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Potential Value of Circulating microRNA as Diagnostic Biomarkers for Breast Cancer in Lebanese Women

Rihab Nasr, Farah Nassar, Maha Itani, Arafat Tfayli, Rosemary Boustany, Joelle Makoukji, Ghada Chamandi, Abdul RahmanItani, Rabih Talhouk, Lifang Hou, Nathalie Zgheib

Breast cancer (BC) is the most predominant type of cancer among women. Lebanon is one of the countries in which the incidence of breast cancer is increasing tremendously. The Lebanese Ministry of Public Health recommends mammography for women of age 40 and above for breast cancer screening, yet 20.75% of breast cancer patients in Lebanon are younger than 40 years. Therefore, it is critical to find new biomarkers that can help in the early detection of breast cancer. Plasma microRNA are stably circulating in body fluids and differentially expressed in tumor versus normal samples making them promising diagnostic biomarkers for breast cancer. Using microRNA microarray profiling, we previously showed dysregulation of 173 mature microRNA in tumors from early breast cancer patients as compared to normal adjacent tissues. A set of these microRNAs including miR-145, miR-425-5p, miR-139-5p, miR-125b, miR-100, and miR-182 were further validated by quantitative real-time polymerase chain reaction (qRT-PCR). Our aim is this study is to investigate the expression of a signature of circulating microRNA (miR-21, miR-130a, miR-155, miR-195, miR-23a, miR-451, miR-145, miR-425-5p, miR-139-5p, miR-125b, miR-100, and miR-182) in the plasma of newly diagnosed early breast cancer patients having Invasive Ductal Carcinoma BC. Accordingly, total RNA was extracted from the plasma of Lebanese breast cancer patients. cDNA of specific microRNA was synthesized using the TaqMan MicroRNA Reverse Transcription Kit. Then, the expression levels of miRNA of interest were measured using real-time PCR. Finally, statistical analysis including Wilcoxon's signed-rank test, Mann-Whitney U test, Linear regression, Logistic regression, and ROC curve was applied to identify microRNA molecules significantly dysregulated in early breast cancer patients, detect any correlation between the expressed microRNAs and breast cancer risk factors, and clinical traits, and to evaluate the role of microRNAs as early breast cancer diagnostic biomarkers. Our results showed that 7 microRNAs are significantly upregulated and 1 is significantly downregulated in plasma of early breast cancer patients compared to healthy controls. miR-23a and miR-145 had a significant positive fair correlation with tumor size. The combined diagnostic potential of miR-145, miR-425-5p, and miR-139-5p was more accurate than that of each microRNA alone. In this context, circulating microRNA would be potential non-invasive diagnostic biomarkers for early breast cancer.

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