

AbstractID: 5881 Title: Reduction of total body exposure in breast radiotherapy using breast IMRT or virtual wedge - Importance in the prevention of the leukemia in combined chemo-radiation regimens for breast cancer.

Purpose: The reported risk of leukemia following adjuvant radiotherapy for breast cancer has been reported to be low. However, two recent publications demonstrated that patients receiving combined high-dose anthracycline chemotherapy and breast radiation as part of their adjuvant treatment have a significant increased rate of secondary leukemia above 1.3%. Radiation was found to be an independent factor for the development of leukemia by a factor 2.38. This study aimed at evaluating the total body radiation exposure during breast radiotherapy and to characterize the factors associated with an increased exposure and more particularly the method of compensation technique.

Patients and Methods: In a prospective cohort of 120 women, radiation measurements were taken at the time of adjuvant breast radiotherapy using TLD's placed on the contralateral breast, on the anterior abdomen, on the back, and on the contralateral ankle. Multiple regression analysis was performed to analyze patient and treatment factors associated with the amount of scatter radiation exposure.

Results: For standard 50Gy breast radiotherapy, the minimal dose received by abdominal organs is on average 0.45Gy, ranging from 0.06 to 1.55Gy. The use of physical wedges as a compensation technique was the most significant factor associated with increased scattered dose ($p < 0.001$), resulting in approximately three times more exposure compared to breast IMRT and dynamic wedge.

Conclusions: The amount of radiation that is scattered to a patient's body is of a magnitude that has been observed to be associated with excess of leukemia in previous studies. In accordance with the As Low As Reasonably Achievable (ALARA) principle we recommend using only breast IMRT or virtual wedging instead of physical wedging for the radiotherapy of breast cancer patients receiving also high-dose anthracycline chemotherapy.