

Initial results: Doses measured by TLD were on average by 4% lower than doses pre-calculated using the modified algorithm. Mean doses normalized to those pre-calculated and their standard deviations (both in per cents) were respectively: 96.1% and 0.4 % for phantom with diameter of 20; 96.5% and 0.7% for diameter of 30 cm and 96.0% and 0.8% for diameter of 40 cm.

Conclusions: Measured doses proved correctness of elaborated algorithm. Very low standard deviations are resulting from regular cylindrical shape of the phantoms.

60.

FACTORS DETERMINING LOCAL CONTROL IN PATIENTS (Pts) WITH LOCALLY ADVANCED BREAST CANCER (Labc) MANAGED WITH RADIOTHERAPY (Rt) AS THE PRIMARY LOCOREGIONAL TREATMENT

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Introduction: RT plays an important role in the management of LABC, yet clinical outcomes still remain far from satisfactory. The aim of this study was to evaluate retrospectively factors determining local control in a large series of consecutive LABC pts managed with RT as the primary locoregional treatment.

Material and methods: The records of 261 primarily inoperable LABC pts treated between 1991 and 1997 at two institutions: Medical University of Gdansk, Poland and Velindre NHS Trust, Cardiff, UK were analysed. All pts received megavoltage RT to the breast with two tangential fields, and the adjacent lymph node areas were irradiated using customised fields. Due to a large scale of RT doses and fractionation schedules, normalised total dose (NTD) was calculated for all patients using a linear quadratic model. In 241 pts RT constituted the only local treatment and the remaining 20 pts were subsequently subjected to mastectomy. Most pts received chemotherapy and/or endocrine therapy prior or after RT.

Results: Within the median follow-up of 37 months, locoregional recurrence occurred in 95 of 251 evaluable pts (38%). Three-year and five-year locoregional-free survival rates were 59%

and 48%, respectively. At multivariate analysis of variables predicting the risk of locoregional relapse, inflammatory carcinoma ($p < 0.01$; RR 2.1), T4 disease ($p < 0.01$; RR 2.9) and involvement of supraclavicular lymph nodes ($p < 0.01$; RR 2.4) were the most significant clinical factors, whereas response to RT ($p < 0.01$; RR 1.2) and NTD ($p < 0.01$; RR 0.7) were the most important therapeutic factors. Increasing the total dose to the tumour by 10 Gy was associated with 30% reduction of local relapse.

Conclusions: Due to large heterogeneity of LABC pts, judicious tailoring of RT, particularly in terms of dose prescribing, is essential to increase the chance of locoregional cure.

61.

THE OUTCOMES OF THE CONVENTIONALLY FRACTIONATED RADIOTHERAPY IN THE PROSPECTIVE AND RETROSPECTIVE STUDIES. IS THE MEANING OF CONVENTIONALITY THE SAME?

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Aim: to discuss some problems of the "conventionality" in the prospective and retrospective studies finished last year at the RT Department in Warsaw. The phase III clinical trial. The study was conducted according to the evidence based rules. Cancer of the larynx - glottis and supraglottis T1 - T3 N0 M0 WHO 0 - 1, 395 cases 196 in experimental, 199 in conventional arm. The retrospective study concerned all patients with the cancer of larynx treated radically in the II department in years 1989 to May 1995. 372 patients T1- T4, N1-N3, M0. The prospective material 150 patients were selected [age 75 and less, WHO 0-1, T1-T3, N0, M0] employing the same selection criteria as in the prospective study. The comparison was performed with the conventional arm of the clinical trial [199 cases].

Results of the study: Significant differences were recorded in the: ? performance status and in the number of T1 and T3 cases, ? compliance to protocol in the total dose and the overall treatment time, ? response to treatment in the whole group and in the particular stages These results indicate the very demanding selection of cases and much more rigorous compliance with the therapeutic protocol in the prospective study.

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, acoustic 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 12%. In