The aim of the present study was to investigate DNA damage in peripheral blood lymphocytes of breast cancer (BC) patients before and after administration of chemotherapy. We analyzed the frequency of sister chromatid exchange (SCE), occurrence of micronuclei (MN), and lymphocyte proliferation rate index (PRI) as cytogenetic markers in 28 female BC patients before and after chemotherapy, and in 20 age-matched healthy female volunteers. Prior to treatment, BC patients showed significantly increased background levels of SCE and MN, and lowered PRIs compared to healthy women. In comparison with pre-treatment levels, SCE and MN frequencies were significantly elevated and PRI reduced in blood samples collected after chemotherapy. Our findings indicate that SCE, MN, and PRI may serve as sensitive biomarkers for routine detection of the genetic abnormalities that may occur following administration of antineoplastic drugs in the clinical setting, as well as for the monitoring of high-risk patients receiving chemotherapy for BC.