comparable with photon chest wall irradiation. Electron chest wall irradiation is relatively simple and safe and therefore is recommended.

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An effectiveness evaluation of simplified hemibody irradiation

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Aim of the study: Assessing of simplified hemibody irradiation (HBI) technique as a palliative treatment of patient with multiple, painful bone metastases.

Material and method: The material comprised 23 patients with multiple painful bone metastases (25 cases of HBI). In no one case bone metastases in skull and distal part of limbs were found, so these parts of the body were excluded from irradiated field. All patients were irradiated using 6 MV photons from two opposite AP_PA fields. The dose of 6 Gy was delivered for UHBI and 8 Gy for LHBI. No tissue density corrections were considered and no shields were used. The degree of pain relief and performance status improvement was assessed one and two months after treatment, depending on clinical and histopathological diagnosis and type of bone metastases. The dependencies between degree of pain relief, performance status and different biological and technical factors were checked.

Results: The biggest mean degree of pain relief (100%) was obtained in the cases of multiple myelomas, prostate cancers (78%) and lung cancers (88%). Taking into account histopathological diagnosis, the best answer has been found in multiple myeloma and squamous cell cancer (88%). The difference between degrees of pain relief for types of metastases also was found (65% for osteolitic vs. 50% for osteoclerotic metastases). No difference between UHBI and LHBI was found. The statistically significant correlation between pain relief, performance status improvement and decrease of analgetics use was found.

Conclusion: The obtained results suggest that presented simplified HBI is an effective treatment modality for patients with multiple painful bone metastases, giving an in

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Nonoperative treatment for locally advanced esophageal carcinoma

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Introduction: Radiotherapy is one of the most widespread methods for treatment of locally advanced esophageal carcinoma. The purpose of this study was the comparison of different radiotherapy regimens.

Materials and Methods: 152 cases of squamous cell carcinoma arising from the cervical and thoracic esophagus (stage II–IV) were treated by radiation therapy at the institute. All patients were divided into 4 subgroups according to the treatment policy. 1st group of 46 patients was treated by external beam radiotherapy (EBRT) to a dose 30 Gy/15 fractions/3 weeks. After 2 weeks rest they continued to receive treatment with ^{60}Co-HDR intracavity brachytherapy (IBT) to a dose 15–20 Gy delivered in 3–4 sessions of 5 Gy each week apart. Simultaneously these patients got EBRT to a dose 20 Gy/10 fractions/2.5 weeks. 2nd group of 41 patients was treated by EBRT to a dose 30 Gy/5 Gy per fraction/6 fractions per week. IBT was provided in 2–3 days after EBRT. The average dose delivered by IBT (Selectron, source ^{137}Cs, pellets LDR-MDR) was 15 Gy; the dose per fraction was 5 Gy twice per week. The dose was calculated at 0.5 cm below esophageal mucosa at both groups. In the 3rd group (29) the ^{137}Cs-IBT to dose 15 Gy/3 fractions was provided in two weeks after EBRT dose 40–45 Gy/19–21 fractions/4–4.5 weeks. For 36 patients of 4th group EBRT alone was done to a dose of 51–54 Gy/17–18 fractions/3.5 weeks.

Results: There was remarkable increase to the end of the 1st year in relief of dysphagia and local control in groups with IBT. The level of benign radiation-induced esophageal ulceration's and strictures was maximum in 2nd group. The survival rate from all groups is represented in the table.

	EBRT + IBT1 (^{60}Co) 46	EBRT + IBT2 (^{137}Cs) 41	EBRT + IBT3 (^{137}Cs) 19	EBRT 36
1-y	72.73 ± 6.2%	69.23 ± 5.1%	57.89 ± 5.3%	36.11 ± 5.1%
3-y	27.23 ± 5.7%	11.54 ± 5.8%	15.79 ± 4.3%	8.33 ± 4.1%
5-y	19.57 ± 4.2%	7.32 ± 4.4%	5.26 ± 3.6%	4.11 ± 2.7%

Conclusion: Use of HDR-brachytherapy combined with traditional fractionated is the most preferable from investigated regimens.

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The virtual simulation process

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Introduction: The Virtual Simulation (VS) is a modern technique allowing the definition of the anatomical contours of the region to treat and the simulation of the fields of the radiotherapic treatment. Once the CT and/or NMR images have been acquired, the Virtual Simulation software gives a three-dimensional view of the anatomy of the patient and allows the definition of the optimal characteristics of the treatment beams in relation to the anatomical structures of the patient, thus substituting the traditional simulator image.

Methods: During the acquisition of the CT scans a correct posistioning and immobilization of the patient is necessary, in order to riproduce it durino the treatment session. During the treatment planning session the contours are drawn onto the CT scans for the target volume and the organs at risk, according to the ICRU 62 recommendations. The software allows the visualization of the patient anatomy from the point of view of the radiation source (Beam's Eye View, BEV); this is essential in order to draw the area shielded by blocks or the multileaf collimator, thus conforming the radiation field. The treatment plan will then be completed with all the necessary dosimetric considerations and the final 2D and 3D dose distributions. Once the isocenter position is decided, the isocenter point is projected onto the patient skin by means of a system of lasers driven by the simulation software of the CT device, and a CT slice is acquired in correspondence of this point to minimize the geometrical set-up uncertainties. One very important feature of the Virtual Simulation Software is the elaboration of the Digitally Reconstructed Radiograph (DRR): this is a 2D radiographic image obtained by the elaboration of the volumetric data coming from the acquired CT scans. The DRR presents the exact geometrical perspective of the radiation source; thus on the DRR the exact dimension of the field edge is visualized together with the used shaping devices (MLC, blocks, mantles), the projection of the target volumes and of the organs at risk.

Purpose: This allows the user to perform a comparison between the field defined during the planning and the effectively supplied field visualized on the portal image.

Results: In our Clinical Center, not having at our disposal an Electronic Portal Imaging Device, we have studied and realized a software to print the DRR image on radiographic film, thus also offering a further permanent documentation. It is now possible to compare the shape of the radiation field (◇=0 mm)and the geometrical alignment between the DRR reference image and the portal image obtained during the treatment (◇ lateral beam=1.9 ± 1.9 mm), (◇ anterior beam =1 ± 1 mm).

Conclusion: The DRRs furthermore offer the possibility to realize a patient coordinate system by means of anatomical markers. As the spatial resolution of a DRR is limited by the voxel dimension of the original CT slices, dimensions not greater than 5 mm are more suitable to get a better identification the anatomical structures. The comparison with the DRR becomes unavoidable in the case of complex conformal treatments with a multileaf collimator, as in our case where a Dynamic Micro-Multileaf Collimator is used for the treatment of head lesions.

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An opportunity for therapeutic index improvements in conservative therapy of early breast carcinoma

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Purpose: Studying the opportunity for the therapeutic index improvement in the follow directions: providing local tumour control by applying the dose of 50 Gy; and limiting the irradiation to the normal tissues.

Material and method: 190 patients with early breast cancer T1-2 (up to 3 cm) NO-1 MO were treated in the National Oncological Center and evaluated in two groups of case - control. In the group with coservative treatment (BCT) 122 patients were treated with postoperative radiotherapy after preserving surgery by "negative" margin between 1992 and 1997. The group-control contains 68 patients, whom was applied a radical modified mastectomy - Patey (M) between 1978-1986. The radiotherapy in N+