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LETTER TO THE EDITOR

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More fat, less migration: breast density as a predictor of sentinel lymph node non-visualization in breast cancer

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Dear Editor,

We carefully read the paper written by Chahid et al. entitled "Risk Factors for Non-Visualization of the Sentinel Lymph Node on Lymphoscintigraphy in Breast Cancer Patients" recently published in EJNMMI research [1]. After investigation of a large dataset of patients and application of multivariable analysis, this team found that the ages of ≥ 70 years ($P < 0.001$; OR: 2.27; 95% CI: 1.46–3.53), body mass indexes (BMIs) of ≥ 30 kg/m^2 ($P = 0.031$; OR: 1.48; 95% CI: 1.04–2.12), and non-palpable tumors ($P = 0.004$; OR: 1.54; 95% CI: 1.15–2.07) were independent predictors of sentinel lymph node (SLN) non-visualization. Therefore, it was concluded that SLN lymphoscintigraphy is a very robust technique that does not depend on the experience of the preparer or administrator of the radiotracer which is indisputable. It is worth noticing that these findings were concordant with those of some previous studies [2–4].

In a comprehensive analysis of breast density distribution of 821 Finnish women with breast cancer [5], it was observed that breast density categories had an association with age and BMI. Indeed, the older and more obese patients were mostly represented in the lower-density categories. In daily clinical practice, when confronted with an elderly female with large and fatty breasts for the SLN procedure, the assumption that the odds of non-visualization are high is frequently right. Therefore, we asked ourselves whether breast density, rather than age and BMI, could be the major variable to take into account for the prediction of SLN non-visualization.

To verify this hypothesis, we randomly selected 210 out of the 569 patients addressed to our unit for breast SLN lymphoscintigraphy in 2018. Their data concerning age, BMI, and breast density were available for 184 patients. The palpability of tumors, which was also identified as an independent predictor in the study of Chahid et al., was not recorded. Breast density of the patients was determined by an experienced radiologist according to the Breast Imaging-Reporting and Data System atlas on mammography and/or breast magnetic resonance imaging (MRI) when available ($n = 81$). Based on their breast density, they were divided into categories one (almost entirely fatty, $n = 19$, 10.3%), two (scattered densities, $n = 115$, 62.5%), and three/four (heterogeneous/extremely dense, $n = 50$, 27.2%).

In accordance with the previously described Finnish study, we found that breast density was significantly associated with both age ($P = 0.0004$) and BMI ($P < 0.0001$); accordingly, lower densities were observed in older and heavier patients (Fig. 1a, b). Even if trends were observed, Mann–Whitney tests showed that the age and BMI of patients for whom the SLN was not visualized were not different from those of other patients: 65.2 ± 11.1 years versus 61.2 ± 13.0 years, respectively ($P = 0.08$) and 28.3 ± 6.7 kg/m^2 versus 26.4 ± 5.9 kg/m^2, respectively ($P = 0.06$). Moreover, we observed a significant association between breast density and SLN detectability; accordingly, patients with lower breast densities had low SLN detectability (Fig. 1c). In other words, lymphatic drainage was less visible in fattier breasts.

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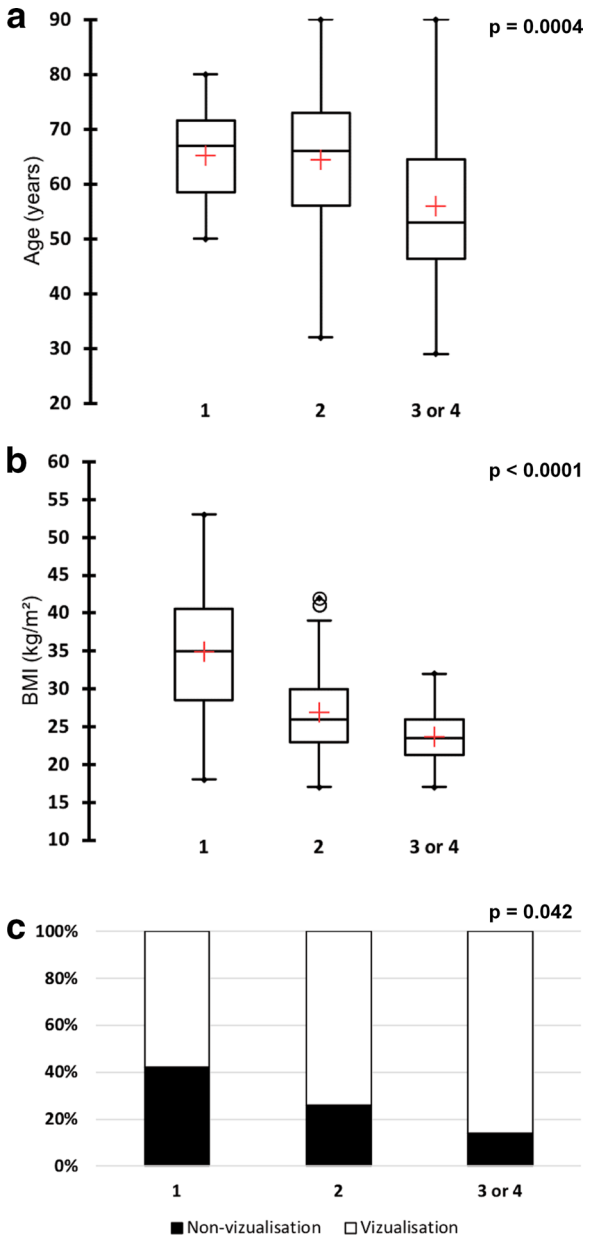

Fig. 1 Comparison of age (**a**) and BMI (**b**) of breast density categories using Kruskal-Wallis tests and comparison of the proportions of sentinel lymph node non-visualization cases among breast density categories (**c**) using a Fischer exact test. BMI: Body Mass Index. Category 1: almost entirely fatty. Category 2: scattered densities. Category 3 or 4: heterogeneous or extremely dense

The rarity of lymphatic capillaries within human subcutaneous adipose tissue, as recently reported by Redonda et al. [6, 7], supports our finding that breast density plays an important role in the success of the lymphoscintigraphy protocol.

With this letter, we would like to draw attention to the correlation between breast density and SLN non-visualization, in addition to the findings reported by Chahid et al. The time seems right to launch a debate on the potential use of breast density (easily determined by mammography and breast MRI that patients undergo as part of their baseline assessment) for the eventual development of SLN protocol adaptation.

Authors' contributions

Data acquisition and data analysis/interpretation were carried out by CL/GB. Manuscript drafting or revision for important intellectual content was done by CL/EQ/KW. Statistical analysis was carried out by CL. Guarantors of the integrity of the entire study were done by all authors. Approval of the final version of submitted manuscript was done by all authors.

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Availability of data and materials

The data supporting the conclusions of this article will be made available by the authors, upon reasonable request.

Declarations

Ethics approval and consent to participate

The authors are accountable for all aspects of the work and guarantee that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in the studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and also the 1964 Helsinki Declaration (as revised in 2013) and its later amendments or comparable ethical standards.

Consent for publication

In accordance with European regulations, French observational studies without any additional therapy or monitoring procedures do not need the approval of an Ethics Committee. Nevertheless, global information for people participating in research was provided, including a specific paragraph on the possibility of using health data for research purposes. The study was approved by our institutional review board and the need for informed signed consent was waived. Additionally, the procedure was declared to the National Institute for Health Data with the registration no. F20210719122319.

Competing interests

The authors declare that they have no competing interests.

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References

1. Chahid Y, Qiu X, van de Garde EMW, Verberne HJ, Booij J. Risk factors for nonvisualization of the sentinel lymph node on lymphoscintigraphy in breast cancer patients. EJNMMI Res. 2021;11(1):54.
2. Chagpar AB, Martin RC, Scoggins CR, Carlson DJ, Laidley AL, El-Eid SE, et al. Factors predicting failure to identify a sentinel lymph node in breast cancer. Surgery. 2005;138(1):56–63.

3. Straalman K, Kristoffersen US, Galatius H, Lanng C. Factors influencing sentinel lymph node identification failure in breast cancer surgery. Breast Edinb Scotl. 2008;17(2):167–71.
4. Goyal A, Newcombe RG, Chhabra A, Mansel RE. Factors affecting failed localisation and false-negative rates of sentinel node biopsy in breast cancer—results of the ALMANAC validation phase. Breast Cancer Res Treat. 2006;99(2):203–8.
5. Nykänen A, Okuma H, Sutela A, Masarwah A, Vanninen R, Sudah M. The mammographic breast density distribution of Finnish women with breast cancer and comparison of breast density reporting using the 4(th) and 5(th) editions of the Breast Imaging-Reporting and Data System. Eur J Radiol. 2021;137:109585.
6. Redondo PAG, Gubert F, Zaverucha-do-Valle C, Dutra TPP, Ayres-Silva JP, Fernandes N, et al. Lymphatic vessels in human adipose tissue. Cell Tissue Res. 2020;379(3):511–20.
7. Ryan TJ. Lymphatics and adipose tissue. Clin Dermatol. 1995;13(5):493–8.

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