

INTRINSIC RADIOSENSITIVITY OF HEALTHY DONORS AND CANCER PATIENTS AS DETERMINED BY THE LYMPHOCYTE MICRONUCLEUS ASSAY

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Purpose

The purpose of the study was to evaluate the usefulness of the cytokines-block micronucleus (MN) assay in assessment of radiosensitivity of lymphocytes in cancer patients.

Material and Method

Lymphocytes from 16 cervical cancer patients, 23 head & neck (H&N) cancer patients, 7 lung cancer patients and 20 healthy donors were analysed using micronucleus assay. Blood samples from the patients were taken before radiotherapy. Lymphocytes were irradiated *in vitro* with ⁶⁰Co gamma rays in doses 1, 2, 3 and 4 Gy. The proportion of binucleated cell (BC) and the micronuclei (MN) frequency in BC only were counted.

Results

The proportion of BC in cancer patients ranged from 20 to 55% and was similar in the control group. MN frequency assessed 5 times over 6 months in 4 healthy donors showed that the inter-individual variation was significantly higher than intra-individual. Before (0 Gy) and after irradiation (1-4 Gy) no statistical differences in the mean number of MN/BC were

observed between healthy donors and cancer patients group, however the highest values were found in lung cancer patients. Nevertheless, statistical cluster analysis allowed to divide each group of donors into radioresistans and radiosensitive subgroups of patients. They showed significantly different ($p < 0.05$) dose-response relationship. Separate comparison of the mean MN frequency within all examined radioresistant and radiosensitive subgroups, showed statistically significant differences only after a dose of 4 Gy. At this dose, the lung cancer patients from radioresistant subgroups presented significantly lower radioresistance ($p < 0.05$) than the other subgroups, that is control, cervical and H&N cancer patients groups. Within radiosensitive subgroups, lung cancer patients as well as cervical cancer patients show significantly ($p < 0.05$) higher MN frequency in comparison to control and H&N cancer patients.

Conclusion

This work has shown that the MN assay performed on lymphocytes can show differences in the intrinsic radiosensitivity of cancer patients and healthy donors.

DOSIMETRY FOR LINAC WITH MULTILEAF COLLIMATOR

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Our work shows measurements of depth dose function and beam profiles dependence on field's contour and size shaped by the multileaf collimator.

All measurements were done for linear accelerator Clinac 2300 - Varian. Such obtained values were compared with analogical ones for

square fields. Dose distributions across the beam for multileaf collimator and for individual blocks were analyzed.

Work load needed for clinical dosimetry of multileaf collimator was estimated. Proposals for measurement protocol in clinical dosimetry is shown.