DNA PLOIDY AND TUMOUR CELL KINETICS AS PROGNOSTIC FACTORS IN RADIOTHERAPY OF CERVICAL CARCINOMA AND MALIGNANT GLIOMAS

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Introduction

There is increasing evidence that in a variety of malignancies proliferative rate and DNA ploidy are prognostic factors in respect to patients survival. Therefore the study was carried out in order to find if the biologic tumour parameters are predictive factors in patient's survival after radiotherapy (RT).

Material

The proliferative potential and DNA ploidy of 260 squamous cell carcinoma of the cervix (SCC) and 62 gliomas were studied before treatment. Tumour cell proliferation was performed on basis of bromodeoxyuridine labelling index (percentage of labelled S-phase cells, BrdUrdLI), S-phase fraction (SPF), Proliferating index (PI; number of cells in S + G2/M), and predictive potential doubling time the tumour cells (Tpot).

Method

Tumour samples from biopsy were incubated in vitro with BrdUrd for one hour at 37^0C using a high preasure oxygen method. After fixation and staining they were analysed with flow cytometer.

Results

The difference in the proliferation rate between SCC of the cervix and gliomas was found. The best parameters in assessment of the proliferation proved to be: BrdUrdLI and Tpot. A higher mean BrdUrdLI (10.3%) was shown for cervical tumours than for low-grade gliomas (1.4%). Also shorter mean Tpot of 7.2 days was found in cervical cancers, than in gliomas, Tpot of 43.3 days. The high-grade gliomas presented higher percentage of aneuploidy (70%) than cervical cancers (56%).

Cox multivariate analysis showed that fast proliferating cervical cancers (LI>10.3% or Tpot <5.6 days) responded better to RT than low proliferating tumours (the median survival time 60 vs 16). However, radiotherapy treated patients with faster proliferating gliomas (LI>1.5%, Tpot<30 days) had lower probability of survival than those with lower proliferative potential (the median survival time 13 vs 31 months). DNA ploidy was not a significant predictor for patient's survival in radiotherapy of cervical SCC and glioma.

Conclusions

In order to improve the therapy results, BrdUrdLI or Tpot can be used to select a group of patients with fast proliferating gliomas for whom the accelerated RT schedule should be applied, and a group of patients with low proliferating cervical tumours to whom alternative treatment strategy as neoadjuvant chemotherapy is suggested.

PRINCIPLES OF TOTAL BODY IRRADIATION

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Total body irradiation delivered prior to bone marrow transplantation remains an important component of the conditioning regimen. Proper engraftment of autologous or allogeneic bone marrow is possible because of the multifarious effects of high doses of ionizing radiation on tumor cells and the host immune system.

We will broadly outline the techniques used to deliver total body irradiation, and the effects of ionizing radiation on normal and tumor cells from a biological and molecular point of view. Finally we will report the results of randomized clinical trials that have been conducted in our institution during the last ten years.