

**Methods:** 160 male Wistar rats were divided into six groups; a control (I, n = 20); a saline (II, n = 30) which received 1 ml intra-peritoneal (i.p.) NaCl; a sham irradiated (III, n = 20); a 5-FU (IV, n = 30), which received i.p. 5-FU (20 mg/kg) for five consecutive days; an irradiated (V, n = 40) which received fractionated irradiation to the whole pelvis to a total dose of 22 Gy, 5.5 Gy per fraction, in four consecutive days; and a concomitant 5-FU + irradiation (VI, n = 20) which received 5-FU as in group IV and irradiated as in group V. All groups underwent left colonic segmental resection and primary anastomosis 3 to 4 days following therapy. Within each group one half of the animals were sacrificed on the third postoperative day and one half on the seventh postoperative day. After the resection of the anastomotic segments, histopathological examination, hydroxyproline content (HP) and myeloperoxidase (MPO) activity were evaluated.

**Results:** Apposition of the wound edges of the mucosa and the muscularis were not influenced by the therapy. The amount of granulocytes was high, exudate and necrosis persisted, granulation tissue formation was delayed, and the amount of macrophages and fibroblasts were low, additionally MPO, and HP content were also influenced in groups IV, V, VI when compared to the other groups.

**Conclusion:** Anastomotic healing can be affected by the administration of pre-operative chemotherapy, irradiation and chemo-irradiation.

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### Standards of reference in early breast cancer post-operative irradiation: The Italian association for radiation oncology (AIRO) document

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**Purpose:** According to the indication of the ESTRO document on "Quality assurance in radiotherapy", it is essential to establish clinical and technical guidelines to optimize radiotherapy practice. To this aim an AIRO Committee was charged to determine the standards of reference for early breast cancer (EBC) post-operative irradiation in Italy.

**Methods:** The AIRO Committee, supported by the Italian Association for Biomedical Physics (AIFB), was composed of radiation oncologists and medical physicists. Current management guidelines were derived from Committee's combined experience and knowledge, from review of the literature and from a Northern Italy 1996 survey. As their own general and specific standards of reference, the Committee widely utilised the 1991 European report on "Quality assurance in conservative treatment of EBC" and the 1996 Italian document on "Quality assurance in radiotherapy".

**Results:** Consensus guidelines were defined on pre-treatment evaluation, on treatment prescription, preparation and execution phases, with respect to both whole breast and tumor bed irradiation, on follow up and on Quality Assurance procedures. Recommendations were given for two levels of treatment: minimum requirements and desirable treatment level.

**Conclusion:** Standards of reference for EBC post-operative irradiation, reflecting the current national practice and adapted to the Italian situation and resources, have been established by the AIRO Committee.

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### Focused ultrasound thermotherapy: A new promising tumor treatment principle

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**Purpose:** Focused ultrasound (US) thermotherapy may become an option for ablation of deeply situated tumors while monitoring noninvasively by MRI.

**Method:** For assessing US therapy the Dunning prostate tumor transplanted to Copenhagen rats was used in vivo and bovine muscle ex vivo. The US system consists of an MR-compatible PZT disc transducer (intensity 2.5 kW/cm<sup>2</sup>). Treatments were performed in a 1.5 T whole-body MRI imager (Siemens) employing a T1 weighted TurboFLASH sequence (acquisition time 1.3 s) for temperature mapping and morphologic measurements.

**Results:** Focused US induces thermal lesions deep in tissue (<1 cm<sup>3</sup> per single shot depending on US parameters). The time course of temperature elevation in the tumor and surrounding tissues was quantitatively evaluated by MRI online during US treatment (T<sub>max</sub> = 75°C). It showed good agreement with invasive thermometry. Lesion geometry inside the tumors evaluated by

histology corresponded to the MRI controlled region. Tumor suppression by US was significant (p < 0.01) compared to untreated controls and correlated with the temperature level.

**Conclusion:** Selective tumor ablation while sparing healthy tissue by US-induced thermal surgery is feasible. MRI allows online monitoring of lesion geometry and temperature mapping. All localizations reached by diagnostic ultrasound are possible targets in humans. This would include lesions in the liver and breast.

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### Prophylaxis by radiotherapy for heterotopic bone after acetabular fracture surgery

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**Purpose:** A prospective study demonstrates the value of a combined protocol of early postoperative external beam radiation (EBR) in order to prevent heterotopic bone formation after reconstructive acetabular surgery.

**Methods:** From January 1991 to December 1996 eighty-one patients/pts. with acetabulum fractures were treated: 44 pts. conservatively and further 37 by reconstructive surgery and early continuous passive motion therapy (CPM). Twenty-two out of those 37 pts. were additionally irradiated postoperatively with 12 Gy total dose, 2 Gy/day.

**Results:** Eight non-irradiated pts. and 16 irradiated pts. were examined by X-ray 6 to 24 months after therapy. 13 (81.25%) out of 16 irradiated pts. were completely free of heterotopic bone formation. 3 (18.75%) out of 16 pts. developed grade 1 ossifications according to Brooker. All non-irradiated pts. developed heterotopic bone: grade 3 or 4 in 37.5%, grade 2 in 25% and grade 1 in 37.5%, respectively.

**Conclusion:** The adjuvant EBR led to a substantial reduction of both frequency and Brooker grade of heterotopic bone formation after acetabular fracture surgery.

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### Late cardiac effects after adjuvant radiotherapy following mastectomy in early breast cancer

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**Purpose:** To assess the occurrence and degree of late cardiac abnormalities after adjuvant radiotherapy (RT) following mastectomy in early breast cancer.

**Patients and Methods:** Ninety women without relapse included in a former randomised trial of early breast cancer with or without RT ± cyclophosphamide were examined with myocardial scintigraphy and echocardiography 10–17 years after therapy. Thirty-four patients with left-sided RT, 33 with right-sided RT and 23 without RT. The RT had included the chest wall and regional lymph nodes, target dose 38–48 Gy. At follow up all patients were below 65 years.

**Results:** Abnormal findings were recorded for ECG (14 pts), exercise test (5 pts), myocardial scintigraphy (6 pts), thickening of valve cusps (14 pts) and mild valvular regurgitation (20 pts). Although no significant differences between the 3 study groups were found, higher relative frequencies of abnormal findings were observed in the RT groups. All patients had normal systolic function. Regarding diastolic function the E/A ratio was significantly lower in irradiated patients regardless of side. No difference in deceleration time or in cardiac dimensions was noted between the 3 study groups.

**Conclusion:** After median 13 years only minor cardiac effects which might be related to adjuvant radiotherapy following mastectomy in early breast cancer were noted.

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### Portal and verification imaging of electron beams by digital storage phosphor radiography

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**Purpose:** Portal or verification imaging of electron beams with various energies is often difficult due to the inadequate dose range of film material, the need of use of several film materials and the variation of the delivered dose per fraction.