Individual radiosensitivity measured with lymphocytes may predict the risk of acute reaction after radiotherapy.

Abstract:

PURPOSE: We tested whether the chromosomal radiosensitivity of in vitro irradiated lymphocytes could be used to predict the risk of acute reactions after radiotherapy.

METHODS AND MATERIALS: Two prospective studies were performed: study A with 51 patients included different tumor sites and study B included 87 breast cancer patients. Acute reaction was assessed using the Radiation Therapy Oncology Group score. In both studies, patients were treated with curative radiotherapy, and the mean tumor dose applied was 55 Gy (40-65) +/- boost with 11 Gy (6-31) in study A and 50.4 Gy +/- boost with 10 Gy in study B. Individual radiosensitivity was determined with lymphocytes irradiated in vitro with X-ray doses of either 3 or 6 Gy and scoring the number of chromosomal deletions.

RESULTS: Acute reactions displayed a typical spectrum with 57% in study A and 53% in study B showing an acute reaction of Grade 2-3. Individual radiosensitivity in both studies was characterized by a substantial variation and the fraction of patients with Grade 2-3 reaction was found to increase with increasing individual radiosensitivity measured at 6 Gy (study A, p = 0.238; study B, p = 0.023). For study B, this fraction increased with breast volume, and the impact of individual radiosensitivity on acute reaction was especially pronounced (p = 0.00025) for lower
breast volume. No such clear association with acute reaction was observed when individual radiosensitivity was assessed at 3 Gy. CONCLUSION: Individual radiosensitivity determined at 6 Gy seems to be a good predictor for risk of acute effects after curative radiotherapy.