

# A case report on the use of contrast-enhanced spectral mammography in the diagnosis of multifocal/multicentric breast carcinoma

Mamografía espectral con medio de contraste endovenoso en el diagnóstico de carcinoma mamario multifocal/multicéntrico. Presentación de un caso



## Key words (MeSH)

Breast neoplasms  
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Contrast media  
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## Palabras clave (DeCS)

Neoplasias de la mama  
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## Summary

**Introduction:** Breast cancer is classified as multifocal when there are two or more malignant foci in the same quadrant and as multicentric when multiple foci develop in various breast quadrants. Another definition is based on the distance between tumors, defining as multifocal tumors those separated by no more than 5 cm and as multicentric when the distance between malignant foci exceeds 5 cm. **Objective:** To describe the importance of contrast mammography in the detection of multifocal/multicentric breast cancer using a case study. **Case report:** A 43-year-old female presented to our institution in March 2022 with an external ultrasound indicating a right breast biopsy for a solitary irregular nodule. **Results:** Prior to the biopsy, contrast-enhanced mammography (CESM) was performed, which in the recombinant image revealed multiple focal enhancements in the right breast, one which correlated with the nodule reported in the baseline ultrasound, while the remaining enhancements lacked ultrasound representation. It was classified as BI-RADS 5. The findings were verified histopathologically and radiopathologically as being consistent with a multicentric carcinoma. **Conclusion:** Patients with suspected breast cancer require a comprehensive preoperative evaluation with images that provide both morphologic and functional information, such as CESM.

## Resumen

**Introducción:** El cáncer de mama se define como multifocal cuando hay dos o más focos malignos en el mismo cuadrante y como multicéntrico cuando se desarrollan múltiples focos en diferentes cuadrantes de la mama. Otra definición se basa en la distancia entre los tumores, y se catalogan como tumores multifocales aquellos que están separados uno del otro por una distancia no mayor a 5 cm y como multicéntricos cuando la distancia entre focos malignos es mayor a 5 cm. **Objetivo:** Presentar un caso sobre la importancia de la mamografía con medio de contraste en la detección de cáncer de mama multifocal/multicéntrico. **Presentación del caso:** Paciente femenina de 43 años quien asistió a la institución en marzo de 2022 con una ecografía externa que indicaba biopsia por un nódulo único e irregular en la mama derecha. **Resultados:** Antes de la biopsia se realizó mamografía con medio de contraste (CESM, por su sigla en inglés), la cual, en la imagen recombinada, mostró múltiples realces focales en la mama derecha, uno de ellos se correlacionaba con el nódulo informado en la ecografía de referencia; el resto no tenían representación ecográfica. Se clasificó BI-RADS 5. Los hallazgos fueron confirmados histopatológicamente con resultado radiopatológico de carcinoma multicéntrico. **Conclusión:** En las pacientes con sospecha de cáncer de mama es necesaria una evaluación preoperatoria integral con imágenes que aporten información no solo morfológica, sino también funcional, como la CESM.

## Introduction

Multifocal/multicentric breast cancer is a frequent phenomenon, with an incidence that varies between 6% and 60% (1, 2); this wide variability is due to the fact that simultaneous breast cancers can be overlooked in the preoperative evaluation if the interpretation of

the images is based only on traditional methods such as mammography and ultrasound (3, 4). Therefore, the implementation of new radiological methods, such as contrast-enhanced mammography (CESM), which provides functional information on tumor-associated neovascularization as well as morphological informa-

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tion on lesions and calcifications, is of interest. This combination of information is especially important for highlighting tumor areas that would otherwise go unnoticed, as well as allowing the radiologist to be more accurate in the detection and staging of breast cancer for a better pre-surgical decision between conservative therapy and mastectomy.

## Clinical case

We present the case of a 43-year-old asymptomatic female patient with no personal or family history of breast or ovarian cancer. The patient attended the service with an external breast ultrasound indicating biopsy for a single solid nodule at the junction of the upper quadrants of the right breast. Ultrasound assessment prior to the biopsy confirmed the presence of a single nodule, with microlobulated contours, without vascularization on color Doppler imaging, measuring  $12 \times 13 \times 8$  mm located in axis 1, 12 cm from the nipple of the right breast (Figure 1). There was no ultrasound evidence of axillary or contralateral breast involvement. Since this was a patient with a very heterogeneous breast ultrastructure, with a high suspicion of malignancy, it was decided to perform CESM. In the low energy image (equivalent to conventional mammography) a single nodule was observed in the right breast that

coincided with the ultrasound finding (Figure 2) and in the recombinant image (with intravenous contrast medium) the same nodule was identified, which was the dominant one, but in addition five additional tumor enhancements smaller than 5 mm were evident in the same breast, which were not visible in conventional methods (Figure 3). The tumor extension between the index lesion and the most distant nodule was 8 cm. Magnetic resonance imaging (MRI) with contrast medium was performed, which confirmed the findings reported on CESM (Figure 4).

In order to rule out multifocal/multicentric carcinoma, a core needle biopsy was performed with ultrasound guidance on the index lesion in H1 of the right breast, which was positive for luminal invasive ductal carcinoma A (Figure 5). For additional enhancements the indication was CESM or MRI guided biopsy; however, these procedures are not available at the institution. Taking into account that one of the additional enhancement foci showed correlation with subtle and scarce amorphous calcifications in the low energy CESM image, we proceeded to biopsy these calcifications with stereotaxy. The result was positive for ductal carcinoma in situ of high nuclear grade (Figure 6). With the results obtained by CESM, we went from a unifocal T1A breast carcinoma candidate for conservative surgery to an extensive multicentric carcinoma with the same T tumor stage, but now a candidate for radical mastectomy.

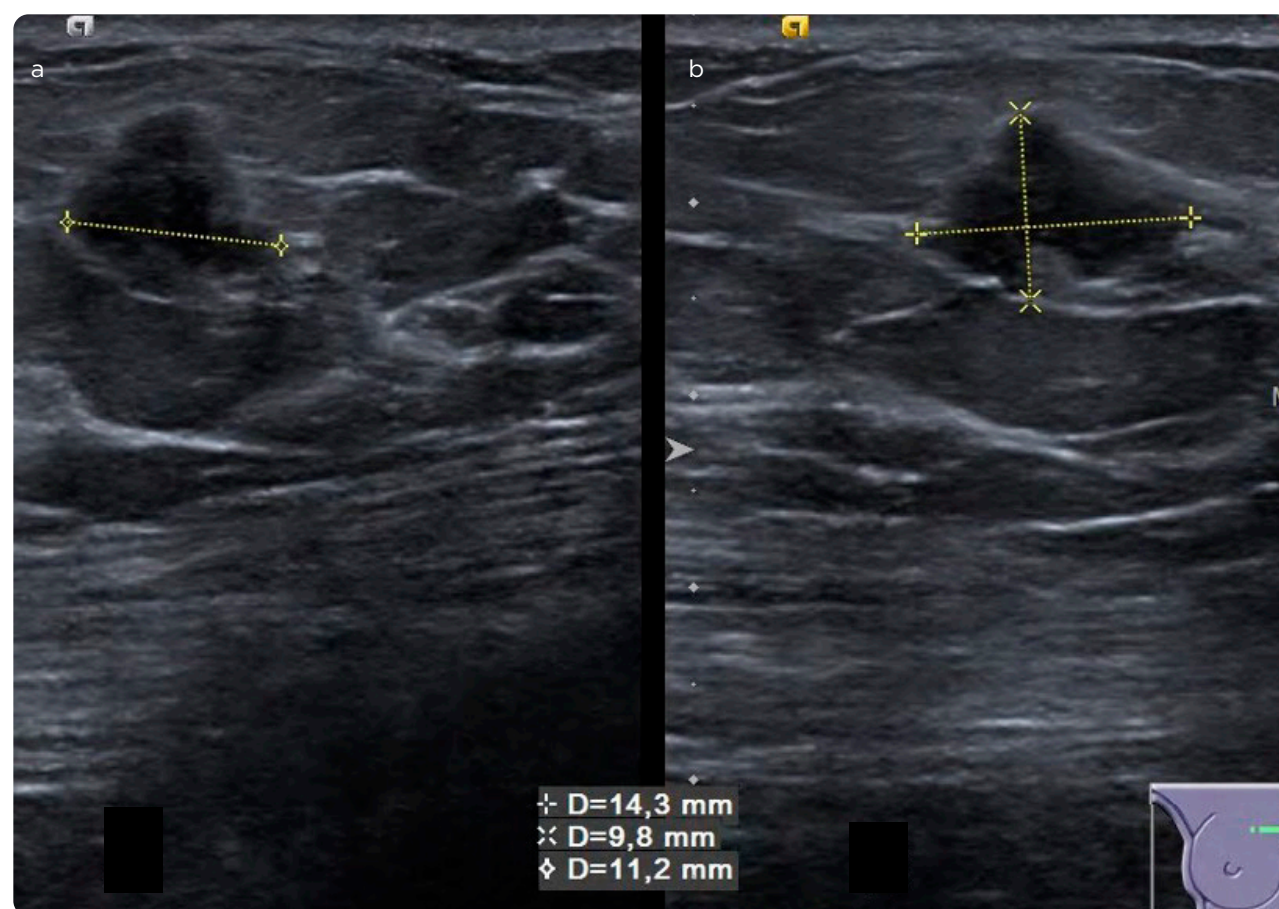


Figure 1. Breast ultrasound. a) Transversal plane. b) Longitudinal. There is evidence of a single, hypoechoic and irregular mass in the right breast.



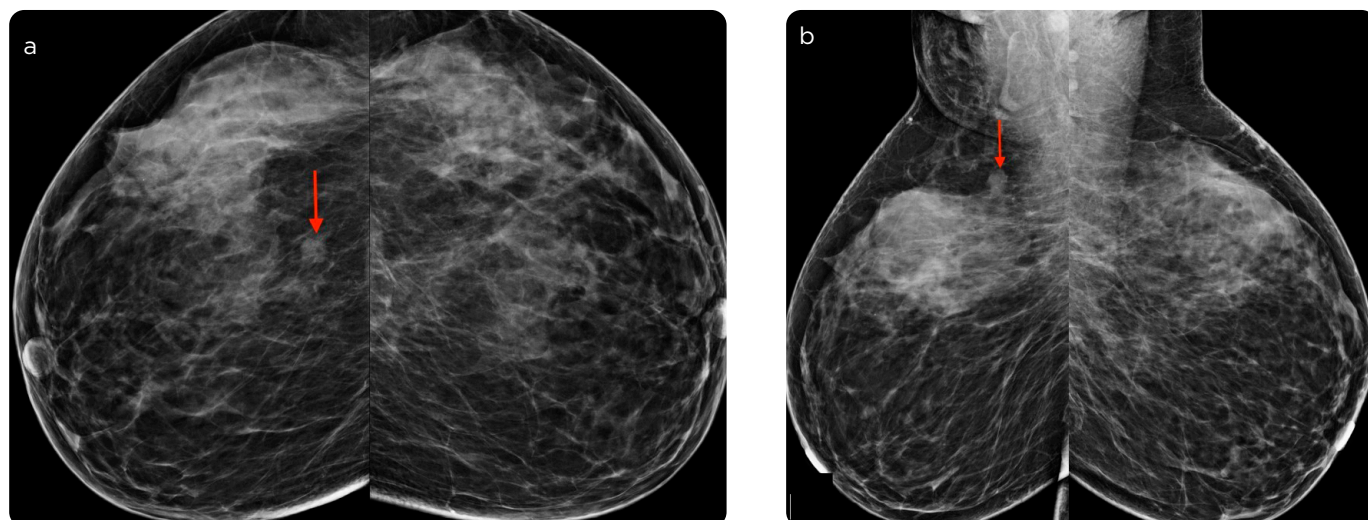


Figure 2. Bilateral CESM, low energy images. a) CC projection. b) MLO projection. Mass with non-circumscribed borders at the junction of the upper quadrants of the right breast (red arrow).

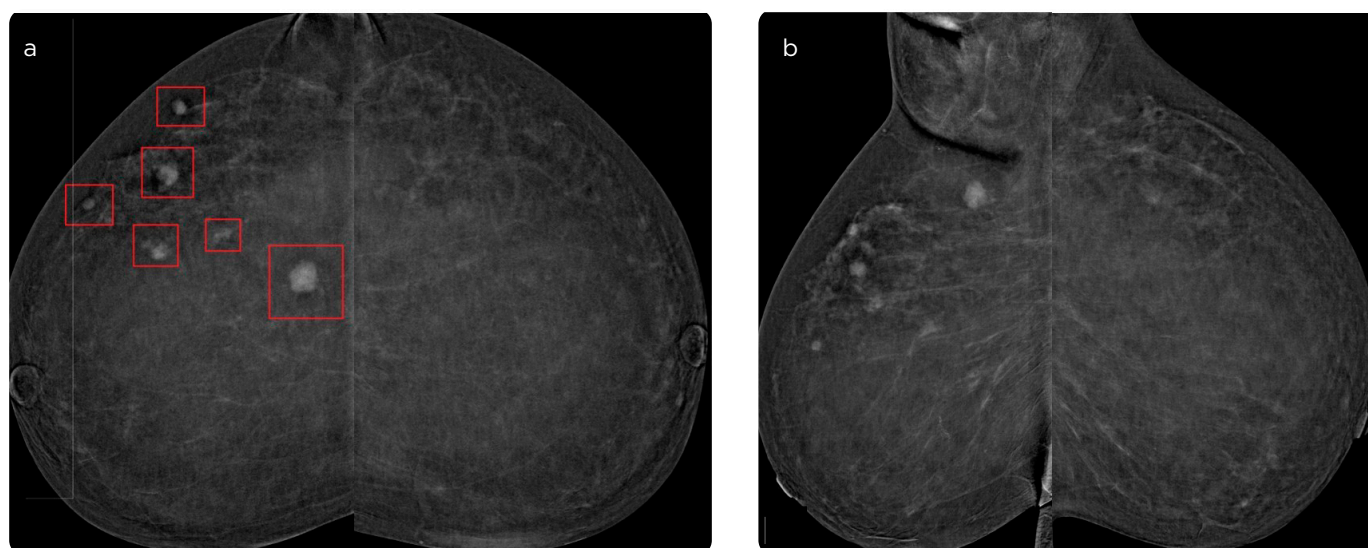


Figure 3. Bilateral CESM, recombined images. a) CC projection. b) MLO projection. At least six tumor enhancements in the upper quadrant junction and superoexternal quadrant of the right breast (red boxes in A), suspicious for multifocality/multicentricity.

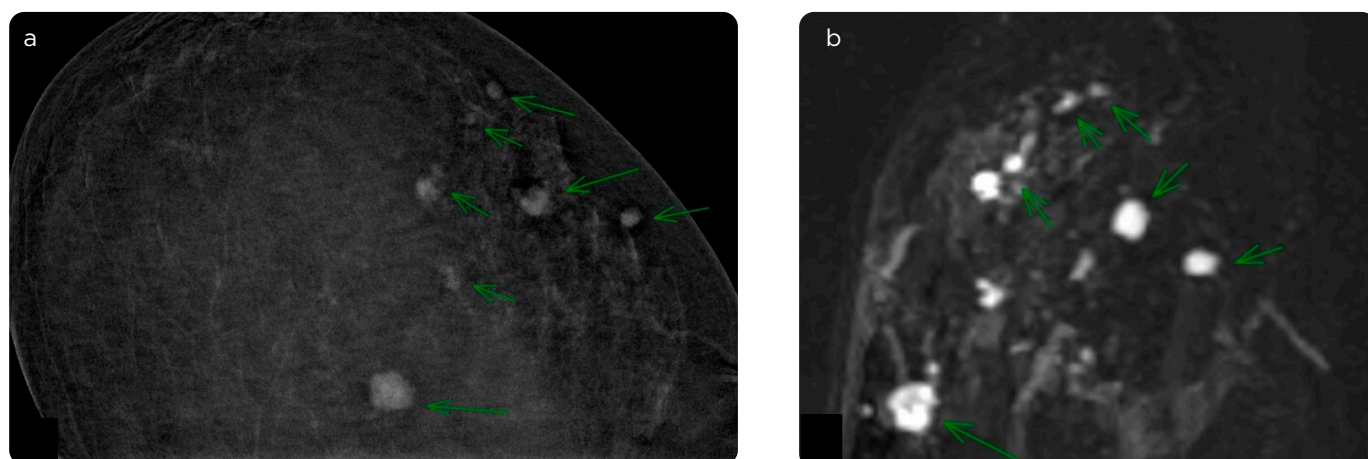


Figure 4. a) CESM recombined image in CC. b) Axial plane MRI with intravenous contrast. The findings between both methods are comparable (green arrows).

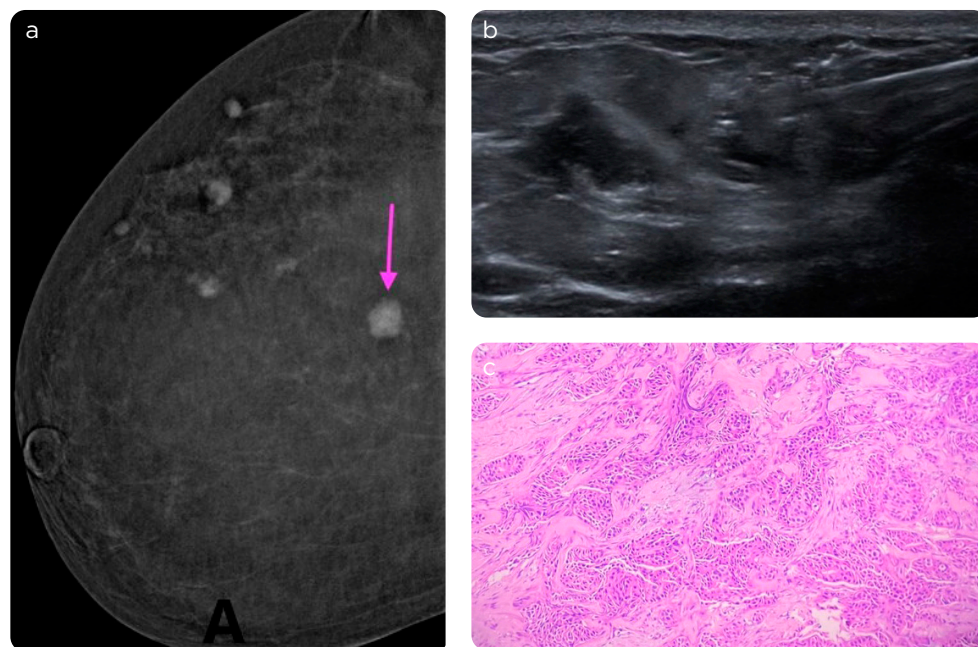


Figure 5. CESM. a) Dominant nodule (pink arrow), the only one with ultrasound representation. b) Biopsy was performed with ultrasound guidance. c) Histopathological section with hematoxylin-eosin 20X magnification, confirming the diagnosis of infiltrating ductal carcinoma, Nottingham histological grade 2 (7/9). The immunohistochemistry profile was hormone receptor positive, HER2 negative.

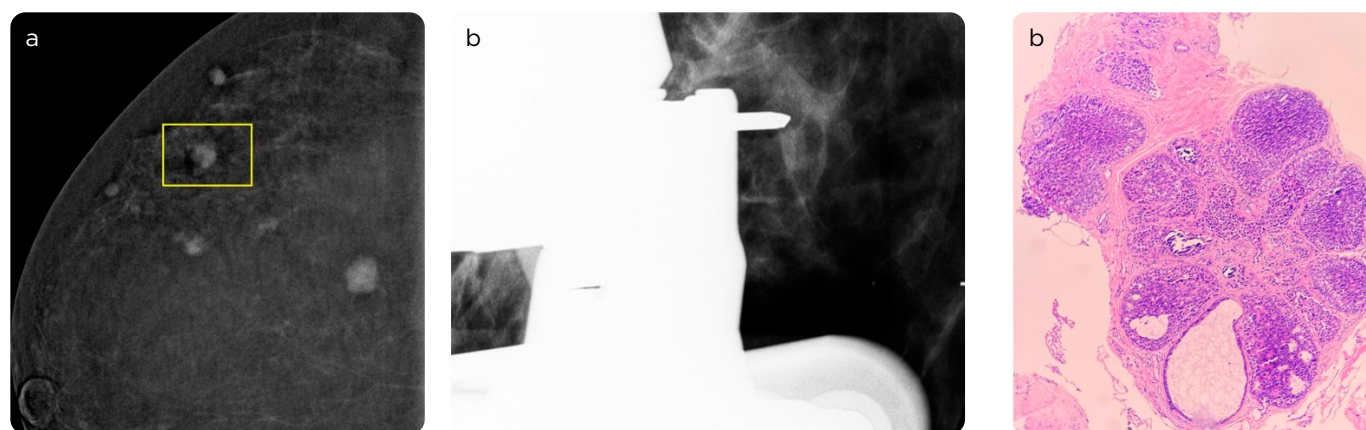


Figure 6. CESM. a) One of the additional enhancements identified (yellow box). b) Correlation with a group of amorphous calcifications biopsied with stereotactic guidance. c) Histopathologic section with hematoxylin-eosin, magnification 20X positive for ductal carcinoma in situ, solid pattern, nuclear grade 3.

## Discussion

Patients with breast cancer stages IA, IB and IIA, according to the National Comprehensive Cancer Network (NCCN) 2020 guidelines (guidelines for clinical practice in oncology) are not candidates for staging with MRI. The patient in the clinical case, due to tumor size of less than 2 cm, without lymph node involvement or distant metastases, belonged to stage IA; in other words, she did not qualify for MRI staging. However, with CESM, which provided vascular information similar to MRI, the multicentric involvement did not go unnoticed.

Although CESM is not among the first-line tests in the clinical staging of breast cancer, several studies (5, 6) have shown that this method, by combining anatomical and vascular images, is more reliable and accurate than conventional mammography and ultrasound, since, unlike traditional techniques, its detection rate is not affected

in patients with dense breasts, which has a significant impact on the underestimation of mammographic lesions. Compared to MRI, CESM is less expensive (it has lower equipment value, less time for image acquisition and interpretation), it can detect ductal carcinoma in situ (DCIS) presenting as calcifications, it is better tolerated by patients and most current studies report that both techniques have comparable diagnostic performance without statistically significant differences.

CESM is thus an excellent alternative to increase the likelihood of screening with functional methods using intravenous contrast in communities with difficult access to MRI and to enable more patients with early stage breast cancer (non-candidates for MRI) to have the opportunity to be correctly staged.

## Conclusion

In Colombia there are no data available regarding the value of CESM in clinical care use. It would be interesting to demonstrate its usefulness as an alternative to MRI in breast cancer patients.

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