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MALDI-TOF plasma profiling: seeking potential biomarkers for early breast cancer in a cohort of Egyptian patients

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Although mammography is now considered the best available tool for screening and diagnosis of breast cancer (BC), critics were reported regarding its sensitivity and specificity. Exploring the low-molecular-weight part of the proteome using matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS) for biomarkers provides a new hope for a rapid non-invasive blood-based method for screening and early diagnosis of breast cancer. This study aimed at evaluating the role of magnetic beads (MBs) and MALDI-TOF MS proteomic profiling in building up a plasma proteomic signature for early diagnosis of breast cancer. To identify a specific proteomic pattern for diagnosis of BC, plasma samples from 26 BC patients and 26 healthy controls (model constructor groups) were fractionated using MBs and were analyzed with ultraflextreme MALDI-TOF. For further validation, the diagnostic performance of the generated profile was verified in an independent group of plasma samples collected from 24 BC patients, and 24 healthy volunteers. Proteomic profiling revealed that 39 peaks showed differential expression between the controls and the patients; 31 were under expressed in patients while 8 were over expressed. A profile consisting of five peaks was constructed using ClinProTools software. Validation of constructed pattern on another set of patients and controls, revealed a sensitivity of 83.7% and specificity of 83.3% for early diagnosis of breast cancer. Profiles for the differentiation between patients with diverse tumor characteristics were also generated. MALDI-TOF proteomic profiling represents a new and effective method for breast cancer screening and early diagnosis.

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