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A rule based system for prediction of radiation induced tissue injury

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Introduction: Increasingly, rule based systems are described for various fields in medicine. We developed a rule based system for use in radiotherapy in order to replace empirical models in radiotherapy.

Methods: On the basis of a fuzzy controller we examined the ability of a rule based system to estimate values given by the logistic model for radiation injury to tissues and organs.

Results: The most simple rule based system containing eight rules dealing with one input variable was able to estimate the empirical models of values with good accuracy. In addition, the fuzzy output of the rule based system tells us something about the certainty of the result that means whether the rule base sufficient enough to solve the individual problem. From the viewpoint of clinical radiotherapy, this can be a significant advantage compared with used empirical models.

Conclusion: Rule based systems on the basis of fuzzy sets can predict tissue damage using rules from radiooncological literature without the use of empirical models.

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Hyperfractionated accelerated radiotherapy for carcinoma of the oesophagus. 5 years follow-up

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Purpose: The aim of this study was to decrease the overall treatment time providing symptom control, side effects, and survival rate remain similar to previously reported studies.

Methods: Fifty eight patients (35 males and 23 females) with the diagnosis of carcinoma of the oesophagus received 30 fractions of radiotherapy over 2 weeks with a 3 times a day fractionation and a minimum of 3 hours gap between fractions. A mean dose of 4390 cGy (range 2998 cGy to 5400 cGy) was given.

Results: Treatment was well tolerated and, after 5 years follow-up, no late unacceptable side effects were seen. Dysphagia improved in 74% of cases, lasting in 4 cases more than 5 years. Survival rates at 1, 3, 5 years were 39.5%, 13.7%, and 8.5%, respectively. With 5 patients surviving longer than 5 years, we can report an 8-year actuarial survival rate of 8.5%. Survival was greater in females, in patients with the tumour in the upper third of the oesophagus and for squamous cell carcinoma. No major differences in survival were seen when comparing tumours smaller or greater than 5 cm.

Conclusions: We think that this approach of hyperfractionated accelerated radiotherapy is feasible, effective, and without major side effects. It is also possible to incorporate the schedule within the normal working day of a radiotherapy department.

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Radiomodification in radiotherapy (RT) of patients with endometrial cancer (EC)

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Aim: To enhance a damaging effect of radiation upon the tumor by application of radiomodifying preparations.

Methods: RT with local application of radio-modificators (mesonidazole solved in dimethyl sulfoxide) was performed in 189 patients (pts) with EC. 134 pts entered the control group. The efficacy of treatment was estimated by the tumor regression rate and 5-year survival with no recurrences.

Results: Total tumor regression was observed in 90.4% of pts exposed to RT combined with the application of radiomodificators, and only 56.3% in control group. 5-year survival was equal to 85.9% and 64.6% in the control

Conclusion: Combination of RT with local application of radiomodificators allows to enhance the efficacy of treatment of patients with endometrial cancer.

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Treatment-tolerance of HIV-infected patients with anal-cancer to radiotherapy and radiochemotherapy

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Purpose: Although not an AIDS-defining malignancy, anal cancer is an evolving problem in HIV-infected patients. Treatment-tolerance to radiotherapy as well as to chemotherapy is supposed to be reduced in patients with HIV-infection with excessive early reactions described.

Material + Methods: Since 1995 we have treated four patients with a long history of HIV-infection but without symptoms of AIDS or repeated severe infections with radiotherapy (1 pt.) or radiochemotherapy (3 pts.). External beam radiotherapy with 45 Gy to the tumor and pelvic as well as inguinal lymphatic drainage was administered by 18 MeV Photon beams in 5 weekly fractions of 1.8 Gy using ap–pa fields. In tumors larger than T_2 N_0 lesions an additional boost of 9 Gy in the same fractionation was given. Chemotherapy consisted of 5-Fluoro-Uracil 1000 mg/m^2/24 h, d 1–4 two cycles and Mitomycin C 10–15 mg/m^2, d 1, one or two cycles in the first and fifth week of radiotherapy.

Results: Acute reactions were mild to moderate in all patients and all treatments could be given as scheduled without breaks longer than 4 days (1 pt.). No excessive acute reactions i.e. grade III or IV toxicity were seen besides one episode of asymptomatic granulocytopenia easily controlled by GCSF-administration. Because of the short follow up, late reactions and local control are not yet evaluable.

Conclusion: In selected patients with anal-cancer and HIV-infection radiochemotherapy is a reasonable therapeutic option without excessive acute toxicity.

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External radiotherapy in macular degeneration: Our technique, dosimetric calculation and preliminary subjective response

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Purpose: Phase I/II study was performed to determine the toxicity and efficacy of external beam radiotherapy in patients with age related subfoveal neovascularization.

Material and Method: Between January 1996 and September 1996, 25 patients with a mean age of 70.5 (60–84) were enrolled. All patients underwent fluorescein angiographic evaluation and documentation of their neovascular disease prior to irradiation. In all the patients on whom radiation therapy was planned following angiography, treatment commenced within 1 week. A total of 24 patients were treated with a total dose of 12 Gy in six fractions of 2 Gy/fraction over 8 days. We used a lens sparing technique and patients were treated with a single lateral 6-MV photon beam and field sizes were 3X3 cm. In order to assess the risk of radiation carcinogenesis after treatment of age related subfoveal neovascularization, we have estimated the effective dose for a standard patient on the basis of tissue weighting factors as defined by the ICRP. The calculations were made with TLD on a male randophantoma. The lens' dose was found 217 mGy per fraction (Our dose per fraction was 200 cGy).

Results: No significant acute morbidity was noted. Patients were according to their visual acuity after the radiation treatment and results were confirmed with fluorescein angiography.

Conclusion: Our observations on these 25 patients support that many patients will have improved or stable vision after radiotherapy treatment with low dose irradiation in this disease.

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The influence of pelvic irradiation and chemo-irradiation on the integrity of colonic anastomoses in the rat

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Purpose: As the neoadjuvant therapy for rectal carcinoma could influence the anastomotic integrity, we decided to investigate the effects of