

1.4.40. DUAL-ENERGY DIVIDING METHOD OF THE EARLY DETECTION OF MICROCALCIFICATIONS IN MAMMOGRAPHY

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In spite of the fact that mammography is a 40-year-old technique and is the best imaging method for the detection of early breast cancer in asymptomatic women, the errors of first and second kinds are higher.

The soft tissue and cancerous tissue are very similar but their atomic numbers differ. The cancers exhibit a higher effective atomic number than do the normal tissue. As the rule the tiny calcifications are the earliest indicator of breast cancer. An effective atomic number of microcalcifications is significantly higher than an atomic number of the normal tissue.

The aim of this study is the early detection of microcalcifications on the base of visualization of an effective number distribution.

Dual-energy subtraction mammography gives the product of an atomic number, density and thickness of the breast tissue. Dual-energy subtraction mammography is based on weighted subtraction of the logarithm of the low-energy image from that of the high-energy image.

The dual-energy dividing mammography is based on dividing of the logarithms of the low-energy image by the high-energy image. That ratio depends upon only an effective atomic number and does not depend on density and thickness of the breast.

The visualization of that ratio improves the detection of microcalcifications.

Figure 1 presents traditional mammogram of the mammary gland with microcalcifications (a) and visualizations of the effective atomic number distribution (b). Microcalcifications are seen significantly better at the atomic number distribution than at the traditional mammogram. The morphological analysis has confirmed presence of microcalcifications in these areas.

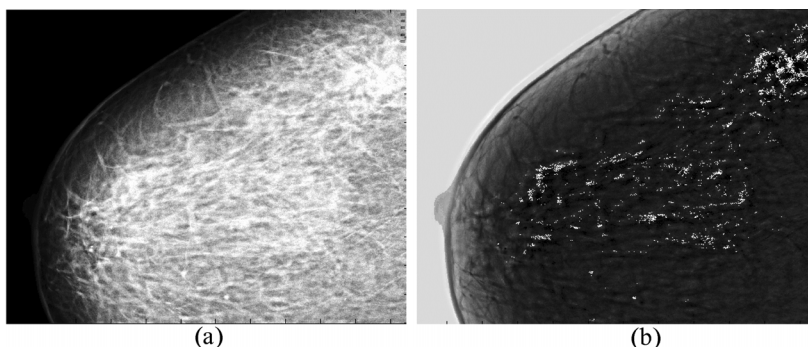


Figure 1

Invariant visualization of an effective atomic number on the base of dual-energy dividing mammography allows improving the diagnostics of the mammary gland disease.