Conclusions: Optical fiber sensors are suitable for clinical *in vivo* dosimetry. They may become a valuable tool in quality assurance, IORT and conformal therapy. Other applications are discussed.

161 POSTER

THE ASSISTANCE OF PET AND MRI IN 3-D RADIATION TREATMENT PLANNING FOR PRIMARY BRAIN TUMORS

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MR imaging has been shown to be superior to CT in the treatment planning for malignant brain tumors. However, even with MR after administration of Gd-DTPA it remains often difficult to differentiate between tumor tissue and surrounding normal tissue and edema. Therefore, we evaluated whether the functional metabolic information provided by F-18-FDG-PET would allow for a better delineation of the target volume. In 10 patients with primary brain tumors (2 oligodendrogliomas, 3 anaplastic astrocytomas and 5 glioblastomas) MR imaging with gadolinium contrast and F-18-FDG-PET were performed in radiation treatment position within the same week. Tumors were histologically proven by biopsy in 2 patients and by subtotal resection in 8 cases. A computer program based on an external Z-shaped marker was developed for fusion of the PET and MR images. On corresponding axial slices FDG-uptake was compared to contrast enhancement in T1 weighted images and to signal hyperintensity in T2 weighted MR-images. Based on the combined PET and MRI data three-dimensional treatment planning was performed. Afterwards all patients underwent LINAC radiotherapy. In all cases tumor and surrounding edema were visible as hyperintense lesions in the T2 weighted images, 8/10 tumors showed Gd-contrast enhancement. Nine out of 10 tumors showed *hypo*metabolism compared to normal *gray* matter, 6/10 tumors *hyper*metabolism compared to normal *white* matter. The area of increased uptake correlated in 5/6 cases with Gd-contrast enhancement, only in 1/6 cases the area of increased FDG-uptake was larger than the area of Gd-contrast enhancement. White matter edema was associated with decreased FDG-uptake in all patients. The authors conclude that only in a minority of patients F-18-FDG-PET provides additional information for radiation treatment planning. This is mainly caused by the high intensity of FDG uptake in normal brain tissue. PET may be of greater value in the definition of viable tumor tissue using different tracers, especially amino acids or thymidine.

162 POSTER

DIFFERENTIAL EFFECT OF THE CHEMOTHERAPEUTIC AGENT TAXOL ON THE RADIOSENSITIVITY OF NORMAL HUMAN FIBROBLASTS AND HUMAN TUMOUR CELLS *IN VITRO*

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In order to analyze the radiosensitizing potency of taxol, *in vitro* culture studies were performed using normal human skin fibroblasts and human tumour cell lines derived from squamous cell carcinomas. Dose response curves based on clonogenic assays revealed that a concentration of 5 nM resulted in a significant inhibition of cell growth for both normal and tumour cell lines by 30–80%. When the cells were irradiated with 2 Gy or with increasing doses of ionizing radiation after preincubation of 24, 48 or 72 h with taxol a significant difference in the radiosensitivity of normal skin fibroblasts and human tumour cells was apparent demonstrating a more pronounced radiosensitizing effect on tumour cells, as compared to normal cells. Although taxol has been described to induce a G_2/M-block, ongoing cell cycle analyses revealed that the increment in radiosensitivity of human tumour cells did not necessarily correlate to a possible induction of the G_2/M-block in the cells treated. Thus, it can be concluded that taxol may exert specific radiosensitizing effects on human tumour cells, but not on normal diploid cells. Experiments are in progress to elucidate the specific cell biological and molecular mechanisms of the radiosensitizing effect of taxol on squamous cell carcinoma cells. On the basis of these data strategies for the use of taxol in radiooncoloy can be developed.

163 POSTER

REDUCING THE INCIDENCE RATE OF THORACIC VERTEBRAL METASTASES IN BREAST CARCINOMA

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This is a report on 885 breast cancer patients studied over the period 1972 through 1987. Postoperative telegammatherapy, including the parasternal lymph portals also, is performed. The patients were distributed in two groups according to method of radiation therapy used: (1) Telegammatherapy of regional lymph pool (RPL) through three gamma fields (387), and (2) Telegammatherapy of RLP through a figure field (498). In group one parasternal irradiation was affected until total dose 46 Gy at 4 cm depth was reached. In this fashion the area exposed to radiation therapy (AERT) comprised half of the vertebral bodies of Th_{4-8}. With the first method total irradiation dose (TID) in the thoracic vertebrae varied in the range 27-19 Gy. In group two parasternal irradiation was effected until total dose 50 Gy. AERT comprised the vertebral bodies of Th_{3-10}. With the second method TID in the thoracic vertebrae varied in the range 27–20 Gy. A considerable reduction of metastases, developing in two-thirds of the thoracic segment of the spine, as compared to those involving other skeletal locations, is noted as a result of exposure to an exit dose of irradiation of the parasternal lymph portals. The obtained results corroborate the statement that relatively small doses, regardless of the radiotherapy method used, are efficient in terms of micrometastases.

164 POSTER

SUBTOTAL BODY IRRADIATION (SBI) IN COMBINED TREATMENT OF ADVANCED CANCER PATIENTS

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SBI has been used as component of systemic antitumor therapy in the management of 187 advanced cancer patients with Hodgkin's disease (76), lung cancer (70), breast cancer (32) and others (9). The patients were treated at the 15 MeV linear accelerator; 1.5 Gy/min with no shielding was employed. Single dose 1–1.5 Gy to total dose 4–6 Gy (lung corrected) was given to the trunk midplane during 7–10 days in Hodgkin's disease patients. Patients showed good immediate results: discontinuance of B-symptoms (fever, night sweats), diminution of lymph nodes, decrease and disappearance of lung involvement. A dose of 1.8 Gy to total dose 19 Gy (N = 11) given every day during 2–3 weeks. There was regression of lung involvement, decrease and disappearance of bone pain, diminution of lymph nodes, regression of hepar involvement. SBI is an effective method of radiotherapy in chemotherapy-resistant cases.

165 POSTER

MRI RADIATION TREATMENT PLANNING OF BRAIN TUMORS

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From November 1993 to July 1994, in a series of 16 patients treated by radiotherapy for brain tumor (9 glioblastomas, 5 low-grade astrocytomas and 2 meningiomas), we evaluated the usefulness of MRI for the definitions of clinical target volumes (CTV) and planning target volumes (PTV).

MRI were performed under the actual conditions of treatment with a thermoformed fixation mask and we used external fiducial markers made of plexiglass squares filled with lipiodol.

The impact of MRI was evaluated by comparison with the standard techniques of simulation and CT dosimetry scans previously performed. Modifications of CTV after MRI were observed in 8 cases and modifications of beam set-up for PTV in 10 cases (1 reduction and 6 augmentations of the size of the beams, 2 modifications of the number of the beams, 1 improvement of blocks). Changes observed were in a range of 1 to 2 cm.

MRI, under the actual conditions of treatment, seems to be a useful tool of optimization for conformal treatment of brain tumors.