Materials and Methods: Individual applicators are rigid plates adjusted to anatomical shapes of patients. On it's surface catheters are placed on the preplanned positions. However the positions of the catheters are planed according to the rules established on the basis of pattern-treatment plans, prepared to learn about the influence of implant geometry (number of the catheters, thickness of the applicator) on the dosimetric parameters (maximum dose value on the surface of the applicator (Dmax), area of the 150% of isodose on the surface of the applicator). 9 pattern – treatment plans for irradiated surface 9 cm^2 were calculated. Pattern-plans were prepared for 3, 4 and 5 equidistant, parallel catheters and assumed thickness of the applicator: 3, 5 and 8 mm.
Results: It's difficult to obtain satisfactory dose distribution for small irradiated surface (below 9cm2). In order to avoid high dose values on the applicator's surface the distance between catheters should be 1 cm and applicator's thickness should be 8 mm while for 3 mm applicator plates is better to use 1.5 cm space between catheters to minimize the area of 150% isodose on the applicator's surface. Dose distributions calculated for individual applicators, prepared on the basis of those rules were used to treat different localizations of tumors e.g.: nose, cheek, forehead, ear even trachea.
Conclusion: Individual applicators allow to adjust the shape of isodoses to the dimension of PTV and to protect OAR. However, performed analysis showed how to improve applicator's geometry in order to avoid overdosed areas on the surface of the applicators. Geometric optimization allow not only to irradiate required area but also to obtain satisfactory dose profile from the applicator's surface to reference depth.

942 POSTER

Superficial dosimetry for helical tomotherapy

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Background: For examination of the feasibility of radiation therapy on a wide curved area of the skin by the helical tomotherapy and its accuracy to calculate the absorbed dose in the superficial region.
Materials and Methods: Two types of radiation therapy treatment plan were made with the 'cheese phantom' which is cylinder-shaped with diameter 30 cm. In the first trial, 2 Gy was prescribed from the surface to depth 1 cm. In the other trial, 2 Gy was prescribed from the external side of the surface by 5 mm to 1 cm depth. Additionally, the inner part of the phantom below depth 2 cm was selected to be completely blocked. To measure the surface dose and the depth dose profile, an EDR2 film was inserted into the phantom, and 6 TLD chips were attached to the surface.
Results: After irradiation, from the film, the surface dose of the former case was 118.7 cGy and the latter case was 130.9 cGy. From TLD chips, the surface dose was higher than these, but it was due to the finite thickness of TLD chips. In the former case, 95% of the prescribed dose could be obtained at 2.1 mm depth, and at 2.2 mm in the latter case. The maximum dose was about 110% of the prescribed dose. As the depth became deeper, the dose decreased rapidly, and at 2 cm depth, it became 20% of the prescribed dose.
Conclusions: As a result, it was found that helical tomography could be applied usefully to treat a wide area of the skin with curvature. However, up to 2 mm depth, the planning system overestimated superficial dose, and thus it was found that for the treatment of more shallow targets, to use a compensator such as bolus is required.

943 POSTER

IMRT based radiosurgery – a planning study

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Background: Radiotherapy is a mainstay for the treatment of brain metastasis regardless of the underlying type of cancer. In case of limited metastases to the brain radiosurgical procedures either alone or in combination with whole brain irradiation comprise the state of the art. Adequate coverage frequently requires more than one isocenter especially in those cases where more than one lesion has to be treated. The availability of IMRT technology prompted us to address the question in how far an IMRT based approach could be used to treat multiple metastases with one isocenter.
Methods: Using the CT and MRT data set of five different patients we generated individual treatment plans employing the IMRT-planning program "Hyperion" for an Elekta Synergy S LINAC. All dose distributions were calculated based on Monte Carlo algorithms and optimized using EUD models. The selected patients had one or three brain metastases with diameters between 5 mm and 27 mm. Dose prescriptions were: 15 to 20 Gy (depending on tumor size) on the tumor enclosing isodose. The steepness of the gradient was controlled by defining a 20 mm margin around the GTV in which the dose was restricted to a mean of 3−4 Gy. The maximum dose inside of the lesions was restricted to 120% of the prescribed dose
Results: Optimal dose distributions were obtained for all patients with six couch angles (30° apart from each other) and 9 gantry angles (20° apart from each other) as preset values for IMRT planning. After planning 29−51 beams, with 78–112 segments and total MUs from 3,240.4 to 4,948.8 were required for an adequate IMRT solution. Calculated radiation time was around 60 min.
Conclusions: Using the described technology single fraction IMRT for one up to three brain lesions seems easily feasible.

944 POSTER

Therapeutic outcome of patients with lytic, mixed and sclerotic bone metastases managed with combined radiotherapy and ibandronate

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Background: To investigate the therapeutic response of patients suffering from different types of bone metastases, managed with combined radiotherapy and bisphosphonates.
Patients and Methods: By using computed tomography (CT), 52 patients were grouped into groups of lytic, mixed and sclerotic bone lesions. All patients were treated with concomitant radiotherapy and ibandronate (10 monthly cycles) and underwent clinical and radiological evaluations prior to therapy and at 3, 6 and 10 months post the onset of therapy.
Results: At baseline there were statistically significant differences between the 3 groups for all the evaluated parameters. At 3 months all differences were leveled out. Statistically significant improvements were noted at all time points of evaluation for all groups in parameters such as pain (0−10), quality of life (QOL-physical functioning, 0–100) and Karnofsky performance status (KPS). The average pain score for the lytic group was reduced from 8.1 to 1.5 points at 3 months. The corresponding reductions for the mixed and sclerotic groups were from 6.2 to 0.5 and from 4.4 to 0.3 points respectively. Complete pain responses (pain score of zero with no increase in analgesic consumption) were >76.4% at all time points for all groups. The percentage of patients requiring opioids for pain relief, as well as the mean opioid consumption per patient measured in oral morphine equivalents, were also markedly reduced at all time points. Overall, the highest clinical response was noted for the lytic group, even though the mean values of pain, QOL and KPS were worse than those of the two other groups at all time points (apart from pain score at 10 months). The percentage of patients of the lytic group experiencing a complete pain response was the least of the three groups during follow up. At 10 months bone density was almost tripled for the lytic and almost doubled for the mixed group.
Conclusions: Even though the therapeutic outcome for the three groups was similar, the degree of clinical response and reossification differed.

945 POSTER

High dose spatially fractionated radiotherapy (SFR) using a megavoltage GRID in advanced lung tumours. A pilot study in the UK

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Background: With increasing tumour size, the ability of conventional EBRT to achieve local control decreases. Normal tissue toxicity is one of the main limiting factors in dose escalation. Grid therapy represents fractionation in space not time. This concept was routinely used in the ortho-voltage era to deliver high doses of RT to deep seated tumours while minimizing superficial normal tissue damage. Recently, the principles of SFR have been adapted to megavoltage beams using a specially constructed grid to deliver large single fractions [1]. The local cell kill after a high-dose fraction is expected to improve reoxygenation during subsequent conventional RT. A cytokine-based bystander effect may also lead to enhanced cell kill in regions adjacent to those receiving high doses. In this phase 2 study, 10 patients with locally advanced NSCLC >6 cm in size were treated as part of a feasibility study to evaluate the tolerability of adding a grid boost to conventional palliative RT.