



# The Utility and Correlation of Tumor Marker CA125 with Breast Cancer in Iraqi Patients

Rifaat M. Rifaat, Mohammed I. Nader

Institute of Genetic Engineering and Biotechnology for Postgraduate Studies, University of Baghdad

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**Abstract:** The current research aimed to detect the correlation between Cancer Antigen 125 (CA125) and breast cancer as well as study the impact of the metastasis of breast cancer on the level of CA125 in patients. Blood samples were collected from sixty patients with breast cancer and forty volunteers' heaths as control from many hospitals in Baghdad/Iraq between the periods (October 2021 to August 2022). The volunteer's blood samples were collected and tested with Cancer antigen 15-3 (CA 15-3) to confirm the absence of breast cancer. The blood samples were collected from these patients, and the healthy control samples were separated by centrifuge to get the serum and the concentration was measured using the electrochemiluminescence immunoassay (ELC) technique. The result showed an increase in the level of CA-125 among the patient's group in comparison with a healthy control group, and it was also shown an increasing level of CA125 when compared between the metastatic and non-metastatic breast cancer, with a highly significant increase between them ( $p < 0.001$ ).

**Keywords:** Breast Cancer, Tumor marker, Cancer Antigen 125 (CA125).

**Corresponding author:** (Email: rifaat.mohammed.89@gmail.com).

## Introduction

Breast cancer is the most frequent malignancy in women and one of the leading causes of mortality in this population (1). Cancer begins in the breast cells; it usually begins in the epithelium of the breast ducts or lobules that supply milk to the ducts. The disease primarily affects women, but men might be affected as well (2).

The metastases of breast cancer known as breast cancer spread to an area farther from where it started to another part of the body. The area of spreading is a "metastasis," or use the plural of "metastases" if cancer has spread to more than one area. The disease is called metastatic breast cancer. Another name for metastatic breast cancer is "stage IV (4) breast cancer" if it has already spread beyond the breast and nearby lymph nodes at

the time of diagnosis of original cancer (3).

Cancer Antigen 125 (CA125), also known as Carbohydrate Antigen 125, is a mucinous glycoprotein with a high molecular weight. It is found on the surface of ovarian cancer cells. It has been crucial in the screening, diagnosis, and treatment of ovarian cancer. The antigen is then released and measured in serum samples from patients with ovarian cancer. In 50% of early-stage tumors, which are primarily type I ovarian cancers, and 92% of advanced-stage tumors, which primarily type II ovarian cancers, serum CA125 levels are increased (4,5).

Cancer Antigen 125 is one of the serological tests, which is carried out when suspecting ovarian neoplasm in a woman and is used in monitoring patients diagnosed with epithelial

ovarian cancers (6). And also High preoperative CA125 levels may reflect a good picture tumor and if are associated with an aggressive molecular subtype, suggesting that it can be used to predict poor outcomes and prognosis of breast cancer patients (7).

## Materials and methods

### Study design and subjects

This study included sixty Iraqi women with breast cancer who attended Al-Andalus hospital and the oncology teaching hospital/medicine city between December 2021 and March 2022, and whose ages ranged from 20 to >60 years. The relevant information regarding the patients, as well as the tumors' histological features, was gathered from the patient's files. All of the patients had been identified. These patients are in various stages of the disease.

### Blood sample collection

Venous blood was taken from the patient and healthy group by three milliliters (mL) All patients diagnosed with breast cancer these samples were placed in a Gel tube.

### Measurements CA15-3, Ca125 tumor marker

This marker was measured by using a kit according to Electrochemiluminescence immunoassay (ELC) (8), the principles of these tests are sandwich and the principle of a sandwich is as follows:

This principle is applied to high molecular weight antigens, like CA15-3 and CA125. The measurement is

directly proportional to the sample concentration.

Low signal = low concentration and high signal = high concentration. In the first stage, a serum is combined in an assay cup with a reagent comprising a biotinylated (CA15-3 and CA125) antibody and a ruthenium-labelled (CA125) antibody. Antibodies bind to the (CA15-3 and CA125) present in the sample during the nine-minute incubation step. The second stage involves the addition of streptavidin-coated paramagnetic microbeads. The biotinylated antibody binds to the streptavidin-coated surface of microbeads after nine minute incubation. Following a second incubation period, the reaction mixture containing the immune complexes is transferred to the measurement cell.

### Statistical analysis

Data analysis was done by utilizing IBM SPSS for Windows, version 26 (SPSS Inc. Chicago, Illinois, United States) (9).

## Results and discussion

### Cancer Antigen 125 compare between breast cancer patients and control

The results statistically showed statistically increased level of CA-125 among the patient's group ( $17.52 \pm 7.48$ U/ml) than a healthy control group ( $7.72 \pm 3.26$ U/ml) ( $p < 0.001$ ) Table (1), These result are agreed with (10) who summarized that significantly increased serum levels of CA125 in patients than healthy control.

Table (1): Biochemical markers in controls and patients with breast cancer

Markers	Healthy control (n=40)	Patients (n=60)	Normal Range	P value
CA 125 (units/ml)	$7.72 \pm 3.26$	$17.52 \pm 7.48$	<35.0 (unit/ml)	0.00

### The level of CA125 in metastasis and nonmetastatic breast cancer

As shown in Table 2, our results showed that the preoperative serum levels of CA125 were significant in

patients with metastatic breast cancer ( $P < 0.001$ ), and the samples were 14 metastatic samples ( $35.85 \pm 16.88$  U/ml) and 46 were nonmetastatic ( $10.57 \pm 4.65$  U/ml).

**Table (2): Cancer Antigen 125 levels about the metastasis of breast cancer patients.**

	Patients (n=60)	P value
	CA 125 (units/ml)	
Metastatic (n=14)	35.85± 16.88	0.00
Nonmetastatic (n=46)	10.57± 4.65	

The result agreed with the research represented by Gregory (11) that shows the patient with early diagnosis breast cancer which metastatic under a supraclavicular lymph node but no visceral or bone metastases has a high level of CA125 greater than 900 U/ml.

CA 125 is a tumor-associated antigen that is most commonly seen in advanced ovarian cancer. It is predominantly derived from coelomic epithelium, which explains elevations in benign conditions or other malignancies. Although CA 125 production has been demonstrated in the normal breast, it has been reported most often as a marker of pleural involvement with metastatic breast cancer.

It also approved with the research represented by Cheng (12) who summarized that the preoperative serum levels of CEA, CA125, and CA15-3

discriminated between patients with invasive breast cancer and breast benign diseases. High preoperative CA125 levels may reflect tumor burden and are associated with aggressive molecular subtypes, suggesting that it can be used to predict poor outcomes and prognosis of breast cancer patients.

### Cancer antigen 15-3 test

The CA15-3 test is one of the most essential tumor markers for breast cancer; it was performed on the entire healthy control group to ensure that they had no risk of getting breast cancer.

Measurement of CA15-3 may help determine whether symptoms are due to benign or malignant disease, so the result rate was 11.5 U/ml., and the test's normal range does not exceed 25 U/ml (Table 3) (13,14).

**Table (3): Cancer Antigen 15-3 levels in the control group**

Markers	Healthy control (n=40)	Normal Range
CA 15-3 (units/ml)	11.55 ± 7.0	<25.0 (unit/ml)

### Conclusion

Preoperative serum levels of CA125 were significantly higher in

patients with breast cancer than in control subjects. Moreover, metastatic cancer patients exhibited significantly

higher levels of CA125 compared with non-metastatic ones. Statistical analysis indicated that elevated CA125 levels were related to patients with metastasis.

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