The response to treatment was about 20% higher in the clinical trial group. The 20% difference between the outcomes in the prospective and retrospective studies recorded in the response to treatment was similar in the 1, 2, and 3 years local control observations.

62.
THE RADIOTHERAPY OF IMRT

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Intensity Modulated Radiotherapy (IMRT) is going to revolutionise treatment planning and delivery of radiotherapy in the next few years. Although there are still technological constraints, IMRT allows delivery of a specified dose-distribution that is superior to what is realistically achievable with 3D conformal radiotherapy using standard techniques. This forces a re-think of the whole process of delivering radiotherapy. With our current technology, the physics has overtaken the biology and it appears that to realise the full potential of IMRT, a major research effort on the biological aspects of radiotherapy is needed. This goes far beyond traditional cellular radiobiology. New powerful assays in molecular biology and bioimaging will be key elements in the biological optimisation of radiotherapy. In this lecture, I will try to identify some of the research areas that will need to be further developed in order to get the full therapeutic benefit from IMRT.

63.
STEREOTACTIC RADIOTHERAPY FOR PRIMARY AND RECURRENT BRAIN TUMORS. A NEW METHOD FOR IMPROVEMENT OF THE TREATMENT RESULTS?

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To evaluate the effectiveness of the stereotactic radiosurgery (SRS) and stereotactic fractionated radiotherapy in the primary, recurrent and metastatic brain tumors.

To present potential usefulness of stereotactic boost in anaplastic astrocytomas (AA) and glioblastoma multiforme (GBM).

Between March 2000 and December 2000, SRS was applied in 23 patients (pts) with brain tumors (metastatic tumors – 9 pts, recurrent tumors – 7 pts, primary meningiomas – 4 pts, vascular malformations – 3 pts).

Fractionated stereotactic radiotherapy was applied in 6 pts (recurrent anaplastic gliomas – 2 pts, recurrent medulloblastoma – 1 pt, acustic neurinoma – 1 pt, meningioma – 1, pituitary adenoma - 1).

Detailed technique of treatment planning is presented and discussed. The planning target volume (PTV) and organs at risk (OAR) were assessed comparing dose statistics, dose volume histograms and RTOG stereotactic radiosurgery criteria.

Recommendations regarding the total dose level and fractional dose are proposed.
The treatment tolerance and preliminary results are presented.

The own protocol of stereotactic boost to residual tumor using SRS after initial conformal radiotherapy in patients with AA and GBM is presented and discussed.

64.
STATE OF MONTE CARLO CALCULATIONS IN RADIATION TREATMENT PLANNING

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Monte Carlo (MC) particle transport simulations are increasingly applied in treatment planning methods. This has become feasible through a number of adaptations of general MC codes, such as EGS4 or ETRAN, to the specific needs of treatment planning. The currently most advanced "conventional" planning methods, such as convolution or delta-volume algorithms still have serious limitations in terms of accuracy when tissue inhomogeneities, small and complex body shapes or high-density implants are involved. The Monte Carlo simulation mimics individual particle transport, in any applicable geometry, by applying first principles of radiation interaction with matter and random choice of collision parameters such as step length, type of interaction, energies and scattering angles. In principle, the accuracy of MC calculations is only limited the radiation beam quality definition and the interaction parameters and can be taken to below l2%. In

practice, a very large number of particle "histories" have to be simulated to attain sufficient statistical accuracy, and various approximations (e. g. condensed history, variance reduction) have been introduced in the process of adaptation of MC codes to the special needs of treatment planning. Such codes have become known as V(oxel)MC and X(ray)VMC, M(acro)MC, S(uper)MC, MCPAT(ient...). These will be described in detail and performance characteristics as well as treatment planning examples given. While the general-purpose MC codes result in computing times per case of the order of several hours, the special treatment planning codes reduce this time to around an hour or even much less on modern workstations or Pentium-based PCs.

65.
PHYSICAL AND CLINICAL DOSIMETRY BY MEANS OF MONTE CARLO USING A PROCESS DISTRIBUTION TOOL

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The choice of the most appropriate strategy in a Radiotherapy treatment is mainly based on the use of a planning system. With the introduction of new techniques (conformal and/or small fields, asymmetrical and non coplanar beams, true 3D calculations, IMRT) the trustworthiness of the algorithms is being questioned. An alternative verification procedure is every time more necessary to warranty a treatment delivery. The reliability of Monte Carlo is generally accepted. However, its clinical use has not been operative due to the high CPU times needed. During the last few years our objective has been focussed to reduce this time by means of new process distribution techniques. This drop has made it feasible, not only the physical dosimetry under special conditions, but also a numerous variety of clinical cases: photon and electron conformal fields, Radiosurgery and IMRT. The carried out procedure is presented. Furthermore, experimental dosimetry data as well as conventional TPS calculations are compared with Monte Carlo simulations.

66.
LATE EFFECTS OF CNS PROPHYLACTIC IRRADIATION IN CHILDHOOD DUE TO LLA USING MAGNETIC RESONANCE SPECTROSKOPY. (PRELIMINARY REPORT)

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Purpose: The aim of this study was to evaluate changes in magnetic resonance imaging (MRI) and magnetic resonance spectroscopy (MRS) of the brain in survivars with Acute Lymphoblastic Leukemia to assess neurotixicity follow profilactic brain irradiation.

Methods: Ten from 100 patients with LLA treated in Department of Pediatric Hematology from 1990 to 1995 and irradiated in Centre of Oncology were icluded in MRI and MRS studies. The study group included 6 male and 4 female. All patients had been irradiated for brain using fraction dose of 1,8 Gy up to total dose of 18 Gy and had recived MTX based chemotherapy in doses depending on level of risk. Two of them were included in low risk and eight in intermediate risk.

Results: MRI of brain was abnormal in 5 cases. There were mild white matter changes. The changes were Been in H- MRS metabolite ratios. In one of these cases we observed a impair of verbal functions.

Conclusions: The MRS could be valuable method to access brain tissue metabolism after radiotherapy. That noninvasive method may be recomended for children with LLA to observe neurotoxicity of profilactic irradiation.

67.
RADICAL RADIOTHERAPY OF MUSCLE-INVADING BLADDER CANCER (BC): A RETROSPECTIVE ANALYSIS OF 49 PATIENTS

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Growing interest in the use of combined modality approaches for bladder-sparing procedures force radiation oncologists to optimise methods of radical radiotherapy. Since