

Phase contrast mammography: A novel tool for breast cancer screening and diagnosis

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Phase contrast mammography using grating interferometer is a promising alternative to current mammography. Preserving the conventional absorption contrast, this novel technology also yields differential phase contrast and small-angle scattering contrast simultaneously. Our research team imaged mastectomy breast samples from 33 patients using this technology and a multicenter, international reader study is performed aiming at the evaluation of its clinical relevance. The results show that phase contrast mammography images have a better image quality with respect to sharpness ($p < 0.001$), lesions delineation ($p < 0.001$), visibility of microcalcifications ($p < 0.001$) and additional clinically relevant information ($p < 0.001$), resulting in a general improvement in image quality.

Additionally, by combining the three complementary signals, quantitative information can be obtained to further improve screening and diagnosis. We proposed a method which is able to discern microcalcification types noninvasively as well as a method for quantitative volumetric breast density estimation. The first one provides a possible way to discern the benign and malignant breast lesions in the imaging stage thereby reducing unnecessary biopsy rate and the second yields more accurate estimation about breast density, which is a strong indicator of breast cancer risk, overcoming the subjectivity of the methods in daily routines.

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