Association between Background Parenchymal Enhancement (BPE) and Breast Density on Contrast-Enhanced Mammography (CEM)

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OBJECTIVE

- Breast density is a well-known factor in breast cancer risk assessment, with higher density linked to increased malignancy risk and reduced sensitivity of conventional mammography. BPE, observed in contrast-enhanced imaging, reflects physiological contrast uptake in fibroglandular tissue, and has been identified as a potential risk factor for breast cancer development.
- To evaluate whether there is association between background parenchymal enhancement (BPE) and breast density on contrast-enhanced mammography (CEM).

MATERIALS AND METHODS

Retrospective review of consecutive CEM examinations performed in our institution between 13 December 2019 to 2 December 2024.

Exclusion criteria

Patients who have received prior systemic chemotherapy or ipsilateral breast irradiation were excluded due to possible confounding effects on BPE and breast density.

Classifications

- BPE was classified into four categories (minimal, mild, moderate, marked) by visual assessment on recombined (RC) images according to ACR BI-RADS CEM lexicon published in 2022.
- Breast density was classified into four categories (a,b,c,d) also by visual assessment on low-energy (LE) images.
- The classifications were assigned by one or more radiology specialist(s) who has/have received formal training in breast radiology.

Statistical analysis

- The association between BPE and breast density was analyzed with Fisher's Exact Test using IBM SPSS Statistics (version 31.0.0.0 (117)).
- P-values < 0.05 indicated statistical significance.

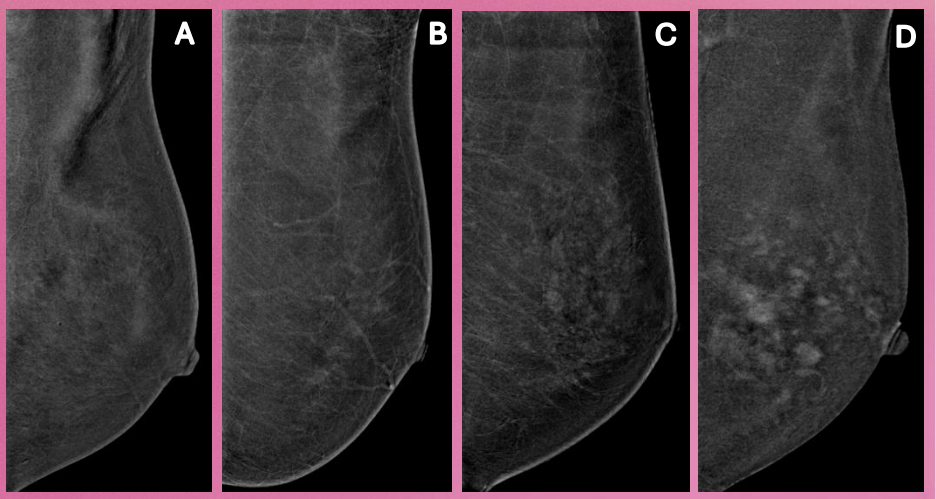


Figure 1. BPE on RC images of CEM (A) minimal (B) mild (C) moderate and (D) marked.

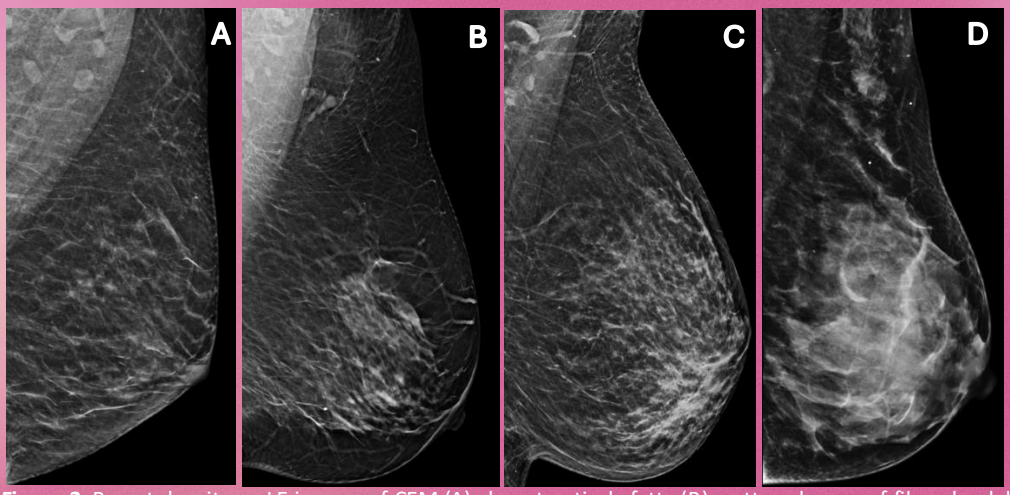
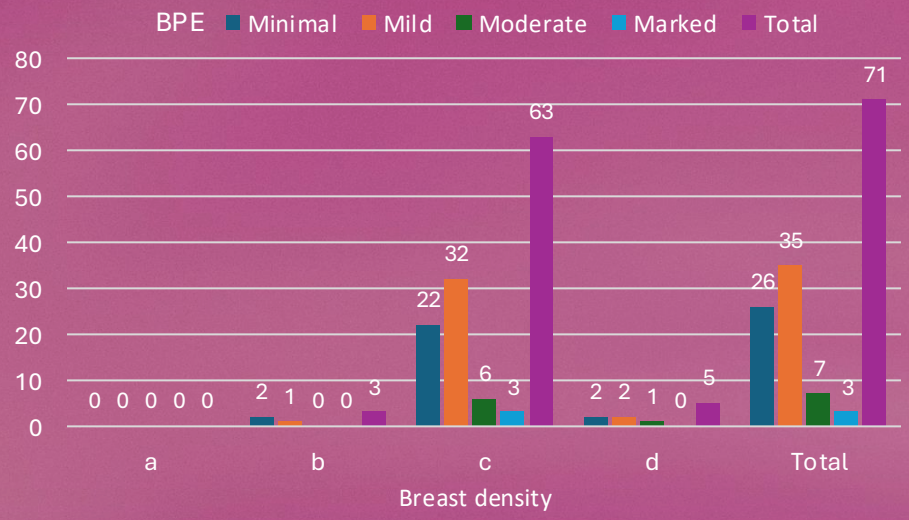


Figure 2. Breast density on LE images of CEM (A) almost entirely fatty (B) scattered areas of fibroglandular density (C) heterogeneously dense and D) extremely dense.

RESULTS

- A total of 71 CEM examinations were included.
- All are female patients, ranging from 28 to 78 years of age (median 54).
- Ethnicities: Chinese: 52, Filipino: 14, Indonesian: 3, Nepalese: 1, Indian: 1.



- Statistical analysis revealed no significant correlation between the level of BPE and breast density ($p = 0.77$).
- This retrospective study has several limitations: it included only Asian patients with predominantly dense breasts, most with newly diagnosed breast cancer, which may introduce confounding factors; it had a relatively small cohort; it did not control for menopausal status; and it lacked quantitative assessments of BPE and tissue density for more objective measurement.
- Future prospective studies with quantitative, standardized measurements for BPE and breast density that include diverse ethnic groups may improve generalizability in future research.

CONCLUSION

No significant association was found in this study between background parenchymal enhancement and breast density on contrast-enhanced mammography.

References

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