

	Bladder	Prostate	Rectum	Femoral Heads	Pelvic bones	Contours
Manual	5m 20s	5m 38s	5m 37s	9m 5s	52m 36s	47m 50s
Computer	2m 40s	6m 1s	6m 52s	6m 14s	28 s	1m 12s

Computer segmentation algorithms can considerably reduce the time taken to define pelvic anatomy relevant to radiotherapy treatment planning, thereby increasing the productivity of the planner. They are best applied to those structures which have strong edges and are less well suited to definition of the prostate (poor edge contrast) and rectum (gas filled lumen). More sophisticated algorithms are required if further time savings are to be realised.

171 POSTER COMPENSATORY HYPERTROPHY OF THE CIRRHOTIC LIVER WITH HEPATOMA AFTER PROTON BEAM RADIOTHERAPY

K. Ohara, T. Okumura, H. Tsuji, H. Tatsuzaki, MyoMin, Y. Imai, Y. Akine, H. Tsuji

Section of Radiation Oncology, University of Tsukuba, Tsukuba City, Japan
Background/Aims: The liver has a tremendous ability to hypertrophy in compensation for acute parenchymal loss by surgical hepatectomy and possibly by radiotherapy. This ability, however, is impaired in the cirrhotic liver and therefore major hepatectomy is even precluded from a treatment of choice for hepatoma. Radiotherapy can be an alternative treatment of hepatoma and the ability to hypertrophy will be a major determinant of radiation tolerance. The aim of this study is to determine the ability of the cirrhotic liver to hypertrophy following radiotherapy.
Materials and Methods: Thirty-two series of CT scans of hepatoma patients with cirrhotic livers were used. These tumors were treated by proton beam radiotherapy of doses ranged from 72 to 84 Gy +/- chemoembolization therapy. The tumors were selectively irradiated leaving most part of the non-tumorous liver intact. A minimum follow-up period was 12 months after initiation of radiotherapy. The total liver volume and the treated liver volume (recognized as an area of altered density after radiotherapy) were measured to examine a change of liver volume.
Results: The total liver volume decreased mostly over half a year after radiotherapy and then tended to increase moderately. The treated liver volume continued to decrease even 12 months after radiotherapy. This change of both liver volume was smaller in more severely cirrhotic livers.
Conclusions: The cirrhotic liver certainly hypertrophies in response to radiotherapy, although it occurs rather moderately and slowly.

172 POSTER CANCER IN THE ELDERLY: ANALYSIS OF 2061 PATIENTS AGED 70 AND OVER REFERRED TO RADIOTHERAPY CENTERS IN ITALY IN 1994

P. Olmi¹, G. Ausili-Cefaro²

¹Radiotherapy Department, University of Florence

²Radiotherapy Department, Catholic University of Sacro Cuore, Rome, Italy
The incidence rate of tumors increases with aging. Radiotherapy represents the most widely used oncologic therapeutic tool in the aged patients due to its lower toxicity. In 1993 a cooperative research group (GROG: Geriatric Radiation Oncology Group) was founded with the principal objective to deepen the topic of Radiotherapy for aged patients ill with cancer. Thirty-seven Italian Radiotherapy Centers joined in the initiative and participated in a study run in 1994 that collected data concerning patients referred to Radiotherapy Centers. In particular, epidemiologic data, tumor data (site, histology and stage) and radiotherapy treatment data (site, dose and fractionation) were analysed. Data concerning 2061 patients aged 70 and over were analysed, with the following characteristics: Age: min. 70, max 103, mean 72.5; Gender: M 1138, F 923, ratio 1/1.2; P.S. (according to ECOG) min. 0, max 4, mean 1.4. The most frequently irradiated sites were the following: breast (265), lung (227), sigmoid colon and rectum (118), prostate (103), bladder (88), skin (137). Diagnosis was incidental in 247 patients and on symptoms in 1764; in 651 out of 1764 diagnosis was considered early, 1092 neoplasms were not metastatic at presentation, while 604 cases showed distant metastases (365 of these 604 neoplasm were not staged). Radiotherapy was performed in 1810 patients. The remaining 251 patients did not undergo radiotherapy because of disease extent (66), bad general conditions (34), patient refusal (38). In 1235 cases a conventional fractionation of the dose (1.8-2 Gy) was used, while nonconventional fractionation schedules were used in 526 patients. In 49 cases the datum was not available. Treatment-related toxicities concerning different organs were recorded.

The second part of the form made it possible to collect data about social conditions, education, concomitant disease, and daily life activities.

173 POSTER SYMPTOMATIC BENEFIT OF PALLIATIVE RADIOTHERAPY FOR PATIENT WITH ADVANCED NON-SMALL CELL LUNG CANCER

M. Zemanová¹, L. Petruželka¹, P. Zatloukal²

¹Department of Oncology, Medical Faculty, Charles University, Unemocnice 2, 128 08 Prague 2

²Department of Pneumology, Medical Faculty, Charles University, Kateřinská 19, 128 08 Prague 2

The efficacy of palliative radiotherapy of NSCLC was evaluated.

Seventy patients with histologically and cytologically confirmed advanced NSCLC were palliatively irradiated in the Department of Oncology I Medical Faculty, Charles University, Prague, in the period 1/93-12/94. Forty-six patients were evaluable for response (32 men, 14 women, median age 66.1, range 46-82). Median survival was 24.5 weeks. The most frequent intrathoracic symptoms were: cough 54%, chest pain 41%, dyspnoea 54%, hemoptysis 13%, VCS sy 7%. Palliation of the main symptoms have been achieved in 68% for cough, in 83% for hemoptysis, in 89% for chest pain, in 60% for dyspnoea and in 100% for VCS sy (in combination with chemotherapy). The median duration of palliation was 14.7 weeks for all the main symptoms.

Two fractionations schedules for the chest radiotherapy were used: 30 Gy/10 fr/2 wks (67%) or short regimens 8-20 Gy/1-2 fr/1-2wks (33%). The results of palliation and survival are similar for both treatment schedules. Side effects have been infrequent, only 6 patients (13%) had dysphagia during the treatment. Radiation myelopathy has been not observed in any case.

174 POSTER THE ROLE OF RADIATION THERAPY IN THE TREATMENT OF TYMPANO-JUGULAR CHEMODECTOMAS

J.Y. Pierga, B. Dessard-Diana, Ph. Ronchin, C. Diana, J.J. Mazon, F. Baillet

Centre des Tumeurs, Hôpital Pitié-Salpêtrière, Paris, France

Tympano-jugular chemodectomas although rarely malignant present a functional risk because of their possible involvement with the cranial nerves. For a long time surgery has been the standard treatment. Radiation therapy was used only when surgery had failed or presented too high a risk. From 1979 to 1992 we treated 30 patients with radiotherapy (RT): women: 75%. Eighty percent of chemodectomas were extensive (Fish stage C and D). Four patients had a recurrence after surgery. In 10 cases radiotherapy was delivered after exploratory or partial surgery. A dose of 45 Gy was given, for 5 weeks (5 x 1.8 Gy/week) to the tumor bed except for the first eight patients who were treated with a dose of 55 Gy-60 Gy and for one patient who received 75 Gy for a malignant chemodectoma. With a follow-up of 3 to 16 years only one patient suffered a tumor progression after the RT. Clinical symptoms decreased in 80% of the patients and were stabilized in 15% of the patients. After RT, radiological signs decreased in 50% of the patients. A moderate dose of 45 Gy (25 fractions/5 weeks) stopped tumor growth in 95% of the patients without damage. It is therefore not necessary to deliver a higher dose of RT. When there is a risk of neurological damage RT should be prescribed in preference to a surgery.

175 POSTER LATE TOXICITY OF RADIOTHERAPY IN ELDERLY PATIENTS WITH HEAD AND NECK CANCER

T. Pignon, P. Scalliet, M. VanGlabbeke, H. Bartelink

EORTC Data Center 1200 Brussels, Belgium

Information about late toxicity of radiotherapy (RT) in the elderly is rare. Yet late effects are irreversible and must be evaluated also in this range of age. We studied 1588 patients (pts) with head and neck cancers enrolled in EORTC trials and receiving RT. Late toxicities were examined uniquely if they occurred before an eventual tumor failure in order to avoid confusion between effects of first and second line treatments. Thus, we evaluated the probability of occurrence of toxicity in function of time with Kaplan-Meier method. Logrank test was used to compare toxicity in each age range from 50 years to 75 years and more. In such conditions, 751 pts were available for analysis of which 645 had late toxicity grade ≥ 1 for a total of 981. The mean time of occurrence of late toxicity was 2.2 years and was not statistically different in all age

groups. The logrank test showed a significant difference between ages ($\chi^2 = 21.023$, 6 df, $P = 0.002$) but the logrank test for linear trend was not significant ($\chi^2 = 0.242$, 1 df, $P = 0.62$). In conclusion, it is clear that in this study late toxicity occurrence was not related to age.

176 POSTER
QUALITY ASSURANCE USING PORTAL IMAGING: THE ACCURACY OF PATIENT POSITIONING IN IRRADIATION OF BREAST CANCER

O. Pradier, H. Bouscayrol

Klinik für Strahlentherapie Göttingen, Germany

CHU de Poitiers, France

Purpose: To study the accuracy of patient positioning in irradiation of breast cancer.

Methods and Materials: In 31 women with breast cancer portal images were obtained using a fast electronic megavoltage radiotherapy imaging system. Quantitative analysis of 508 megavolt portal images and comparison with 31 digitized simulation films were performed.

Results: Concerning patient positioning in the field, mean standard deviations of the difference between simulation and treatment images were in mm 3.03 for the central lung distance, 3.09 at +4 cm, 3.29 for the central irradiated width, 3.05 for the central beam edge to skin distance, 4.11 for the craniocaudal distance. Maximal variations of standard deviations were respectively 1.72–5.97; 1.92–4.78; 1.20–5.99; 1.06–5.11; 0.98–6.09.

Conclusion: The tangential breast treatment set-up is very stable and reproducible. The Electronic Portal Imaging Device appears to be an adequate tool to study the accuracy of treatment set-ups with this method.

177 POSTER
THE ACCURACY OF PATIENT POSITIONING IN IRRADIATION OF RECTUM CANCER

O. Pradier, H. Bouscayrol

Klinik für Strahlentherapie Göttingen, Germany

CHU de Poitiers, France

Purpose: Evaluation of correct positioning using an ionisation chamber on-line portal imaging system in routine clinical radiotherapy of rectum cancer.

Methods and Materials: In 13 patients with pelvic irradiation, portal images were obtained using a fast electronic megavoltage radiotherapy imaging system. A total of 208 portal images and 13 simulator films were used to determine the values of setup deviations in the X-Y-directions and the rotation of fields in a fixed coordinate system, and the accuracy of the manually positioned blocks.

Results: Mean standard deviations of the difference between simulation and treatment images were in mm: 7.33 and 7.13 for X and Y, 3.55 for the rotation fault, and 4.55 for the position of blocks. Maximal variations of standard deviations were respectively 2.29–11.91; 2.39–7.83; 1.84–7.07; 1.17–10.09.

Conclusion: The errors of field positions summed up to a mean of up to 11.91 mm in one patient. Maximal errors counted in single fields up to 30 mm. The mean error of manual block positioning was not acceptable. Thus, mechanically fixed blocks are now used after obtaining the results of this study. A daily control should be considered for difficult patients.

178 POSTER
CONCURRENT RADIATION THERAPY AND CHEMOTHERAPY (CARBOPLATIN/5-FLUOROURACIL) IN ADVANCED CANCER OF THE UTERINE CERVIX

E. Pras¹, P.H.B. Willemse², H. Boonstra³, M.A.A.M. Heester¹, E.G.E. de Vries²

¹Departments of Radiotherapy, ²Med. Oncology, and ³Gynecol. Oncology, University Hospital Groningen, The Netherlands

Aim: Combining RT and CT aiming at a better local control and disease free survival.

Materials and Methods: From April 1989 till January 1994, 74 patients (pts), with bulky stage IB and/or IIA (12), IIA/B (44) and IIIA/B (18) cervical cancer were treated with external radiation therapy (45 Gy in 1.8 Gy fractions) followed by 2 × 17.5 Gy brachytherapy or 25 Gy external boost. This was combined with 3 cycles of Carboplatin 300 mg/m² i.v. day 1 and 5-FU 600 mg/m² over 24 hrs day 2–5, q 28 days. Six weeks after treatment additional hysterectomy was performed when feasible, otherwise multiple biopsies were taken. Histology: 60 pts squamous,

3 adenosquamous, 5 small-cell squamous, 2 small-cell neuroendocrine and 4 adenocarcinoma.

Results: The median follow-up is 48 months (range 16–67 months). Seventy-three pts are evaluable. In 43 pts a hysterectomy was feasible: 28 showed pCR and 25/28 are NED; 1 died of complications and 2 pts of metastasis. In 15/43 pts tumor cells were found: 4 died of metastasis and 11 are NED. In 29 pts only biopsies were taken: 6 showed tumor cells and 5/6 died; in 23/29 there was pCR with 14 pts NED, 5 pts died of local ± distant disease and 4 pts of distant disease. In 1 patient no histology is available: she died of distant disease. Twenty-two out of 73 pts relapsed: 11 locally (3 distant also) and 11 distant only. So the local control is 85%. All local relapses occurred <1 yr. The overall survival at 4 yrs is 68% (st IB-IIA 75%; st IIB 75%; st III 47%). All 74 pts completed therapy. Leucopenia gr.I (WHO) occurred in 18, gr.II in 34, gr.III in 20 and gr.IV in 2 pts. Thrombocytopenia gr.I occurred in 58, gr.II in 12, gr.III in 1 and gr.IV in 2 pts. No bleeding or leucopenic fever occurred. G.I. toxicity was mild. Severe late toxicity is similar as with radiation therapy alone. These good results on local control and survival are now the basis for a randomized study we started.

179 POSTER
PREVENTION OF ORAL MUCOSITIS IN HEAD AND NECK RADIATION THERAPY

J. Ferre¹, A. Rovinsky², M. Bondia¹, F. Ferrer², A. Biete²

¹Oral medicine Unit, School of dentistry, University of Barcelona

²Radiation Oncology Department, Hospital Clinic Universitari, Barcelona, Spain

The purpose is to evaluate the effectiveness of a protocol to prevent oral mucositis, an usual complication of head and neck radiotherapy. This protocol consists of a previous oral cavity examination, mouth hygienization, infectious focuses removal and administration of chlorhexidine, sucralfate and benzydamine mouthwashes. A retrospective study was made on 45 patients that received radiotherapy, 19 of them started without prevention and the others 26 were controlled since the beginning. Mucositis level was evaluated every week following the OMS criteria. U-Mann-Whitney test was used to compare the two groups. Statistical significant differences were found between both ($P = 0.0001$). Median value mucositis in the prevention protocol (PPG) and no prevention protocol groups were 0 and 1 respectively. The differences were more important between the 3th and 5th weeks. Tolerance treatment was better in PPG.

180 POSTER
SIMULATION BY A DIAGNOSIS CT IN THE VOCAL CORD CARCINOMA. PRELIMINARY RESULTS IN TEN PATIENTS

A. Rovinsky, J. Berenguer¹, F. Ferrer, J. Casals, A. Sánchez-Reyes, C. Arias, B. Farrús, J. Traserra

Radiation Oncology Department

¹Radiology Department and Head and Neck Surgery Department, Hospital Clinic i Universitari de Barcelona, Spain

To optimize the radiotherapy of the vocal cord carcinoma we started their simulation by a diagnosis CT. Since June 1994 to February 1995 ten patients were simulated and treated. With a thermoplastic mask the patients were referred to the radiology department. Some real size CT slices every 2 mm were obtained in the treatment position. The center, dimensions and limits of the fields were established in the CT room. After, a dosimetric study was performed in our department. We found anatomical differences in each patient that had repercussion in the treatment approach (location and size of the vocal cord and contour of the neck). This procedure allowed us the selection of the best radiotherapy approach for each patient. We report the advantages of this technique for each patient and we describe the rules for this simulation technique.

181 POSTER
RADIATION-INDUCED PNEUMONITIS DUE TO POSTOPERATIVE IRRADIATION FOR BREAST CANCER—INCIDENCE AND RISK FACTORS

F. Saran, I.A. Adamietz, C. Thilmann, S. Mose, S. Tieku, S. Jäkel, B. Schopohl, H.D. Böttcher

Department of Radiotherapy and Oncology, University of Frankfurt, Theodor-Stern-Kai 7, 60590 Frankfurt, Germany

Objective: Radiation-induced pneumonitis (RIP) is an acute side effect in 5–57% of patients postoperatively irradiated for breast cancer. Pulmonary fibrosis and spontaneous pneumothorax can be late sequelae resulting from RIP. Clear dose response curves exist for single dose lung