

*Opto-acoustics as a potential new
diagnostic technology in breast care:*

*Clinical implications and future
potential applications*

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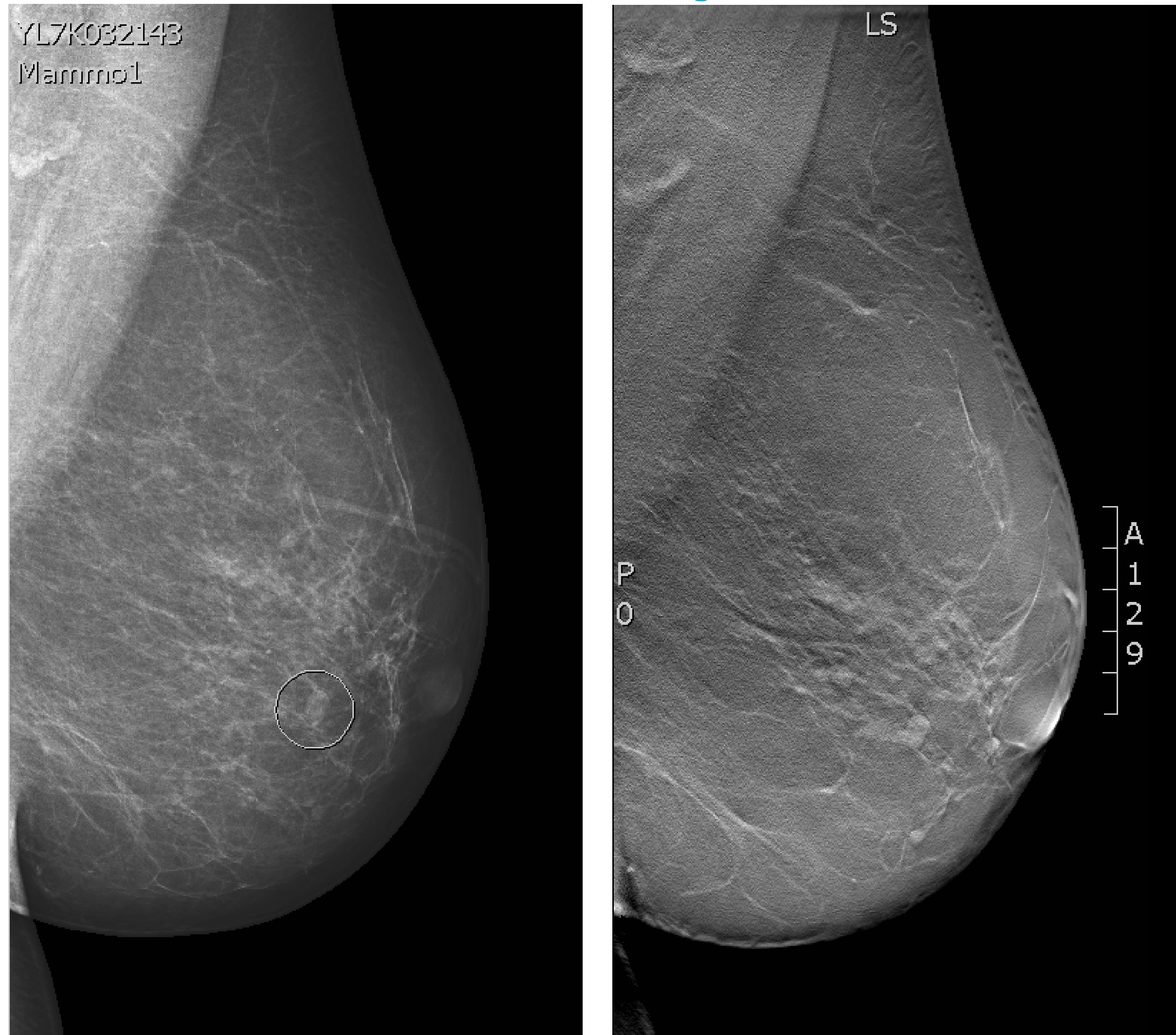
Department of Radiology and Nuclear Medicine

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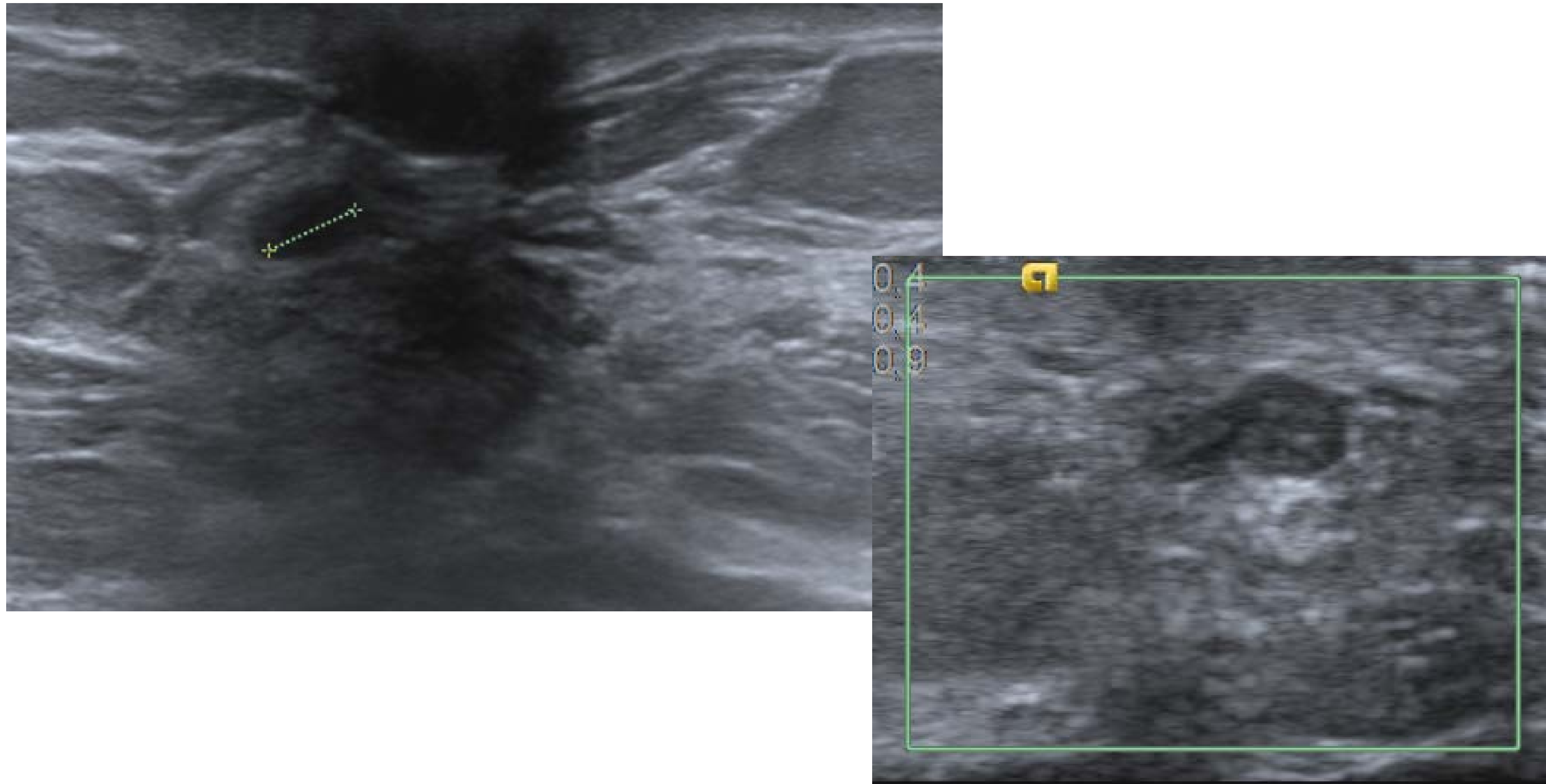
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Current clinical practice

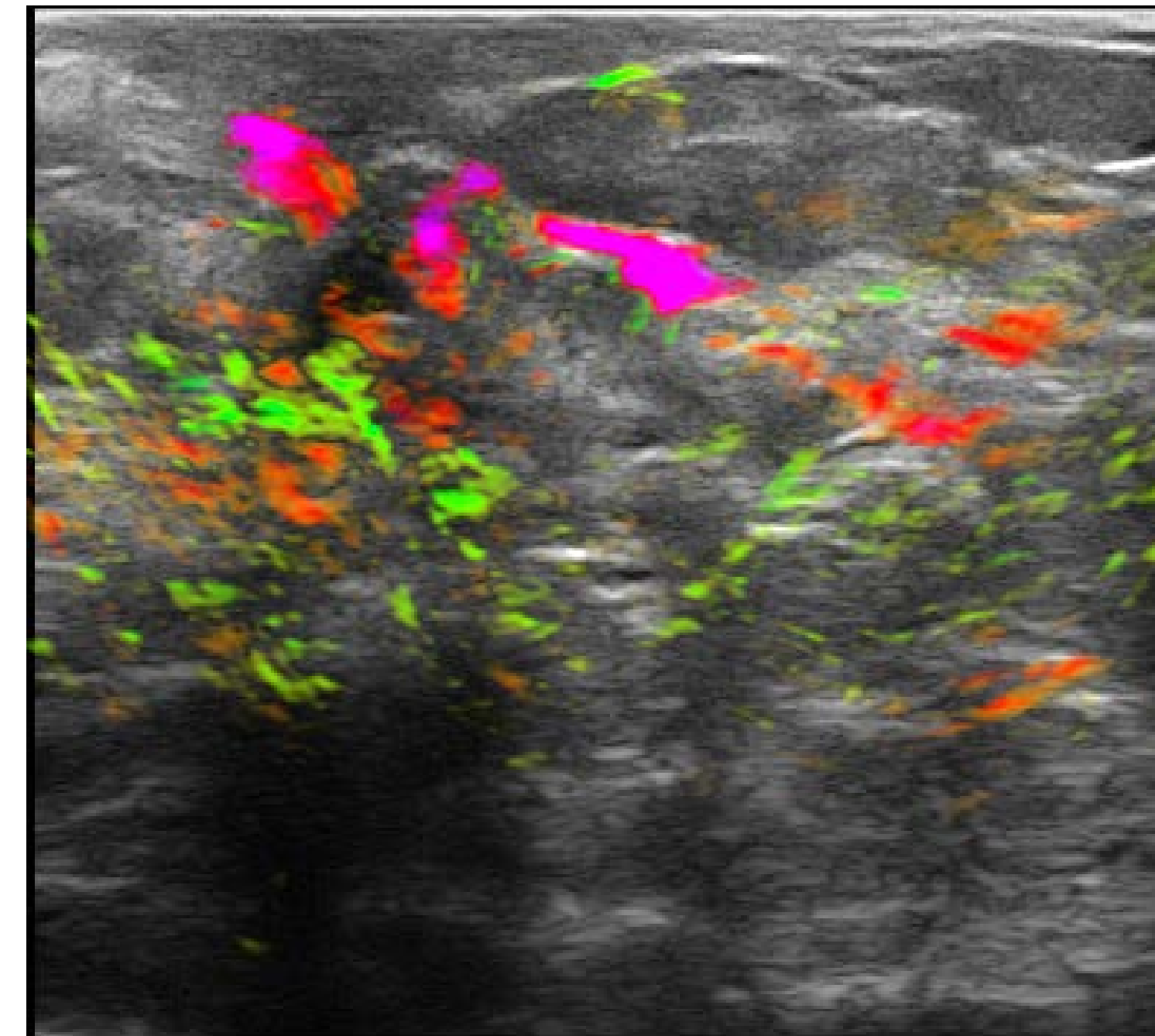
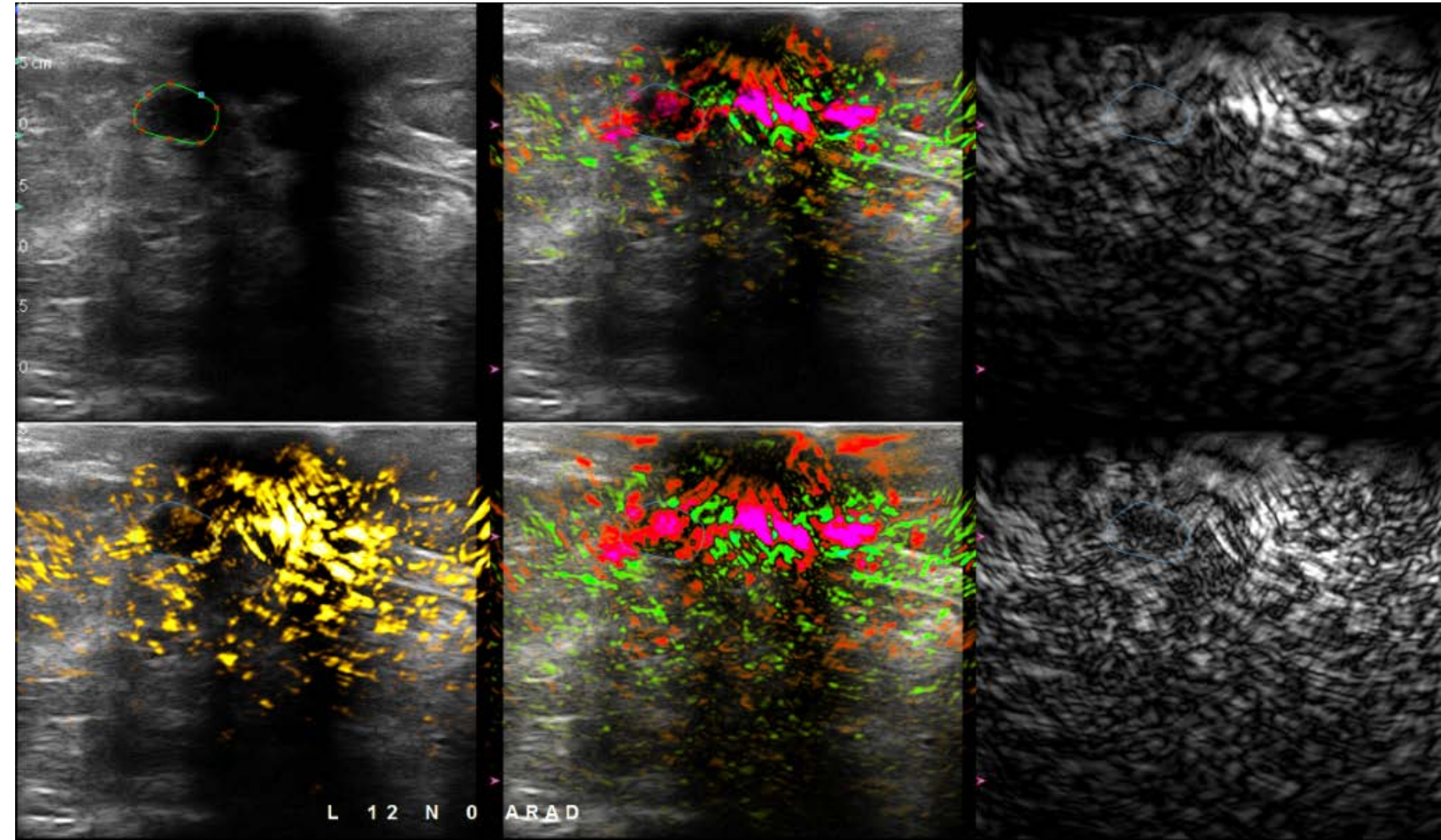


64 year-old woman
recalled from
screening

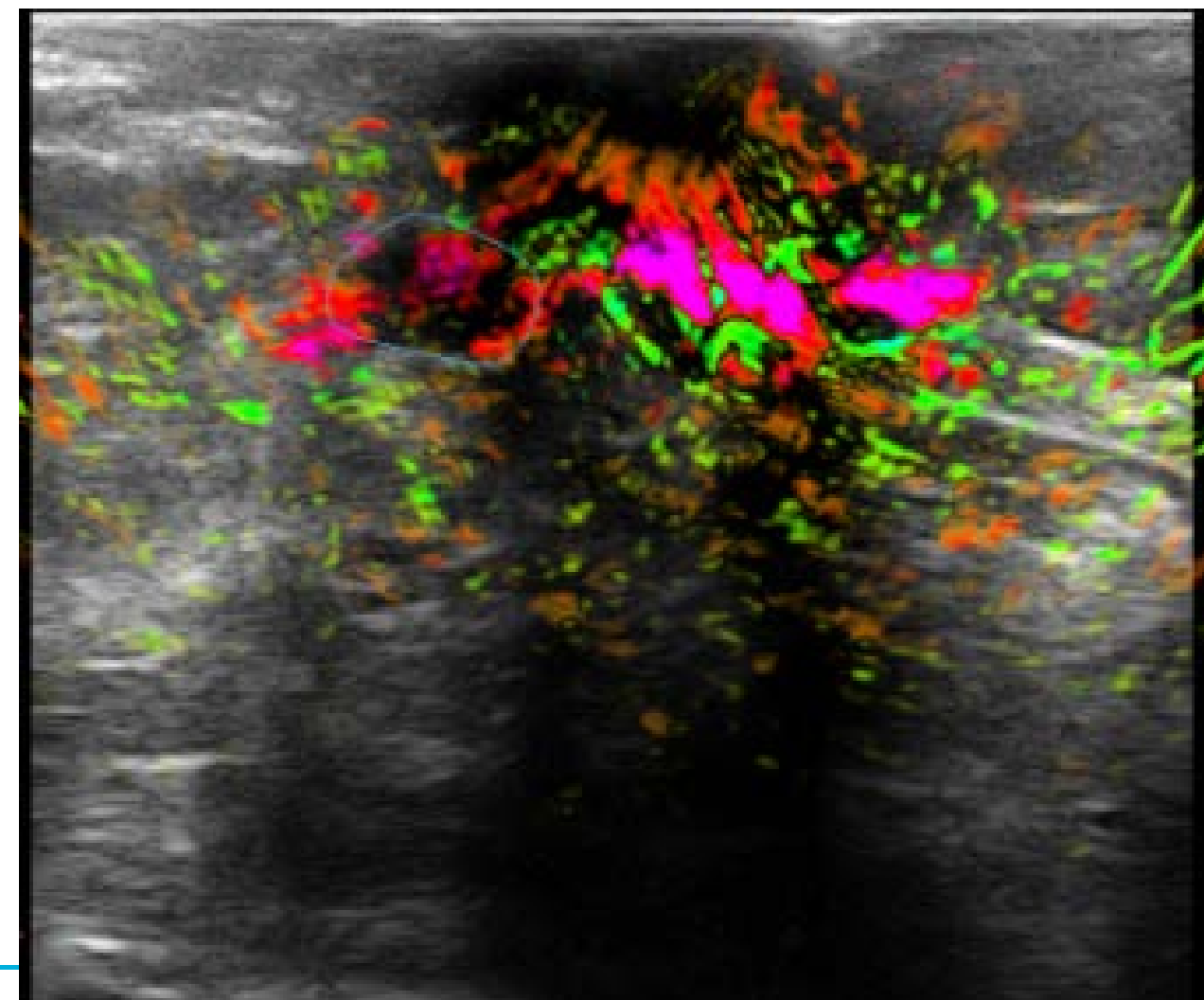
Well circumscribed intraductal nodule



Surprising results



Reinforces biopsy demand

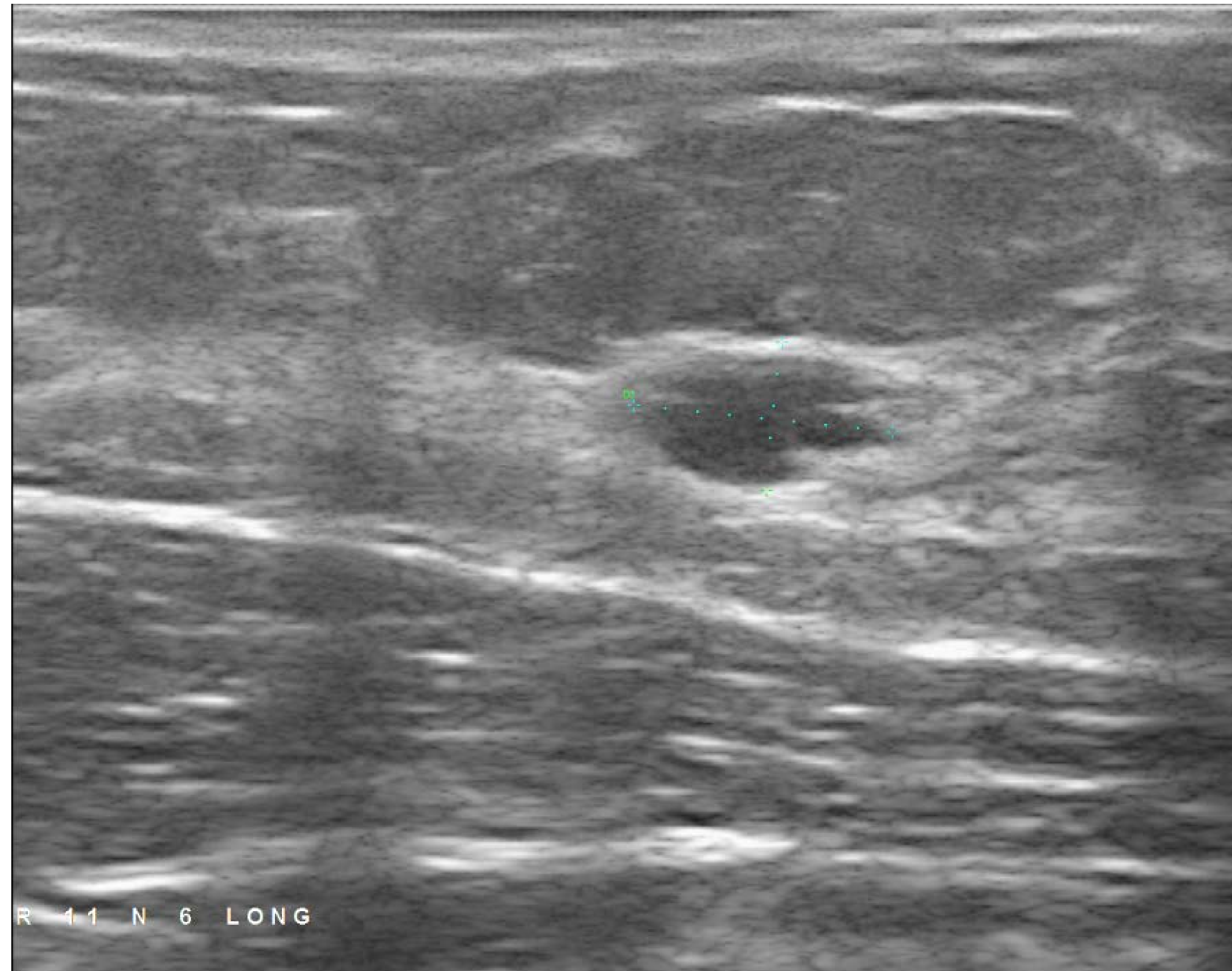


Biopsy

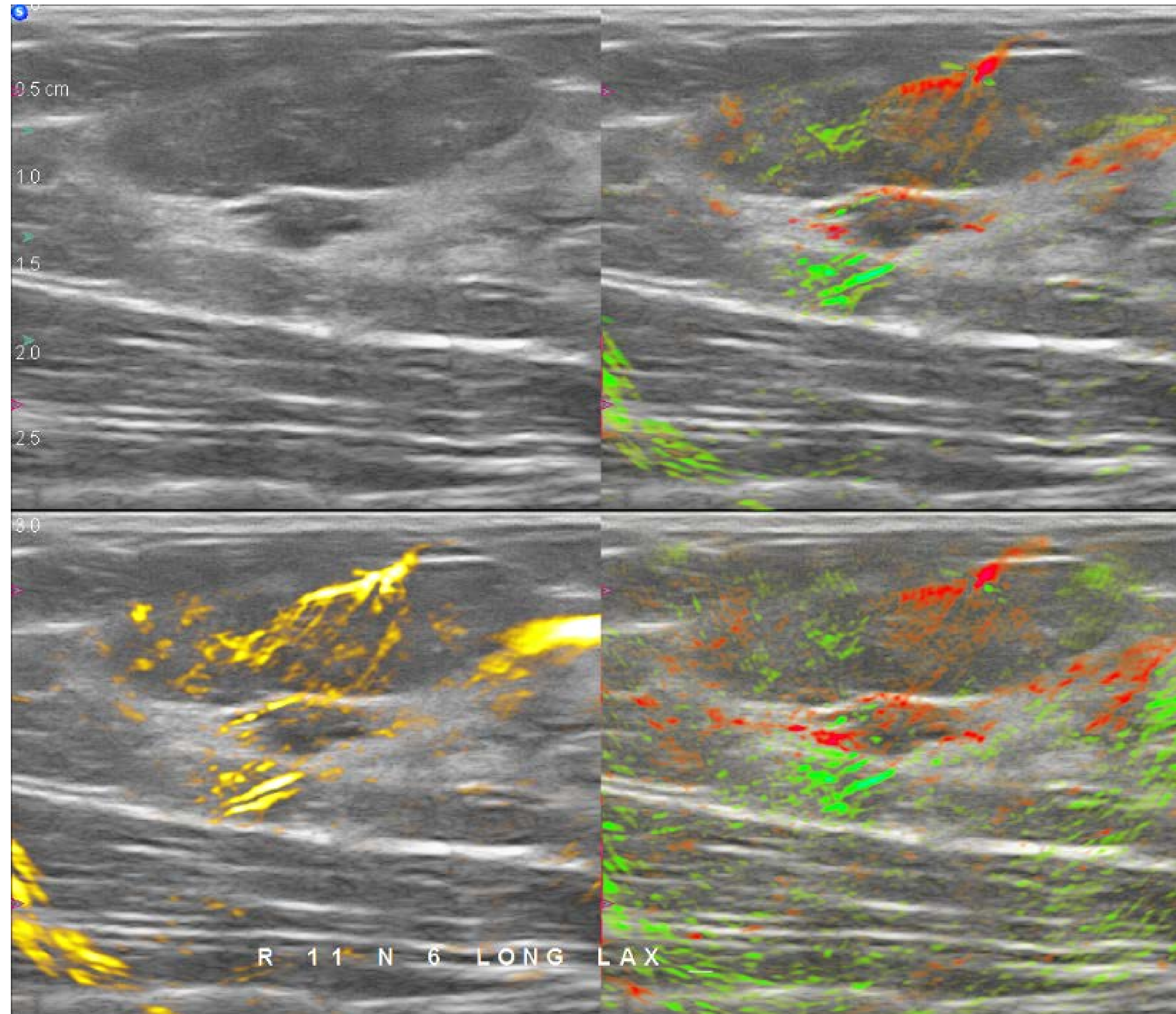


DCIS growing
inside a papilloma

Irregular mass



Reducing the need for biopsy



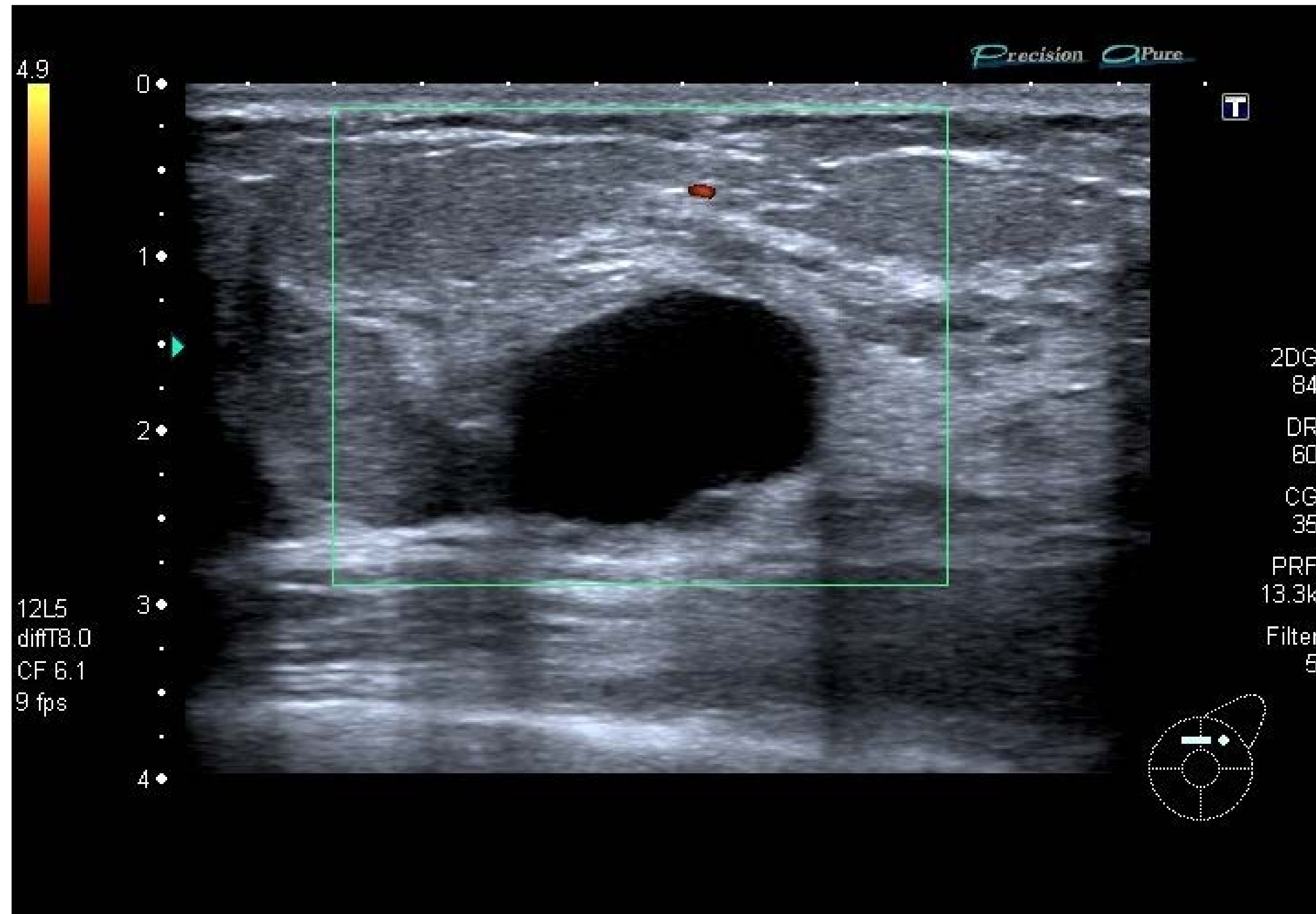
BI-RADS 4a

To

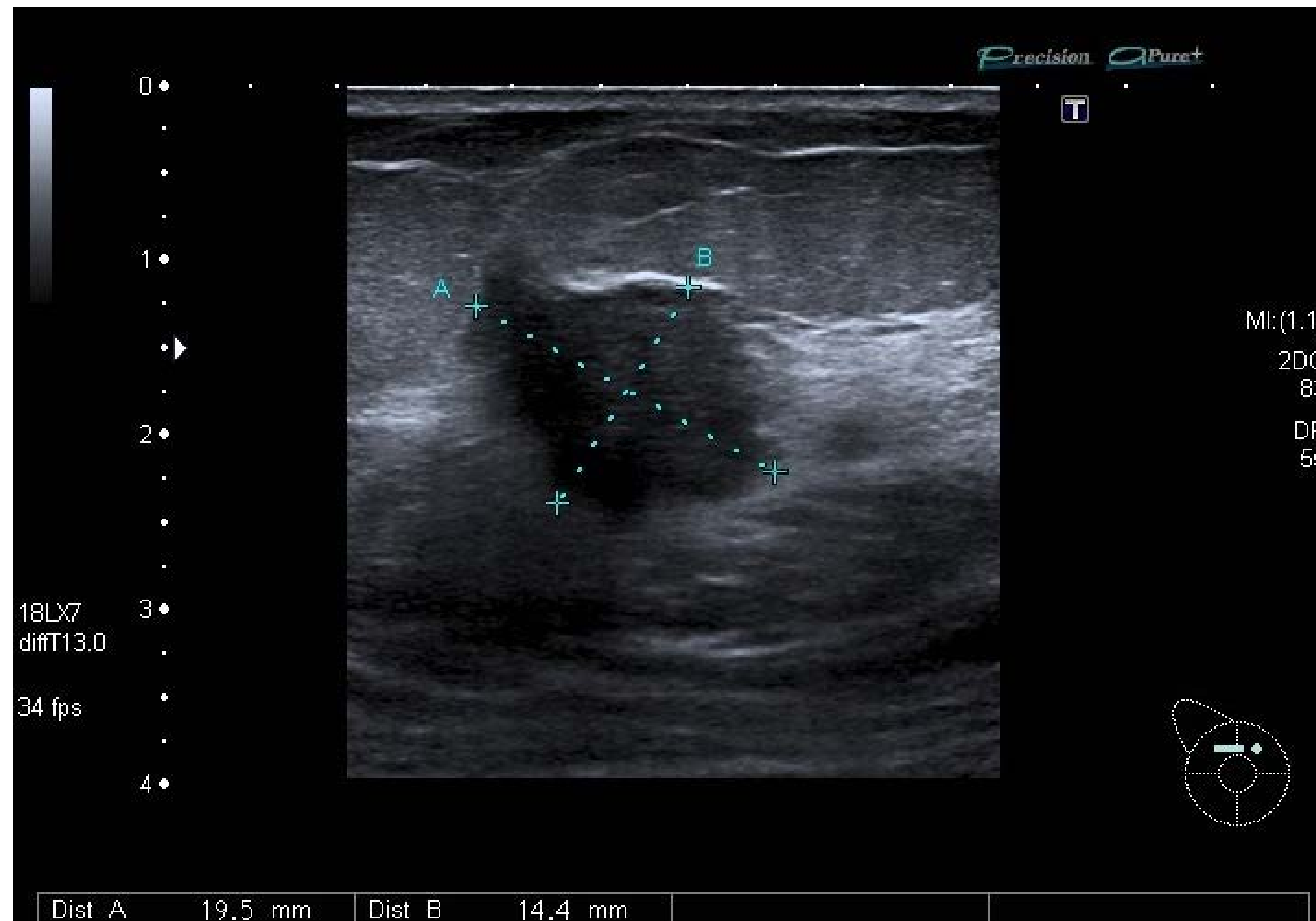
BI-RADS 2

Fibroadenoma

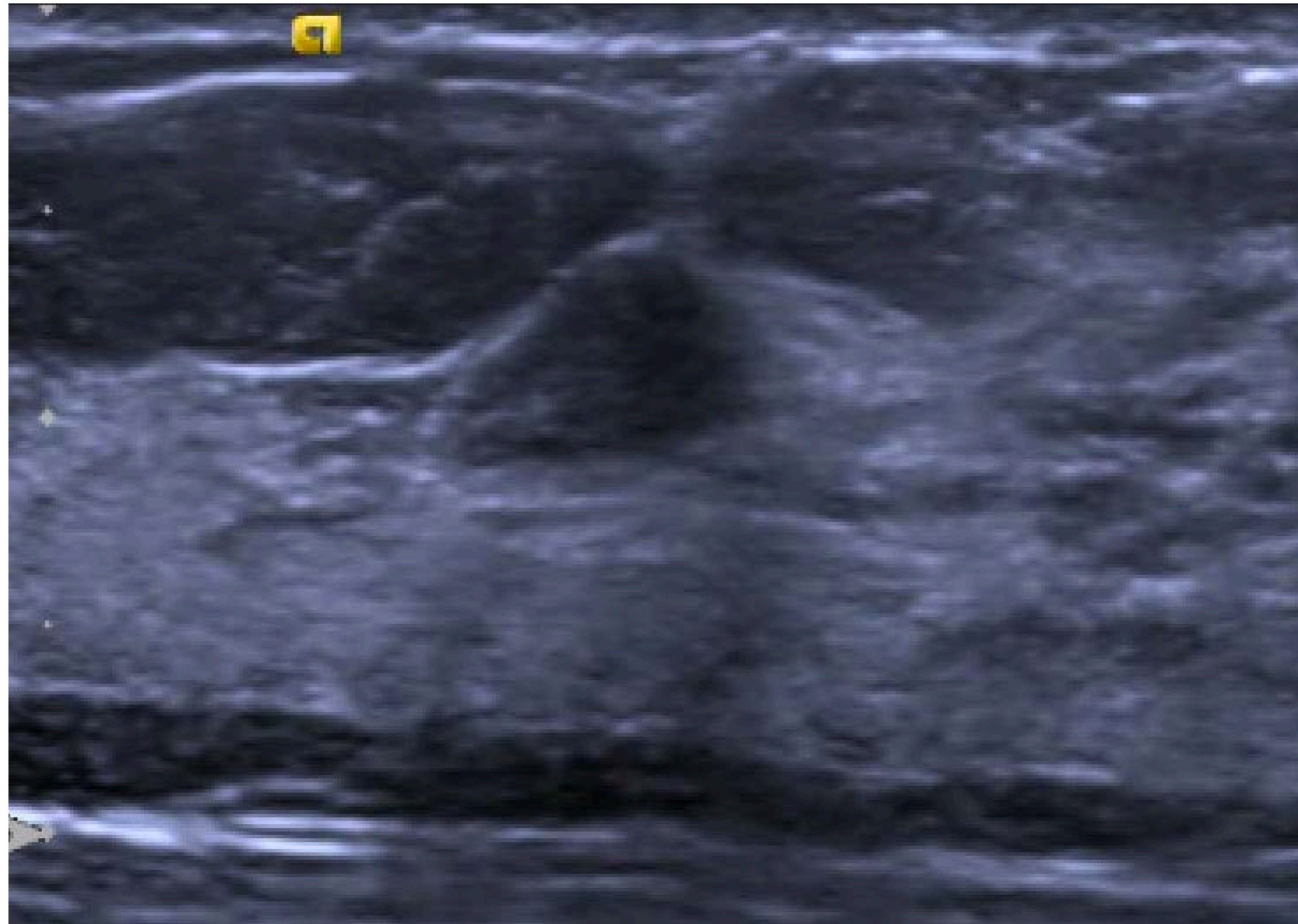
When to use opto-acoustics?



When to use opto-acoustics?



When to use opto-acoustics?



A look at IMAGIO

- Combines US and opto-acoustics
- Switches from US to hybrid in seconds



A look at IMAGIO

Lasers generate
heat, so some
cooling is mandatory

Imagio now only needs a
well air-conditioned room



Safety

- No IV contrast agents or radio-nuclides required
- No negative side-effects seen within maestro trial



Does IMAGIO meet the demands

- Easily available
- No inconvenience (both for the doctor and the patient)
 - Safe

5 Reasons that negative likelihood (NLR) ratio is both underappreciated and very important in BI-RADS

1. Can be calculated from sensitivity and specificity – therefore, can be calculated for any study with published sensitivity and specificity
$$\text{NLR} = (1 - \text{sensitivity}) / \text{specificity}$$
2. Is prevalence independent, unlike PPV and NPV
3. Allows comparison of different modalities and neutralizes the differences in prevalences between studies
4. Can calculate post test probability by multiplying NLR x pre-test probability
5. When we know the desired post-test probability – (2% or less for BI-RADS 3), we can calculate exactly how high a pre-test probability can be reduced to BI-RADS 3 when test is negative

Sensitivity– Negativity Likelihood Ratio

Table 1 - Comparative Diagnostic Breast Imaging Modality Effectiveness				
Modality	# of studies analyzed	Summary sensitivity	NLR	authors
OA MAESTRO interim	1 (75 masses)	97.1%	0.067	Seno Medical
MRI	41	91.7%	0.107	Bruening W et al. (ref 1)
PET	7	83.0%	0.230	Bruening W et al.
Scintomammography	10	84.7%	0.199	Bruening W et al.
Color Doppler	6	88.5%	0.151	Bruening W et al.
Power Doppler	7	70.8%	0.402	Bruening W et al.
ES - color scale	22 (4713 masses)	83.4%	0.197	Gong X, et al (ref 2)
ES - Strain ratio	22 (4713 masses)	88.3%	0.144	Gong X, et al
SWE - ARFI	12 (1552 masses)	86.2%	0.158	Liu B et al. (ref 3)
SWE - Supersonics	21 (4436 masses)	89.7%	0.119	Liu B et al.

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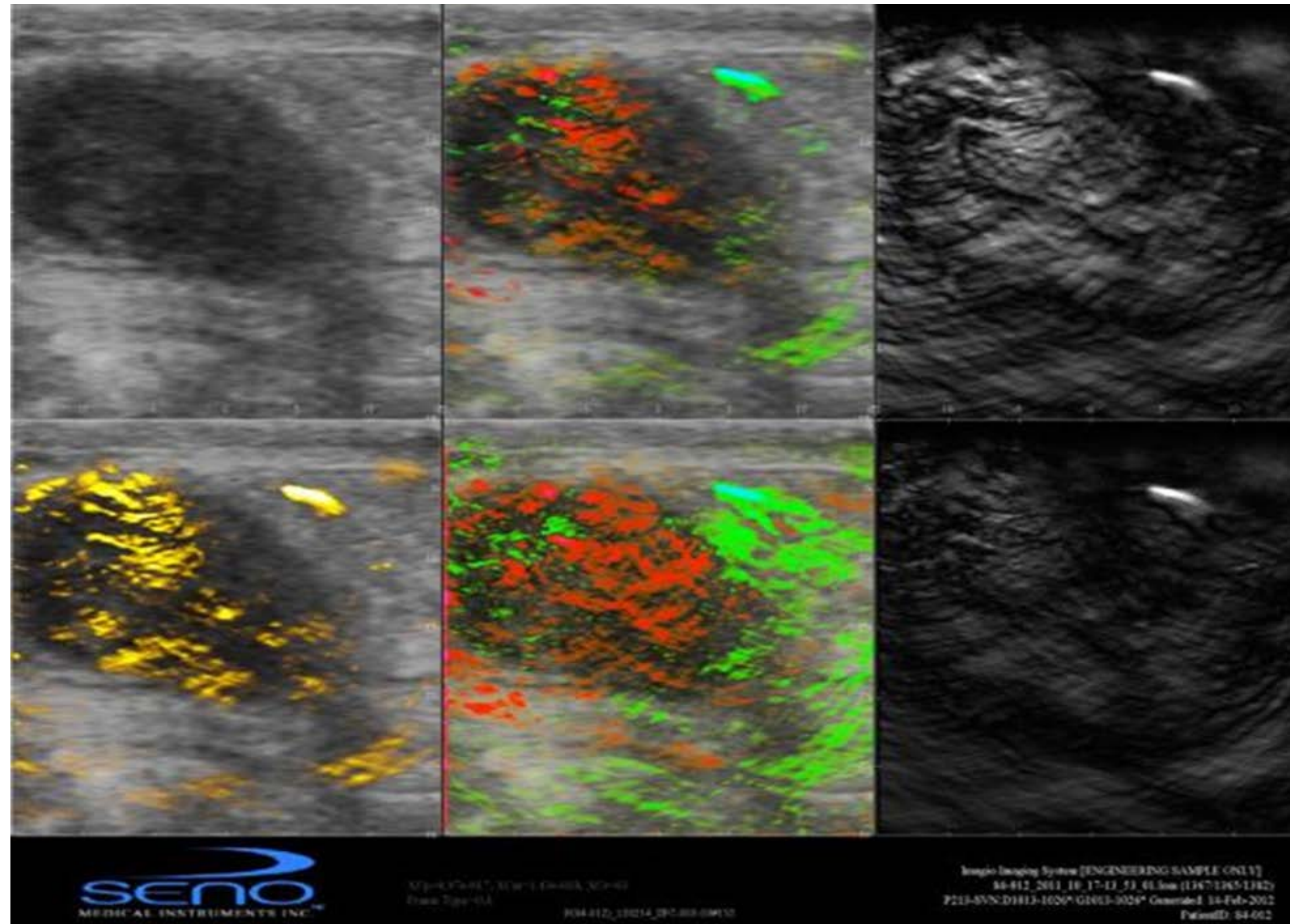
Safe

Might be worth it

Clinical benefit for other patients?

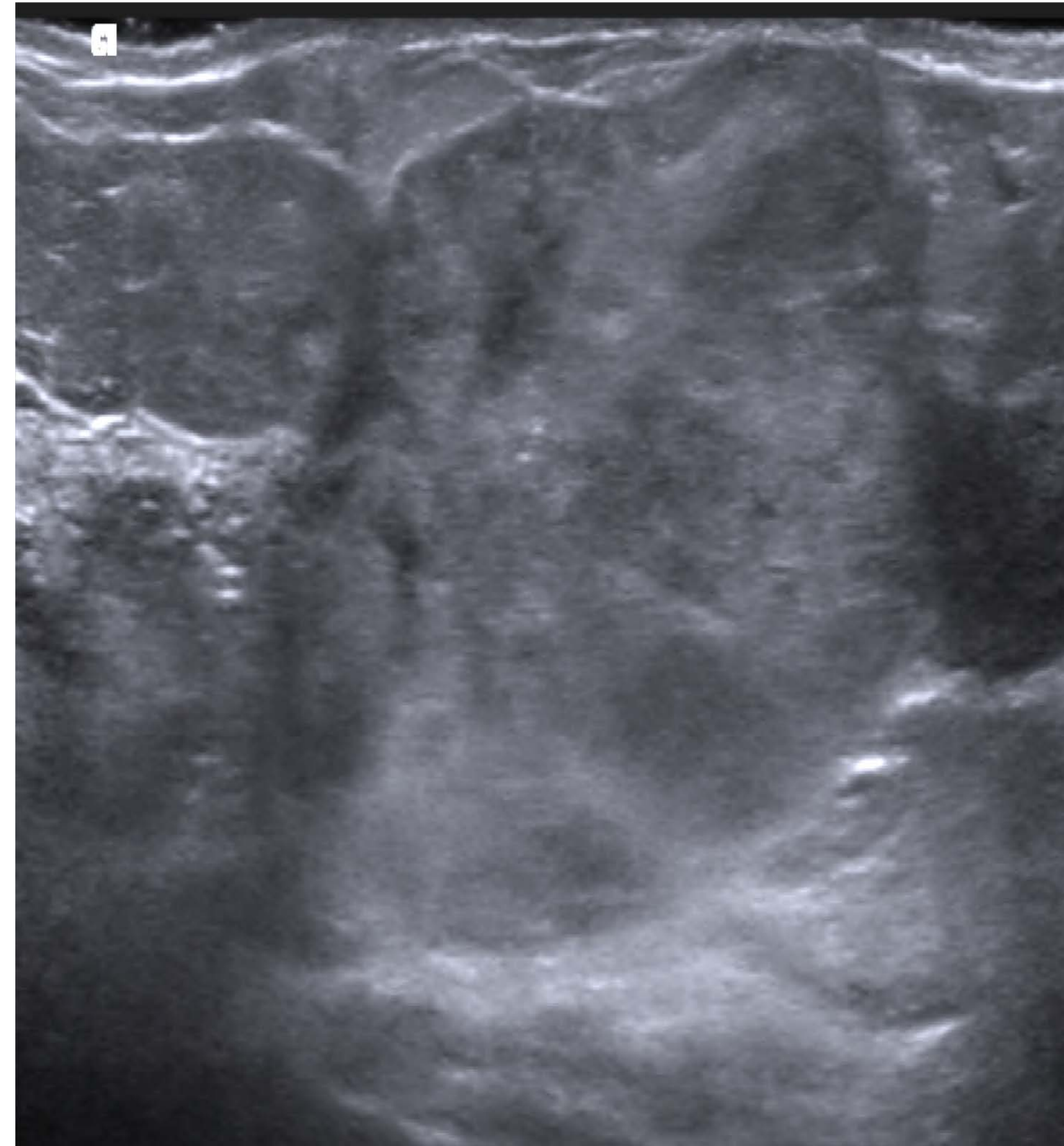
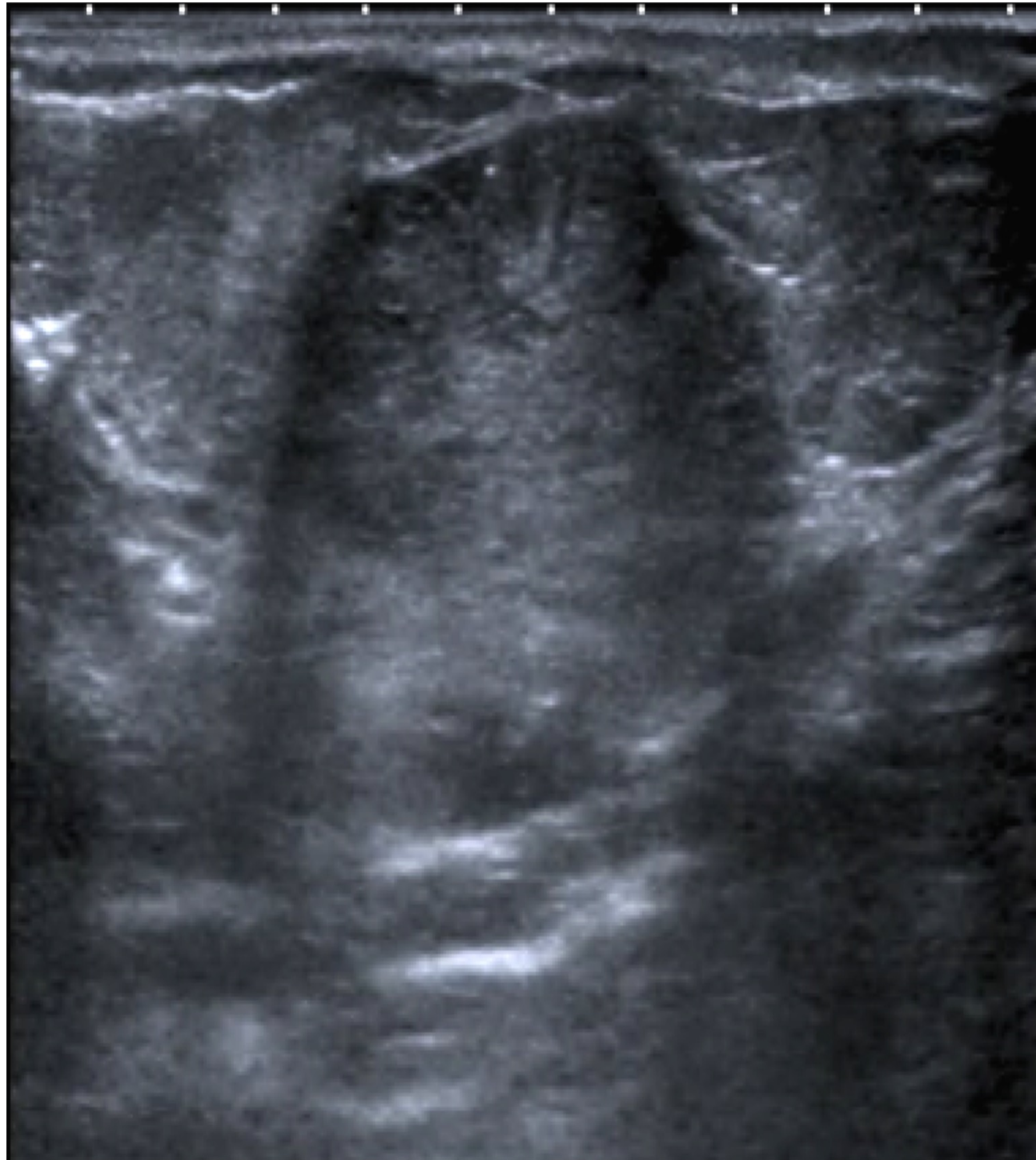


Intracystic papillary carcinoma



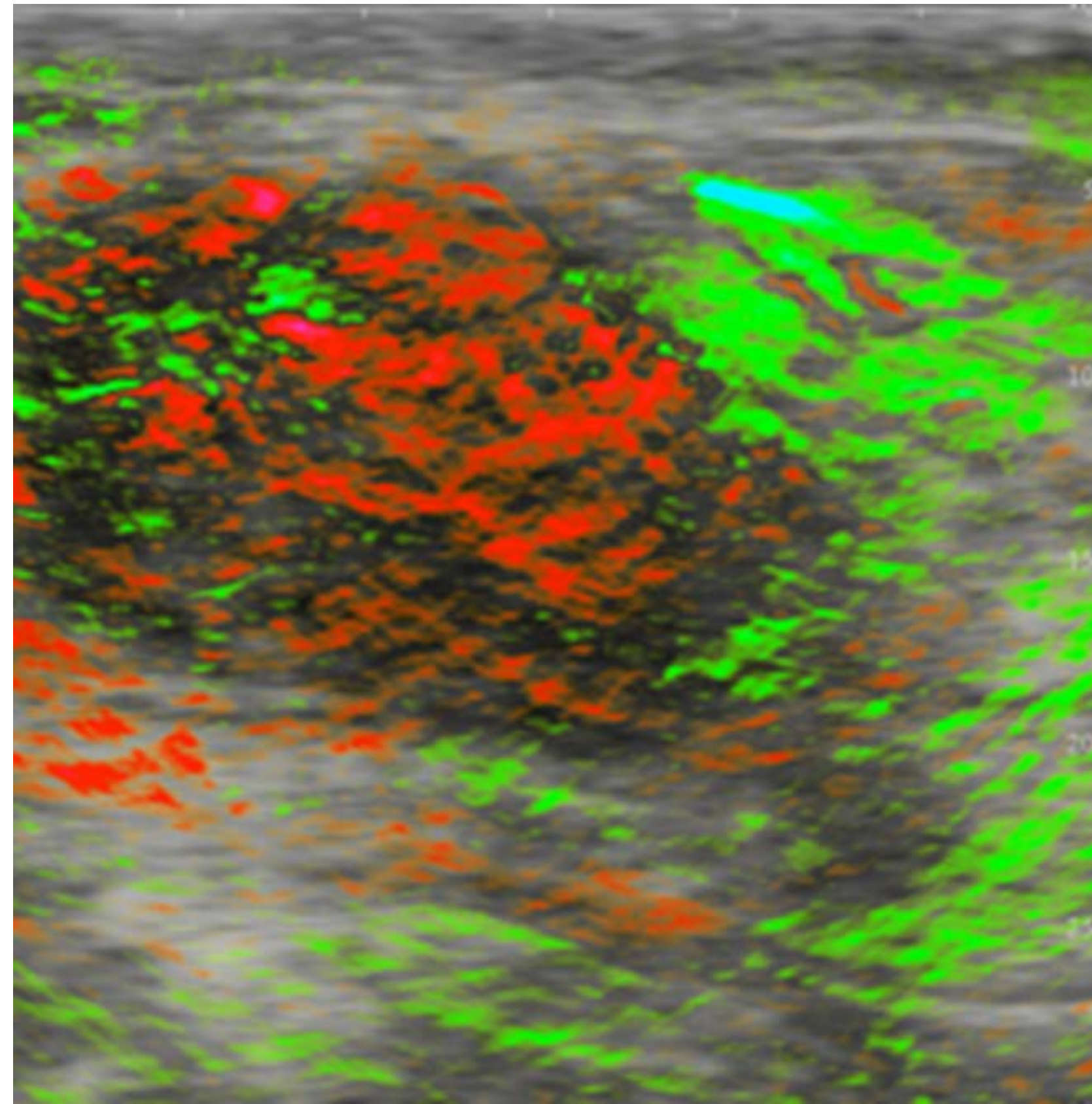
- 82-year-old lady in poor medical condition
- After multi-disciplinary discussion, it was decided not to treat

Prediction of growth?



Prediction of response to anti-angiogenic drugs

OA image of highly vascular tumor



In conclusion

- OA is capable of reducing the need for biopsy in breast lesions
- OA might be used to characterize cancers and be used for therapy monitoring
- OA might be highly valuable in other organs

However, research has so far only just started...

Thank you for your attention

