

Scientific bibliography

THYMIDINE KINASE 1 IN BREAST CANCER



THYMIDINE KINASE 1

A VALUABLE BIOMARKER IN BREAST CANCER

This document presents a summary of 53 scientific publications that illustrate the importance of Thymidine Kinase 1 (TK1) as a biomarker in breast cancer. The application of the AroCell TK 210 ELISA has been successfully used and is described in several of these publications.

Thymidine Kinase 1 (TK1) is a key enzyme in DNA synthesis and its presence in cells is an indication of active DNA synthesis and cell growth. It is released into the extra-cellular fluid during incomplete or deranged cell division. Many studies have shown tissue and serum TK1 to be a biomarker for malignancies and increased cell turnover^{1,2}. Increased expression of TK1 may be an early event in the development of breast cancer and elevated tissue expression that can be detectable even at the pre-malignant stage and may be an indicator of more aggressive disease and resistance to therapy³.

Serum TK1 levels are elevated in women with breast cancer and when combined with other biomarkers, it may increase diagnostic accuracy. TK1 concentrations in a group of subjects with T2 stage breast cancer and metastases and nodal involvement were significantly higher than in a group of subjects with localized stage 2 disease³. Elevated serum TK1 levels at the time of diagnosis and failure to suppress it following therapy are associated with more progressive disease. High serum TK1 levels at baseline correlated to poorer progression free survival and overall survival even after adjusting for other prognostic factors⁵.

Successful neoadjuvant treatment is associated with an initial increase in serum TK1 after second treatment cycle followed by a fall. When changes in serum TK1 levels are related to tumor volume, a "Cell Loss Metric" (CLM) is derived which is predictive of obtaining a pathological complete response (pCR). 48% of women with the highest CLM response showed pCR, compared with only 11% of those in the lowest two quartiles⁶. High serum TK1 levels 3-6 months after surgery correlated with clinical stage, tumor size, occurrence of metastasis and poorer survival. The hazard risk for the development of metastatic disease and mortality among breast cancer patients was 11/12 times higher in patients with high compared to those with low serum TK1 values⁷.

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