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Clinical Importance of Serum in Breast Cancer

Zara Nat*

Department of Pharmacy, University of Yale, New Haven, United States

*Corresponding author: Zara Nat, Department of Pharmacy, University of Yale, New Haven, United States; E-mail: zaranat@gmail.org

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DESCRIPTION

Cancer is one of the illnesses where the patient's quality of life and survival depend greatly on the stage at which the cancer is discovered. Given that Breast Cancer (BC) is the most prevalent malignancy in women, finding a diagnostic marker that may identify cancer in its early stages is crucial. Tumor markers are one area of attention because of their noninvasive, quick, and straightforward nature.

The most often utilised markers are Carcino Embryogenic Antigen (CEA) and cancer antigen 153 (CA153), despite their limited sensitivity and specificity. MicroRNAs are discovered to be closely related to the growth and development of tumours and are engaged in controlling a variety of cellular functions. They belong to a group of non-coding RNAs with 19–25 nucleotides. The majority of human cancers have elevated levels of miR-21 because it is implicated in the oncogenic process and has been shown to be a crucial regulator. The advantages of serum sample are clear: straightforward collection, little invasiveness, and easy monitoring. Using SYBR-Green as a base and miR-16 as a reference, the stem-loop real-time reverse transcription-polymerase chain reaction was used to assess the expression of miR-21 in 89 BC patients (RT- PCR). MiR-21 expression levels were examined, taking into account the hormone receptor status and illness stage, and then its sensitivity for diagnosing BC was compared to CEA and CA153. The miRNA molecule is small, consisting of only 19–25 nucleotides, but it controls a number of cellular signalling pathways. Numerous studies have shown the strong connection between miRNA and the development, invasion, and metastasis of tumours, among other characteristics. This association may serve as the foundation for completely new cancer treatment methods. Malignant tumours frequently express more miRNA in the serum. And it is receiving more and more attention as a diagnostic and prognostic sign.

It should come as no surprise that an early diagnostic marker for BC, the most frequent malignancy in women, is very valuable and influences prognosis. Serum indicators are the subject of research since they are straightforward and less invasive. Recent research has

shown that several miRNA, including let-7a(8), miR-21, and miR-145, express themselves differently in normal and BC tissues. They regulate biological processes in BC cells and play a number of roles in apoptosis and proliferation. Recent research has suggested that miRNA may function as a BC tumour marker for diagnostic and therapeutic reasons.

MiR-21, which is situated on 17q23.2 and possesses independent transcriptional units, has been linked to the emergence of stomach, lung, and colon cancers. The study did not, however, address the practical significance of this discovery in the diagnosis of BC. Additionally, the focus of earlier research was breast tissue, while our study's main topic, miR-21 serum levels, received little attention. Utilizing stem-loop real-time RT-PCR, which is based on SYBR-Green, miR-21 serum expression levels in BC patients were assessed, addressing the use of miR-21 as a diagnostic and monitoring marker in BC patients. In BC patients, the expression level of miR-21 was (3.39) times greater, which is statistically significant ($P = 0.001$). Additionally, miR-21's sensitivity and specificity for the diagnosis of BC were 87.6% and 87.3%, respectively. This performance stands out in contrast to the standard markers CEA and CA153, whose sensitivity was only 15.73% and 22.47%, respectively. Additionally, our study found no association between miR-21 serum expression and clinical stages or hormone receptor status (progesterone receptor and oestrogen receptor) and miR-21 expression. Other studies revealed similar outcomes.

As a result, the new serum marker miR-21 outperforms established serum markers like CEA and CA153 in terms of sensitivity, which can enhance BC prognosis by enabling early detection sensitivity. As a potential early stage BC blood tumour marker, miR-21 can be taken into consideration.