



Automatic Classification of Breast Lesions in Contrast-Enhanced Mammography Using AI

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Contrast-enhanced mammography (CEM) was introduced in 2011 and its utilization has grown in recent years. CEM is becoming more commonly used in everyday clinical practice mainly for diagnostic indications, such as call back for abnormal screenings, symptomatic patients, preoperative staging of breast cancer, evaluation of response to neoadjuvant chemotherapy. CEM demonstrated in many studies high sensitivity from 93% to 100% and variable specificity ranged from 63% to 88%.

As known in breast MRI, benign lesions can show enhancement, the most common are fibroadenomas, and papillomas. Our research is focused on how to differentiate breast cancers from benign lesions and improve the diagnostic specificity. And avoid, in many cases, breast biopsy for benign lesions.

An automatic decision support system has been developed at Sheba Medical Center to help radiologists reach a confident classification of CEM breast lesions as benign or malignant. The system relies on a supervised classification algorithm in which the characteristic visual signatures of CEM lesions, with known biopsy results, are learnt during a training phase. The system is trained to provide positive scores for malignant lesions and negative scores for benign ones, with the classification confidence increasing with the score amplitude.

A retrospective study of 438 breast lesions was performed in CEM. For each lesion, biopsy results were available. With 266 lesions were benign, 172 lesions were malignant.

In a preliminary analysis, with 100% sensitivity of CEM, the specificity was improved by 36%. Therefore, a significant amount of benign biopsies could be avoided.

In the future we plan to explore enhancement patterns of benign and malignant lesions in order to further improve the specificity.

In summary, the current study presents a new and possibly effective AI-based strategy to improve CEM specificity and reduce the number of benign breast without decreasing the sensitivity.

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