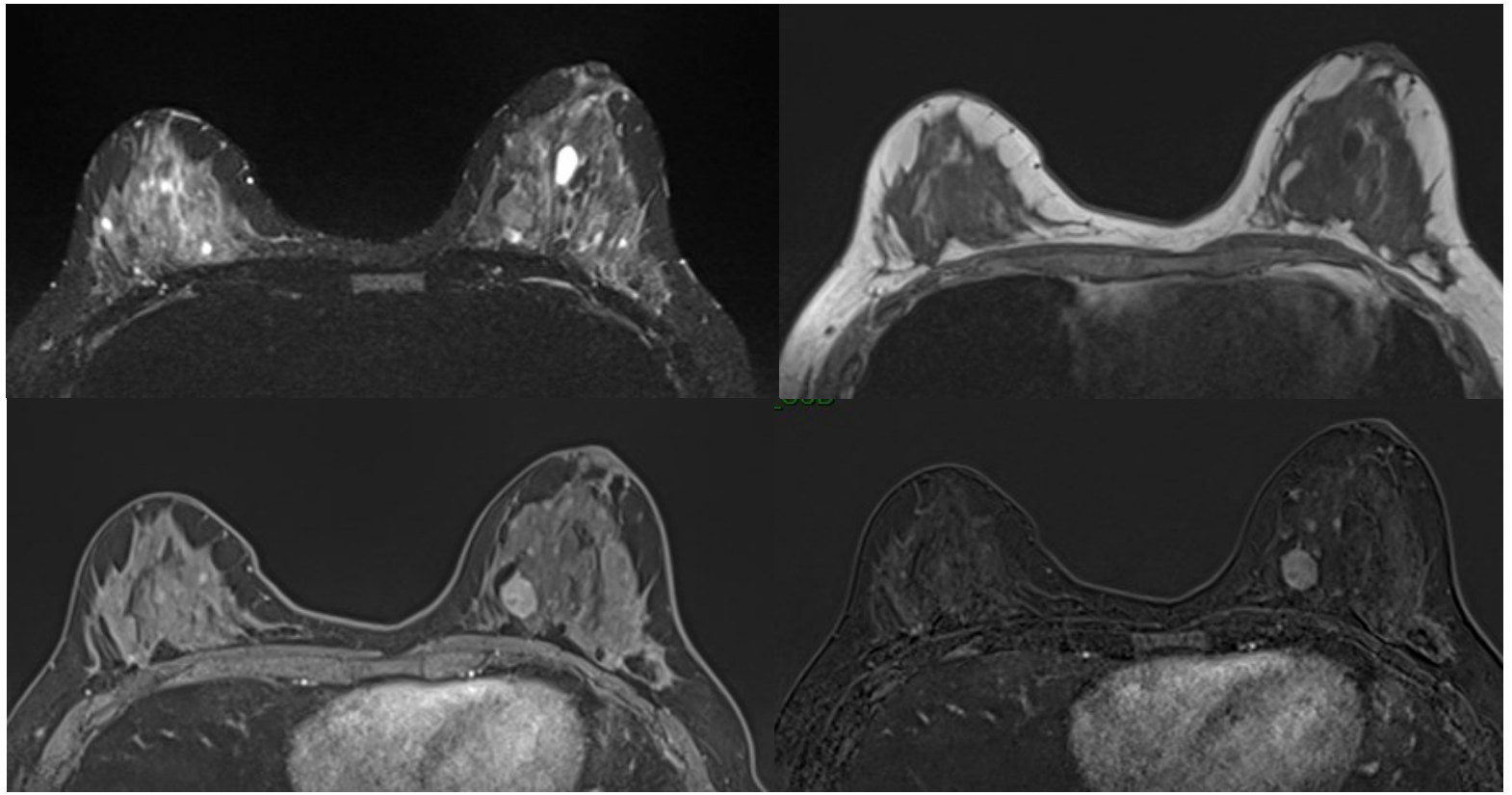


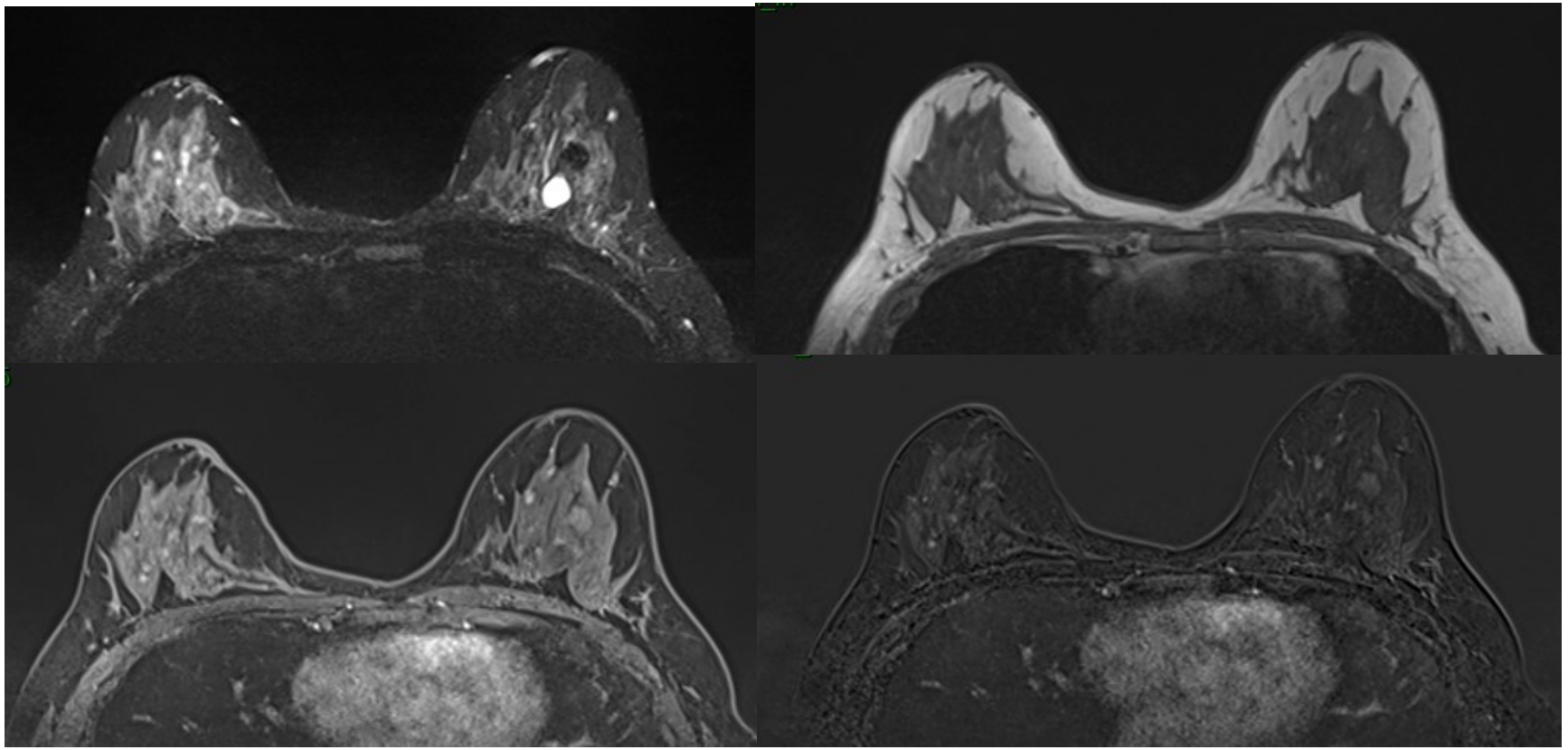



19,5mm
Sein D 11 H 8 cm Trans

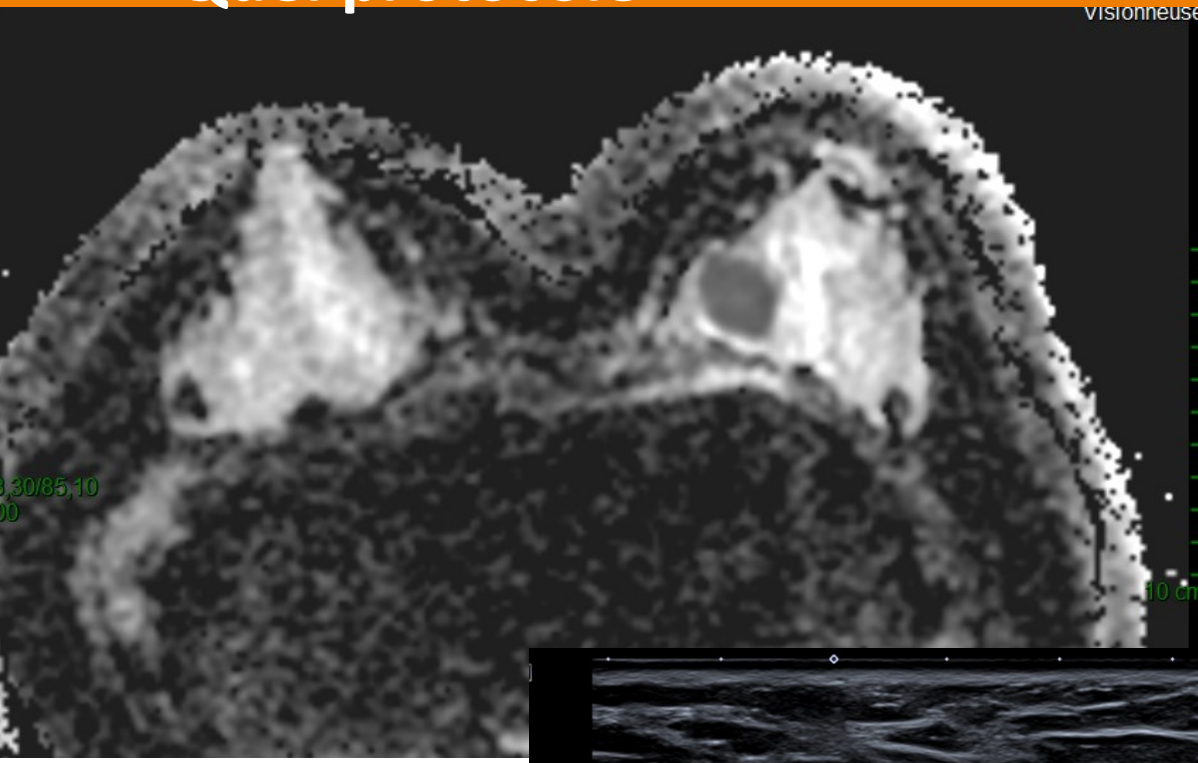


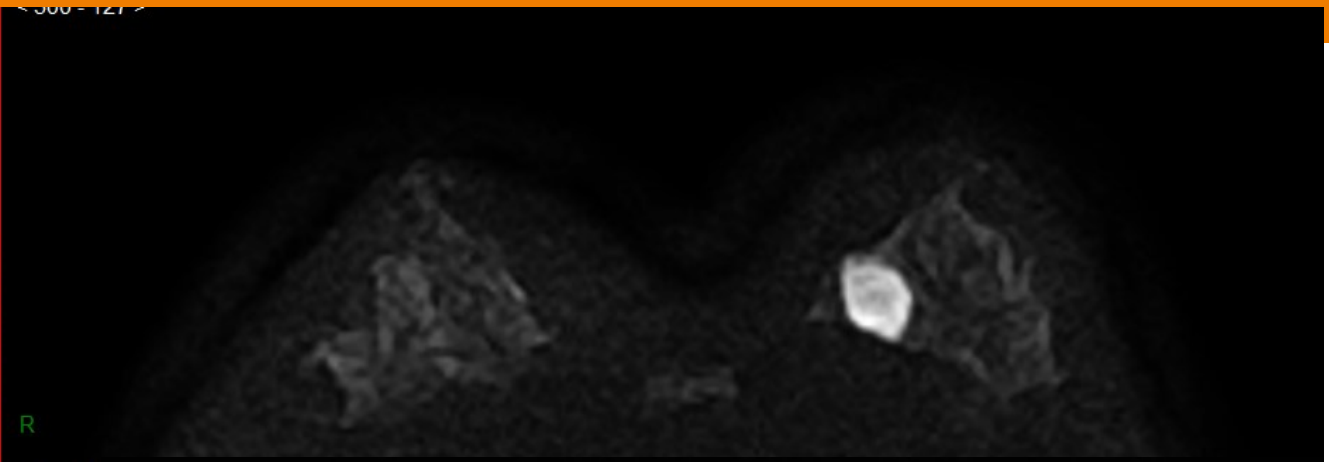

34,8 mm

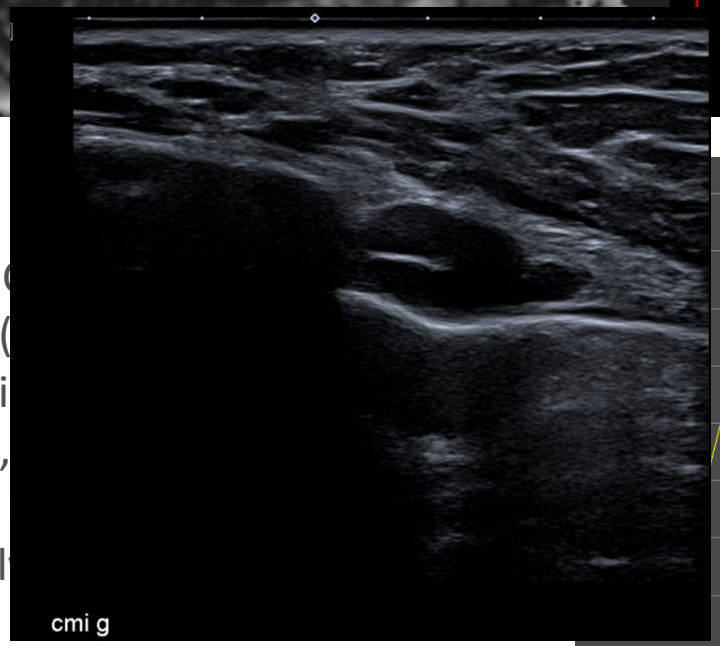


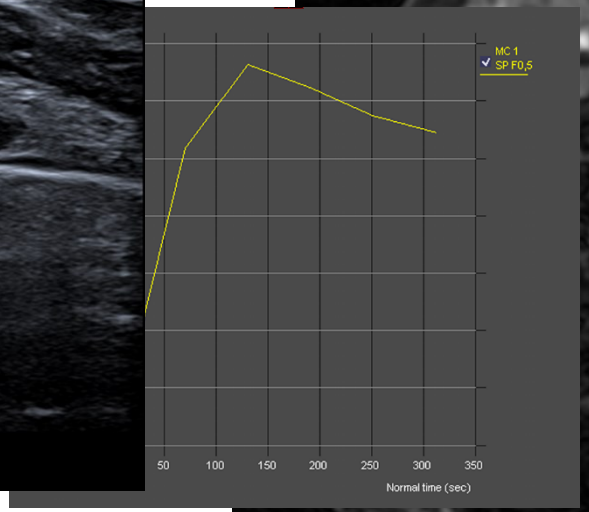


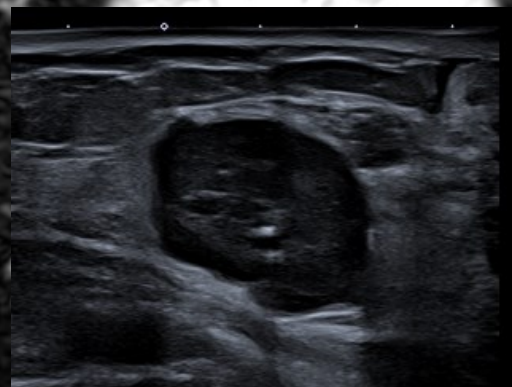
Quel protocole





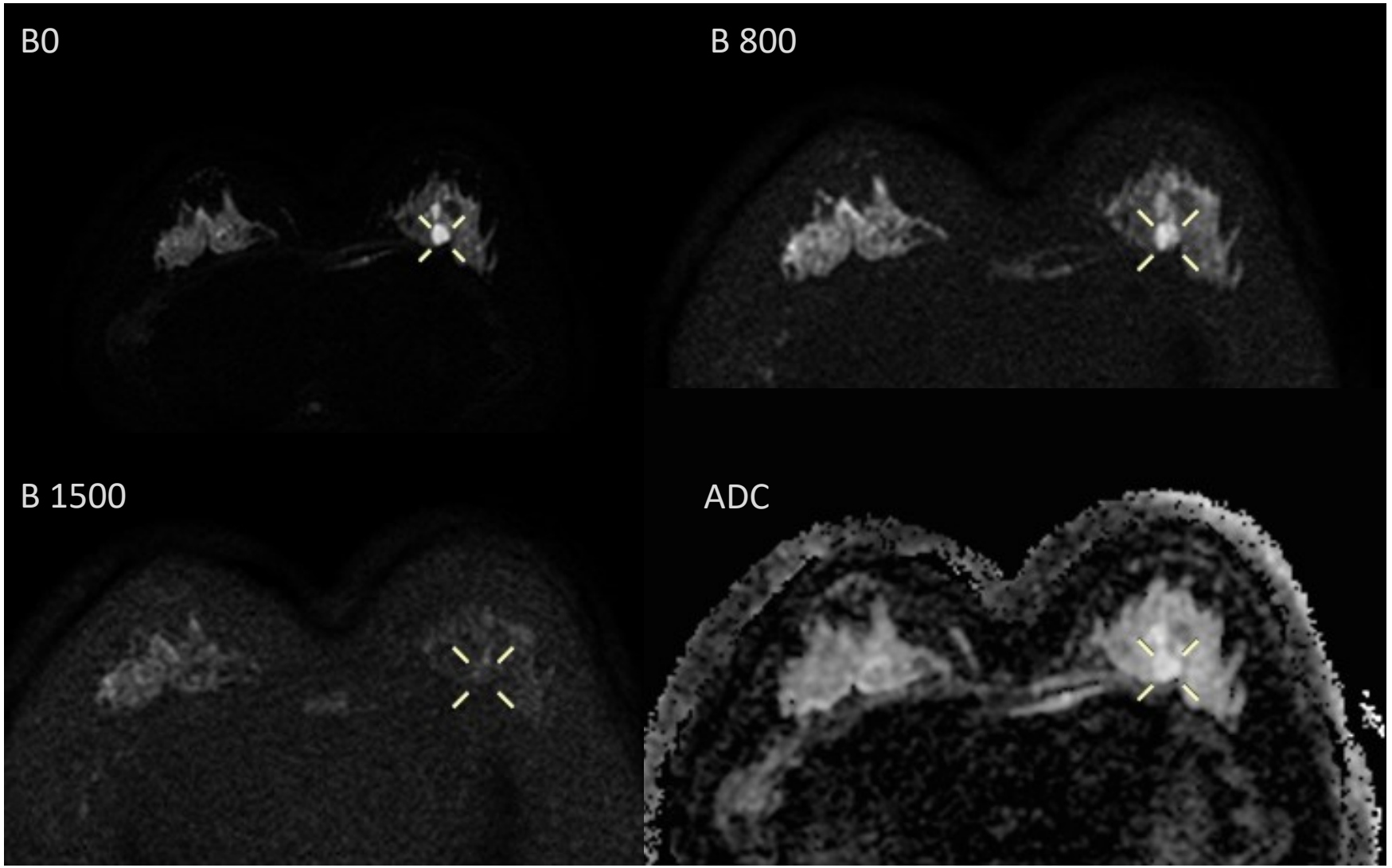


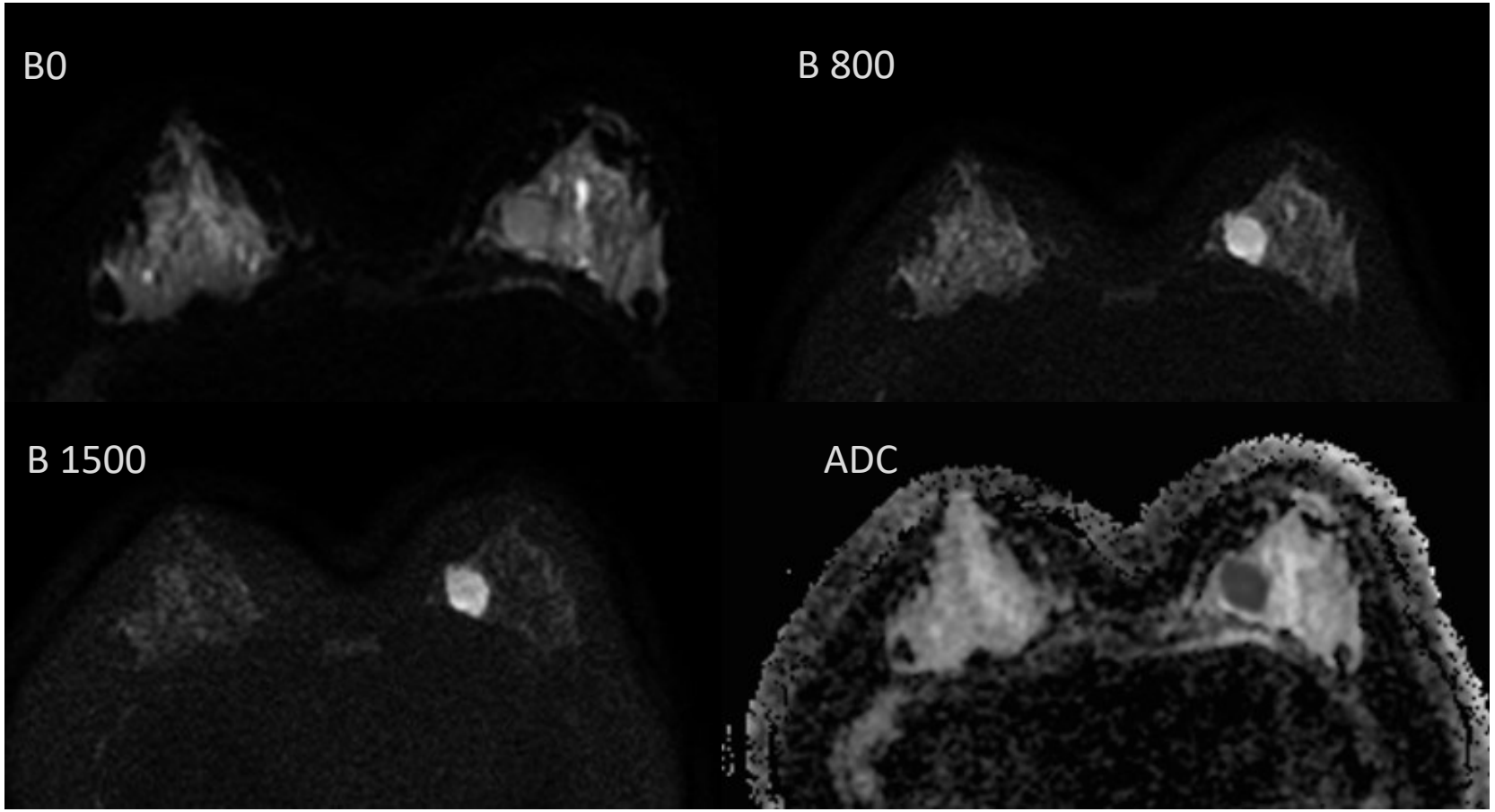


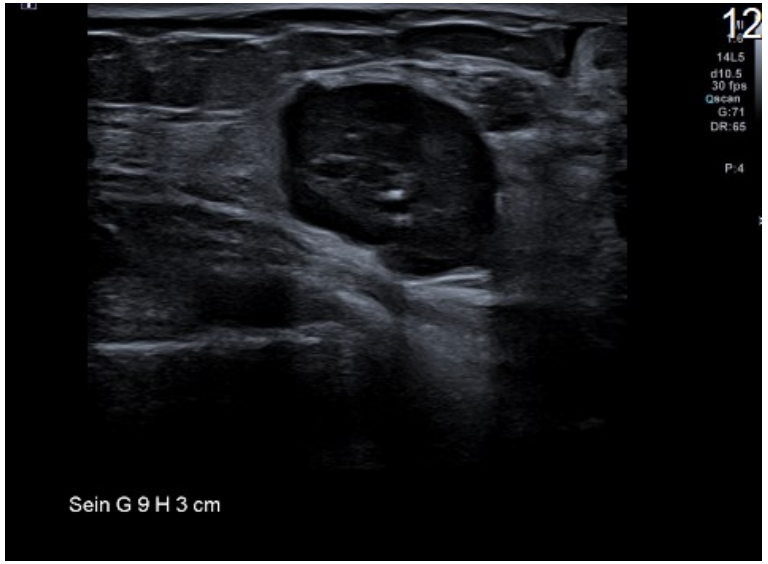


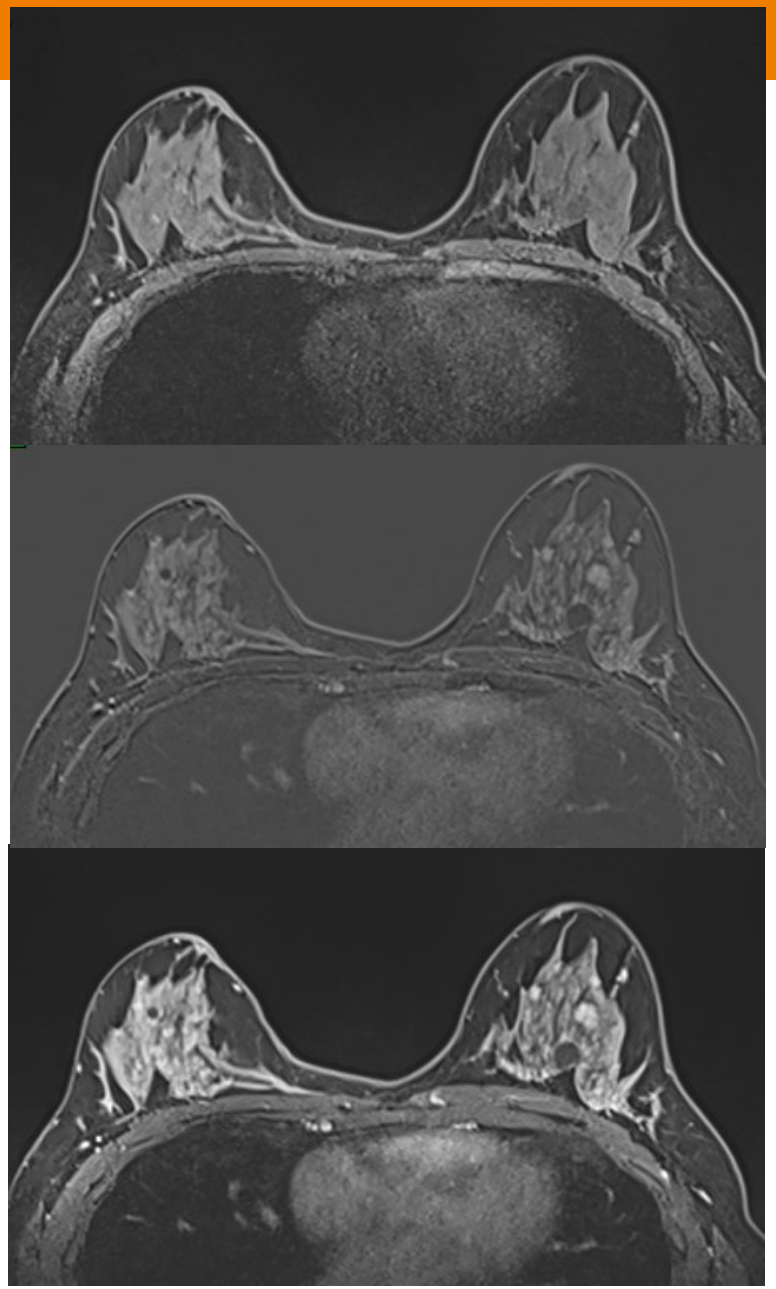
N+ CMI gauche

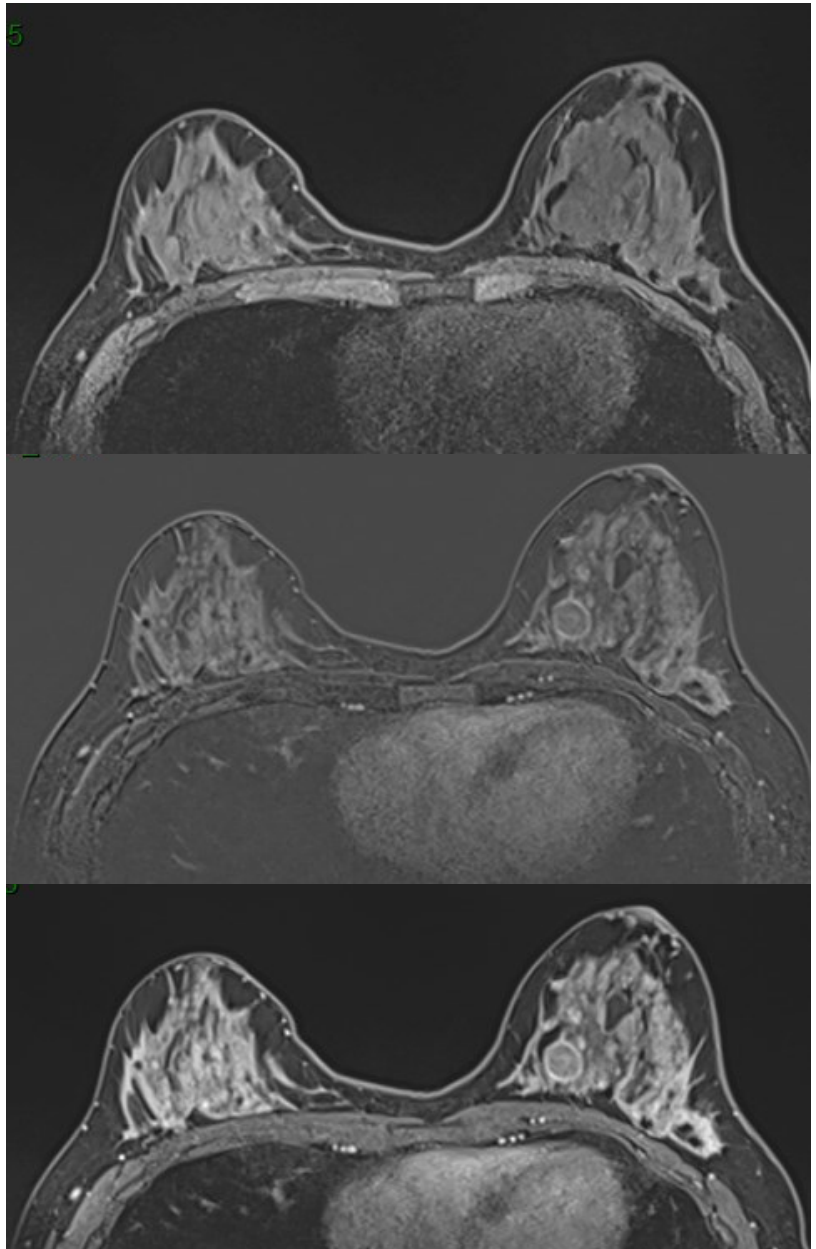
Carcinome Infiltrant TNS (
- Grade histopronostique (
- Index mitotique eleve, Ki
- immunophenotype: RE+,
- Classe histomoleculaire:
- Stroma tumoral : 5% de l

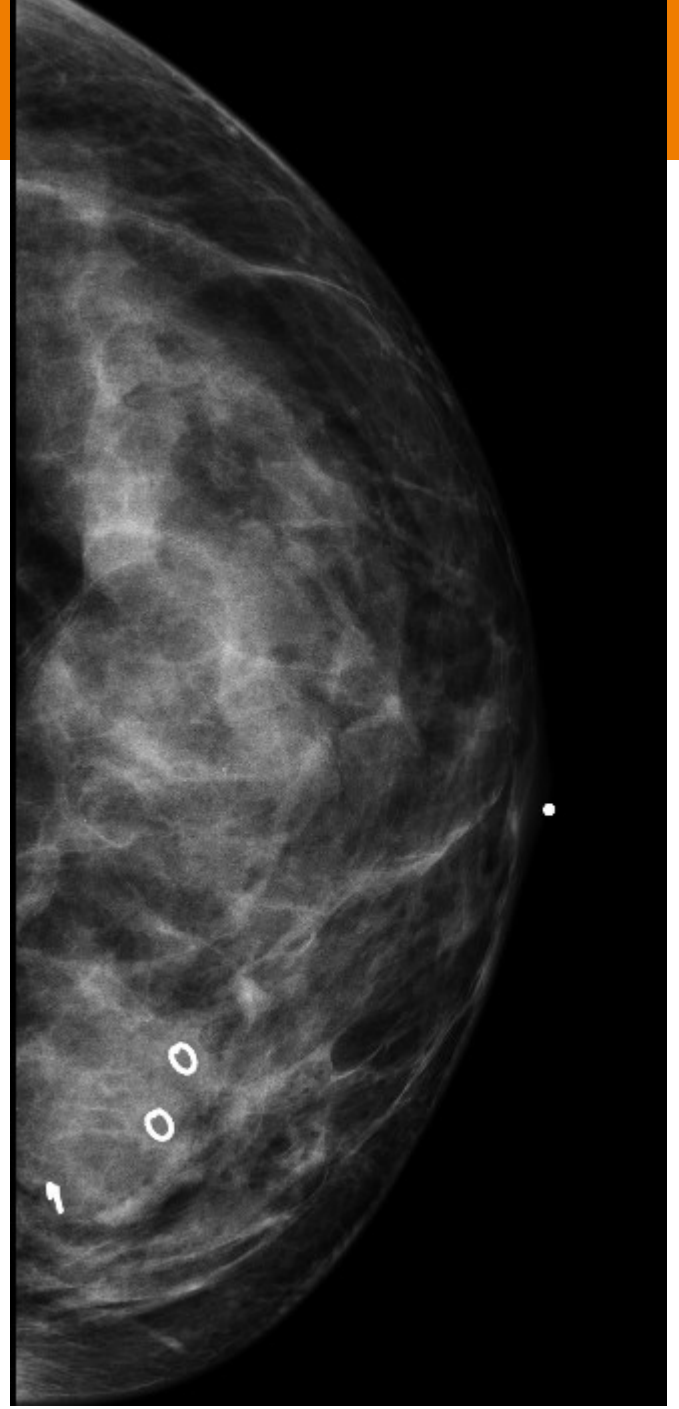

B0
B 800
B 1500
ADC

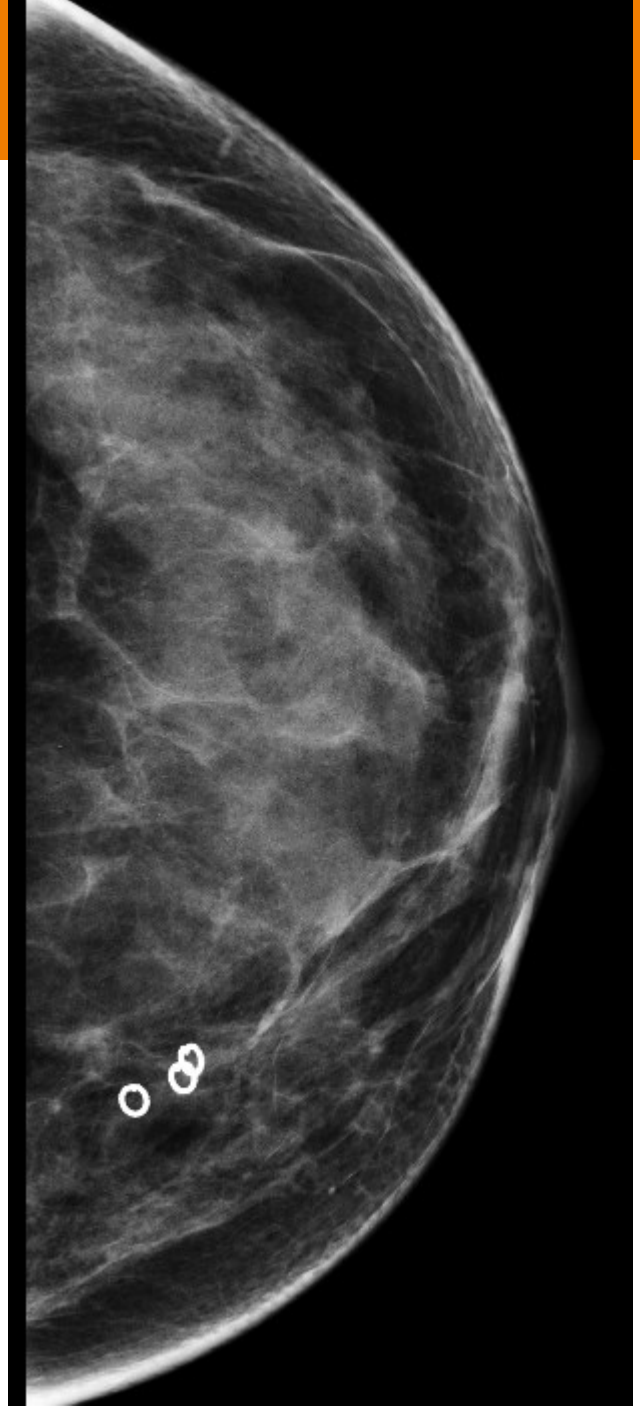

B0
B 800
B 1500
ADC


12
14L5
d10.5
30 fps
Qscan
G:71
DR:65
P:4
Sein G 9 H 3 cm









15 minutes

- Session 3 **: Le bilan pré-thérapeutique : étape préalable à l'optimisation thérapeutique**

- Modérateurs : Luc Ceugnart, Isabelle Thomassin-Naggara

- 14h00 **Chirurgie ou Chimiothérapie première : comment décide-t-on ?** Victoire Brillaud-Meflah, Jean-Sébastien Frenel
- 14h15 Discussion
- 14h20 **Jusqu'au bout du bilan conventionnel.** Foucauld Chamming's
- 14h35 Discussion
- 14h40 **Angiomammographie, la solution ?** Isabelle Doutriaux-Dumoulin
- 14h55 Discussion
- 15h00 **IRM pour toutes ?** Caroline Malhaire
- 15h15 Discussion
- 15h20 **Reste-t-il une place pour l'évaluation du creux axillaire ?** Jean-Marc Classe, Roshanak Movassaghi
- 15h35 Discussion
- 15h40 **TEP-MR** : une réelle avancée dans le bilan d'extension ? Agnès Morel, Laurence Vilcot
- 15h55 Discussion

PRINCIPLES OF DEDICATED BREAST MRI TESTING

See NCCN Guidelines for Breast Cancer Screening and Diagnosis for indications for screening MRI in patients at increased breast cancer risk.

Personnel, Facility, and Equipment

- Breast MRI examinations are performed with IV contrast and should be performed and interpreted by an expert breast imaging team working in concert with the multidisciplinary treatment team.
- Breast MRI examinations require a dedicated breast coil and breast imaging radiologists familiar with the optimal timing sequences and other technical details for image interpretation. The imaging center should have the ability to perform MRI-guided needle sampling and/or image-guided localization of MRI-detected findings.

Clinical Indications and Applications

- May be used for staging evaluation to define extent of cancer or presence of multifocal or multicentric cancer in the ipsilateral breast, or as screening of the contralateral breast cancer at time of initial diagnosis (category 2B). There are no high-level data to demonstrate that the use of MRI to facilitate local therapy decision-making improves local recurrence or survival.[1]
- May be helpful for breast cancer evaluation before and after preoperative systemic therapy to define extent of disease, response to treatment, and potential for breast-conservation therapy.
- May be useful in identifying otherwise clinically occult disease in patients presenting with axillary nodal metastases (cT0, cN+), with Paget disease, or with invasive lobular carcinoma poorly (or inadequately) defined on mammography, ultrasound, or physical examination.
- False-positive findings on breast MRI are common. Surgical decisions should not be based solely on the MRI findings. Additional tissue sampling of areas of concern identified by breast MRI is recommended.
- The utility of MRI in follow-up screening of patients with prior breast cancer is undefined. It should generally be considered only in those whose lifetime risk of a second primary breast cancer is >20% based on models largely dependent on family history, such as in those with the risk associated with inherited susceptibility to breast cancer.

1 Houssami N, Ciatto S, Macaskill P, et al. Accuracy and surgical impact of magnetic resonance imaging in breast cancer staging: systematic review and meta-analysis in detection of multifocal and multicentric cancer. J Clin Oncol 2008;26:3248-3258.

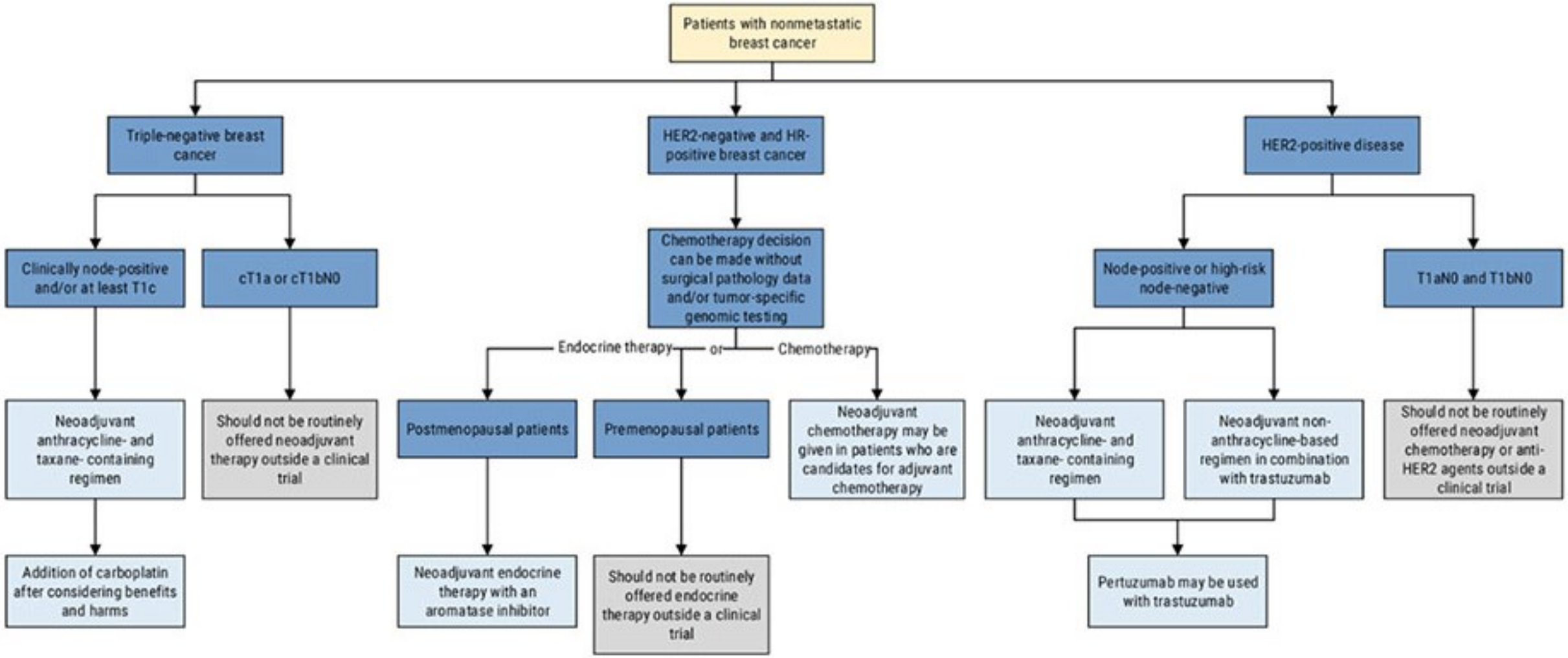
Note: This is the NCCN Framework for Resource Stratification of NCCN Guidelines. For definitions of the NCCN Framework™, see page FR-1.
All recommendations are category 2A unless otherwise indicated.
Clinical Trials: NCCN believes that the best management of any patient with cancer is in a clinical trial. Participation in clinical trials is especially encouraged.

institut Curie

Evolutions thérapeutiques

ASCO Guidelines

Neoadjuvant Chemotherapy, Endocrine Therapy, and Targeted Therapy for Breast Cancer



Stadification : Taille tumorale

- Taille la plus large dans les 3 plans de la lésion principale
- Dimension du plus large foyer tumoral invasif utilisée dans le stade TNM
- Le chirurgien a besoin d'une mesure globale de l'extension des lésions
  - Différencier la mesure de stadification
  - De la mesure de l'extension maximale (CCI + CCIS typiquement)

Table 1: Primary Tumor Anatomic Staging: Clinical and Pathologic

T Category	T Criteria
TX	Primary tumor cannot be assessed
T0	No evidence of primary tumor
Tis (DCIS)	Ductal carcinoma in situ
Tis (Paget)	Paget disease not associated with invasive carcinoma or DCIS
T1	Tumor size ≤ 20 mm
T1mi	Tumor size ≤ 1 mm
T1a	Tumor size > 1 mm but ≤ 5 mm
T1b	Tumor size > 5 mm but ≤ 10 mm
T1c	Tumor size > 10 mm but ≤ 20 mm
T2	Tumor size > 20 mm but ≤ 50 mm
T3	Tumor size > 50 mm
T4	Tumor with direct extension to the chest wall and/or the skin with macroscopic changes
T4a	Tumor with chest wall invasion
T4b	Tumor with macroscopic skin changes including ulceration and/or satellite skin nodules and/or edema
T4c	Tumor with criteria of both T4a and T4b
T4d	Inflammatory carcinoma

Source.—Reference 3.

Kalli et al. Radiographics 2018, 10.1148/rg.2018180056

En fin de traitement