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POSTER

NATIONAL COMPARATIVE AUDIT IN CLINICAL ONCOLOGY: THE ROYAL COLLEGE OF RADIOLOGISTS' COIN PROJECT

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The Faculty of Clinical Oncology of the Royal College of Radiologists together with the Joint Council for Clinical Oncology has a strong commitment to clinical audit and has established a major programme to clinical audit and has established a major programme of work, the Clinical Oncology Information Network (COIN) project to address variations in medical practice. COIN is funded by the Clinical Audit Unit of NHS Executive to: develop evidence-based guidelines of best practice; get national agreement on clinical core data sets for oncology; and to develop computer work-stations specifically designed to facilitate data capture. This is a collaborative effort between cancer specialists, all of whom have been invited to contribute by nominating themselves or others to be active collaborators (Specialty Working Groups) within particular areas of interest or specific cancer sites. It is intended that the COIN deliverables will be adopted by the NHS as clinical standards, making national comparative audit of clinical oncology possible. COIN is also a member of consortia which have submitted proposals to the European Commission's Framework IV programme, Telematics for Healthcare, to work on systematic reviews and guidelines and their telematic dissemination, and on the development of clinical workstations for oncology.

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POSTER

THE CANCER EPIDEMIOLOGY IN REGION SUBJECTED TO MULTIPLE RADIATION INFLUENCE

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We try to clear up the causes of abnormal oncomorbidity in the Altai region, the population of which is about 2.8 million people. It has been proved that the region was subjected to the influence of radiation after nuclear testing at Semipalatinsk between 1949–1965. The oncomorbidity has increased three times within the last 35 years (mean increase is about 8.5% per year). The analysis revealed a waved character of oncomorbidity increasing, having reached its maximum over two six-year periods (1961–1966 and 1982–1988). These peaks appeared in 12–26 years after nuclear testings in 1949 and 1962 that were accompanied by the most powerful radiation influence on the Altai region. In 1969–1991 the rate of oncomorbidity increasing was 1.5 times higher than the average data obtained in Russia, being respectively in men 84.6% and 51.2%; in women 29.2% and 20.7%. The highest increase of oncomorbidity was revealed in two age-groups: before 29 years and in subjects older than 70 years. Among all cancer subjects children made up 1.2% that is one-third higher than that of the average data in Russia. Lung cancer ranks first in Russia, i.e. one-fifth of all cancer incidences (in m. one-third). Small cell lung cancer makes up 27%. Thus, the Altai region is important for a very high degree of oncomorbidity, which seems to be the result of a long effect of ionized radiation.

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POSTER

APOPTOSIS, INTRINSIC RADIOSENSITIVITY AND PREDICTION OF RADIOTHERAPY RESPONSE IN CERVICAL CARCINOMA

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Apoptosis has been thought a feature of radioresponsive malignancy. Sixty-six patients with cervical cancer & previously measured intrinsic radiosensitivity following 2 Gy of radiation (SF2 value) had measurement of the percentage of apoptotic cells (Apoptotic Index or AI). AI was recorded in ten H and E stained tumour sections with Mitotic Index (MI) and K1-67 positivity as measures of proliferation. High AI was associated with poor prognosis. Five-year survival & local control for tumours with an AI below the median was greater than for those with an AI above the median (79% versus 47% for survival, $P = 0.003$; 79% versus 61% for local control, $P = 0.01$). AI & SF2 were independent, but AI correlated with MI & K1-67. Patients with both an SF2 & AI value above the median did badly (25% 5-year survival, 46% local control) compared with those with values below the median (80% 5-year

survival, 100% local control), AI may reflect proliferation and could be used with SF2 as a predictor of tumour response to radiotherapy.

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POSTER

IMPACT OF SECOND MALIGNANT TUMORS (SMT) ON SURVIVAL AFTER HODGKIN'S DISEASE (HD), EARLY (T1-2) LARYNGEAL CANCER (ELC), BREAST AND CERVIX CANCER (BC, CC)

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Many patients (pts) treated for MD, ELC, BC and CC are cured of their diseases. They are therefore exposed to the risk of developing a SMT. These four groups of pts, however, are quite different as far as their features are concerned. We considered of interest to compare the incidence of SMT in the different clinico-pathological and therapeutic subsets of the four series, along with the effects of SMT on survival.

We studied 1121 HD pts consecutively treated 1960 through 1988 at the Florence Radiotherapy Department (743 Clinical Stage I-II, 378 with CS III and IV; 745 treated with radiotherapy -RT- alone, 104 with chemotherapy alone -CT- and 272 with RT + CT). Cause specific survival at 20 years is 63%. Among these pts 74 SMT have been observed, for a cumulative incidence at 20 years of 18%. Cumulative survival after the diagnosis of SMT was 26% at 7 years, for the solid tumors, 9% at 3 years, for the leukemias. The second group consists of 424 ELC pts consecutively treated 1970 through 1992 in Florence (308 glottic; 111 supraglottic; 5 subglottic; all treated with radiotherapy). Cause specific survival at 10 years is 82%. Among these pts, 36 SMT have been observed, for a cumulative incidence at 10 years of 17%. Cumulative survival after the diagnosis of a SMT was 23% at 5 years. We studied also survival data and incidence of SMT in pts treated at our institution for BC and CC, whose clinical and therapeutic features are largely different from those of the two groups already described. Some general statements will be drawn.

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POSTER

CT-PLANNING OF BOOST IRRADIATION IN DEFINITIVE TREATMENT OF BREAST CANCER

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In 45 of 173 women who underwent breast conserving surgery and irradiation including a boost to the tumorbed, an additional CT planning of the boost was performed.

Treatment volume—setup and electron beam energy initially were determined by clinical examination, pre- and postsurgical mammograms and schedules. CT-planning was performed using continuous slices throughout the whole breast. Tumorbed showed a good visibility by scaric residuals or marked by radiopaque clips. In the CT slices a target volume was defined, containing tumorbed with a margin. Computer assisted treatment planning was performed.

Comparing the clinical assessed treatment plan to the isodose plots of the CT-planning radiation technique had to be changed in part in 38 women and completely in 5 cases.

CT planning of the mamma boost gives the opportunity of an optimal dose delivery to the tumorbed with regard to the individual anatomy.

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POSTER

POTENTIAL TIME SAVINGS USING COMPUTER ASSISTED SEGMENTATION OF PELVIC CT IMAGES

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The aim of this study was to evaluate possible savings in the time spent segmenting pelvic CT data for 3 D conformal prostate radiotherapy planning. Three male subjects with early carcinoma of the prostate underwent an extended CT scan of the pelvis. Contiguous 5 mm. axial scans (mean 76 images per subject) were acquired from L3 to mid thigh. These images were segmented manually into prostate, bladder, rectum, femoral heads, external contours and pelvic bones. The task was repeated using computer segmentation algorithms developed within the COVIRA project of the EU. These include region detectors, edge detectors, algorithms with both functions and others capable of refining approximate outlines. The planner had prior expert knowledge of these and the most appropriate one for a given tissue. Times reported are the average of 3 segmentations for each of the 3 subjects and include editing:

	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

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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 +/- chemotherapeutic 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

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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

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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

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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

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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