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## Can contrast-enhanced spectral mammography (CESM) reduce the number of unnecessary breast biopsies? Analysis of 593 cases of patients with suspected breast cancer

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**Introduction:** Breast cancer is the most frequently diagnosed malignancy, with a frequency of 22.8% of all new cancer incidence rates in Poland. Contrast enhanced spectral mammography (CESM) is a relatively new method used in breast cancer diagnosis, which involves the phenomenon of neo angiogenesis of cancer outstomours, allowing contrast enhancement in the areas of vessel proliferation in the background of the surrounding breast tissue. In recent years, the number of mammography centers using CESM on a daily basis has increased. Typically, CESM is used to evaluate patients with suspected focal lesions in whom conventional mammography (MG) and additional ultrasound examinations (US) do not allow a definitive diagnosis. CESM is particularly useful in the diagnosis of dense breasts (ACR categories C, D), where cancer detection is difficult due to the lower sensitivity of conventional mammography. Our study aimed to assess whether it is possible to reduce the number of unnecessarily performed breast core needle biopsies (CNB) in case of lesions that did not undergo post-contrast enhancement while using contrast-enhanced spectral mammography (CESM). An additional aim of the study was to calculate the potential financial savings from performing a CESM instead of a biopsy.

**Patients and methods:** 547 patients with 593 breast lesions detected in ultra-sonography and classic mammography were enrolled in the retrospective study. All patients before the biopsy underwent CESM examination. The CESM results have been compared with the gold standard in the diagnosis of breast cancer, which is histopathological examination. Sensitivity, specificity, negative and positive predictive values of CESM in detecting breast cancer were calculated. Changes that were not enhanced after intravenous contrast administration in CESM subtraction images were classified as ones for which CNB could be omitted. Then the possible financial profit resulting from the withdrawal from CNB and CESM implementation was calculated. Forth study, the average cost of one CNB and one CESM was setat 170 euros and 65 euros (conversion from PLN to EUR).

**Results:** The analysis includes 593 breast lesions diagnosed in 547 women. In the studied group cancer was detected in 327 (55.14%) lesions, and in 256 (43.17%) cases benign lesions were confirmed by histopathological examination and at least 12 months of observation. In 428 (72.2%) lesions changes of increased vascularization were detected, while in the remaining 165 (27.8%) lesions the CESM result was negative. Taking the CESM enhanced result as the criterion of malignancy, the method shows differentiation of benign and malignant lesions in the breast: sensitivity of 97.86%, specificity of 59.4%; PPV 74.76%; NPV 95.76%. The 165 changes did not present post-contrast enhancement in CESM. 158 (95.76%) of the selesions were verified as benign in the histopathological examination and only 7 as malignant (4.24%).

**Conclusion:** The lack of post-contrast enhancement in CESM is a good indicator of benign character. Thus, unnecessary biopsies can be avoided and cost of diagnostics in breast cancer patients reduced