
MONITORING THE EFFICACY OF ADJUVANT THERAPY IN BREAST CANCER BY QUANTIFYING CIRCULATING TUMOR CELLS USING THE MAINTRAC ANALYSIS (LASER SCANNING CYTOMETRY OF MAGNETIC BEAD ENRICHED CELLS)

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Aim: Until now, there has been no method available to directly monitor the success of adjuvant chemotherapy in early stage breast cancer. We describe here a method that allows direct quantitative determination of circulating tumor cells in blood and bone marrow during adjuvant chemotherapy. The white blood cells and the tumor cells from whole blood were incubated with HEA-coated magnetic beads and FITC- conjugated HEA-antibody (Miltenyi). The cells were run over a magnetic column attached to a strong magnet. Labelled cells were retained and most squeezed out and measured in a laser scanning cytometer (Compucyte). Positive events could be rescreened for intactness of the cells and specificity of staining. We established the sensitivity of the MAINTRAC approach by spiking tumor cells into normal peripheral blood to be 1 cell in 108 normal leukocytes, with a recovery rate of 90% with the possibility to retrieve every positive event and a good correlation between expected and obtained values ($R^2 = 0.98$) in a model system. We have now analysed more than 300 breast cancer patients, 50 of which were monitored twice or more during the course of adjuvant chemotherapy. Changing numbers of cells during different chemotherapy regimen are shown. Correlation to two prognostic factors (Ki 67 and PAI1 in stroma) is emerging.

Conclusion: Combining automated immunofluorimetry with visual evaluation of the relevant events enables detection and quantitative evaluation of circulating suspicious cells in breast cancer. This allows for the first time monitoring of tumor cells, during adjuvant therapy, in early stage cancers, in a timely fashion and thus real time monitoring of the efficacy of chemotherapy.

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