significantly upregulated on day 2 after 4 Gy *in-vitro* irradiation in both groups (approximately 6-fold in controls and 2.5-fold in cases), but appears to decay more slowly in fibroblasts from cases. However, cases show a significantly higher level of p53 than controls (p=0.0205) and this effect independent of any further radiation exposure.
Conclusions: DNA damage, in particular unrepaired DSB is not a significant factor in the development of late breast fibrosis after radiotherapy.

POSTER: PREVENT TRACK: FUNCTIONAL IMAGING OF NORMAL TISSUE DOSE RESPONSE

PO-0916
Relations between increased SUVmax in esophagus during radiotherapy treatment and dysphagia.
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Purpose/Objective: To validate the hypothesis that: a) The increase of esophagus SUVmax one week after the start of radiotherapy treatment is correlated with parallel severe dysphagia level (grade ≥ 2); b) The increase of esophagus SUVmax at one specific level is correlated to the dose given at this specific level and c) To investigate whether some specific anatomical regions of the esophagus (divided into 3 equal parts) are more sensitive to inflammation than others.
Materials and Methods: A cohort of 39 non-small cell lung cancer patients treated with curative intend and having had two FDG PET scans: one before treatment and approximately one week after start of treatment (average 9 ± 2 days). Dysphagia toxicity, PET and CT scans were analyzed for each patient. The esophagus has been divided into 3 equal regions: a caudal region (part 1), a middle region (part 2) and a cranial region (part 3).
-The maximal PET-SUV value in the esophagus (SUVmax) was computed, excluding the GTV regions, for the whole esophagus and for each part of the esophagus on both time points. The change in SUVmax, ΔSUVmax, was calculated. This change was correlated to the incidence of severe dysphagia (grade ≥2).
-The patients were divided into 2 groups: one group (Gr 2) consisted of patients with dysphagia toxicity larger than grade 2 and the other group (Gr 1) contained patients with mild or no dysphagia (grade 0 or 1). The average difference of SUVmax is measured for each of the groups, ΔSUVmax.
-The dose was computed for each esophageal region. We then correlated the dose given to each third to the ΔSUVmax on the corresponding region.
Results: The dose delivered to the patients until the second PET/CT scan was on average 21 ± 3 Gy.
-The increase in SUVmax was significantly higher in the severe dysphagia group (ΔSUVmax = 0.34 ± 0.66 of increase in Gr 2) than for patients without dysphagia toxicity (-0.17 ± 2.1). By using the one-sided Wilcoxon rank sum test, the p-value was significant (p=0.055).
-The increase of SUVmax was highest in the most caudal part of the esophagus for the patients having severe dysphagia: ΔSUVmax = 0.53 ±0.81 compared to the patients without toxicity: ΔSUVmax = 0.18 ± 1.3, with a trend towards significance (p-value =0.06).
-The increase in SUVmax for the middle and cranial parts were not significant (large p-values > 0.20).
Conclusions: Significant increase in SUVmax for patients with severe dysphagia was observed. The increase in the caudal third of the esophagus was higher for patients with severe dysphagia compared to the other parts of the esophagus. A validation study or an extension of the cohort patients is however necessary.
Figure 1. Summary showing for each part of the esophagus the difference of ΔSUV(MAX) for each region of the esophagus: its value (of increase), standard deviation, p-value and significance of the one-sided Wilcoxon rank sum test.

Regions of the esophagus:	Value of increase	Standard deviation	p-value	Significant at 10% level?
Entire esophagus: ΔSUV(MAX) in Gr2 - ΔSUV(MAX) in Gr1	0.34	1.44	0.055	Significant
Caudal third: ΔSUV(MAX) in Gr2 - ΔSUV(MAX) in Gr1	0.71	0.44	0.063	Significant
Middle third: ΔSUV(MAX) in Gr2 - ΔSUV(MAX) in Gr1	0.17	0.31	0.40	Not significant
Cranial third: ΔSUV(MAX) in Gr2 - ΔSUV(MAX) in Gr1	-0.06	1.47	0.18	Not significant

POSTER: PREVENT TRACK: BIOLOGICAL EFFECT OF NEW IRRADIATION MODALITIES

PO-0917
Radiobiological aspects of intraoperative radiotherapy with large dose fractions
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Purpose/Objective: Novel radiotherapy techniques such as stereotactic radiosurgery (SRS), stereotactic body radiation therapy (SBRT), high-dose-rate (HDR), brachytherapy boost, and intra-operative radiotherapy (IORT), use a single or very few, very large dose fractions. Furthermore, the total time required to apply a dose fraction may be increased, allowing induction and repair of sublethal lesions during the treatment. In addition, IORT potentially influences subsequent wound healing. This departure from conventional fractionated radiotherapy may influence the biological effect in several ways. The purpose was to study the influence of high single doses, and protracted irradiation, on RBE, repair, and wound healing *in vitro*.
Materials and Methods: Human MCF7 breast cancer cells, normal skin fibroblasts and endothelial cells (HUVEC), and hamster V79 cells, were used. Irradiation was performed with 50 kV X-rays from the Intrabeam® machine with a 4 cm applicator for tumour-bed irradiation (Carl Zeiss Surgical, Oberkochen, Germany) or 6 MV X-rays from a linear accelerator. Clonogenic cell survival was determined by the colony formation assay; repair halftimes of sublethal damage (SLD) were determined from split-dose experiments; DNA double-strand breaks (DSB) were monitored by phosphorylated histone γH2AX foci; cell migration was quantified by the *in vitro* wound healing (scratch) assay.
Results: The RBE of 50 kV X-rays was increased relative to 6 MV (mean 1.35; 95% c.i.;1.2-1.5) at 8.1 mm depth in a water-equivalent tumour-bed phantom (dose rate 15.1 Gy/min) but a decrease with increasing dose as predicted by the linear-quadratic (L-Q) formalism was not observed. However, RBE was decreased irrespective of dose at the lower dose rate of 9.8 Gy/min in 12.7 mm depth. This could be partly explained by continuous induction and repair of SLD during protracted irradiation. On the other hand, residual γH2AX foci in V79 cells 24h after irradiation with 4.7 Gy (equivalent to approximately 6 Gy of 6 MV X-rays) decreased with decreasing dose rate (25 to 7 Gy/h) in air, indicating a possible limiting role of the DSB repair system. Whereas a dose of 12 Gy of 6 MV X-rays strongly inactivated fibroblast colony formation, migration in the wound healing assay was not inhibited, and even slightly stimulated, by irradiation. The cytokine TGF-β1, which plays a central role in wound healing, inhibited migration but no interaction between irradiation and TGF-β1 was observed.
Conclusions: The RBE, and effects of repair during protracted dose delivery, should be taken into account when assessing biological effects of large dose fractions of IORT. However, deviations from the dose dependence predicted by the L-Q formalism were observed. Unexpectedly, no adverse effect of high-dose irradiation on migration was observed in the absence or presence of TGF-β1. Further studies of the biological effects of very large dose fractions are warranted.

PO-0918
Effects of everyday low-dose pre-irradiation followed by higher dose on cancer and normal cells in vitro
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Purpose/Objective: The effects of radio-adaptive response is the main interest many studies.The exposure of cell lines to low-dose irradiation leads to changes at molecular level which may induce adaptive response. Cells and tissues exposure to low doses followed by higher irradiation doses is named radioadaptive irradiation. Adaptive response can lead to hypersensitivity or radioresistance. The aim of this research was to examine the effects of everyday low-dose pre-irradiation on cell viability in two cell lines: cancer cells and fetal lung fibroblasts.
Materials and Methods: We studied the effect of a low-dose pre-irradiation (0.03Gy, 0.05Gy and 0.07 Gy), applicated everyday solely and also everyday prior to 2.0Gy challenging dose after two hours, on

the survival of the HT29 cell line (human colorectal cancer cells) and on the MRC5 cell line(human fetal lung fibroblasts). Overall irradiation time was for four days,once per day. Cell viability was tested by dye exclusion test (DET) using trypan blue dye, 24 hours after last irradiation session and the total cell number was estimated. Both cell lines were irradiated using phantom constructed specially for this experiment. Obtained data were processed in STATISTICA ver. 10 software and basic statistical calculations were performed.
Results: The low-doses of 0.03Gy and 0.05Gy given alone every day during four day period did not have any significant effect on both cell lines, while 0.07Gy significantly reduced the cell survival. Same doses applied every day two hours before the 2.0Gy fraction, in four days overall treatment time, gave different response. The low-dose of 0.05 Gy led to a significantly induced radiosensitivity in HT29 cells, but not in MRC5 cells, while 0.07Gy encreased even more the radiosensitivity in human colorectal cancer cells. Contrary, same pre-irradiation dose led to a significant radioresistancy in MRC5 cells.
Conclusions: The pre-irradiation doses of 0.05 and 0.07Gy prior to the 2Gy fraction increase cell killing in human colorectal cancer cells, and at the same time have no significant effect on the survival of human fetal lung fibroblasts. Even though these results represent promising effect of applied low-dose pre-irradiation with 2Gy fraction afterwards, these findings should be proved in vivo, and finally implemented as method of choice in radiotherapy treatment.

PO-0919
Tumor growth inhibition by pulsed low-dose (below 0.5 Gy) X-ray irradiation
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Purpose/Objective: Main radiotherapy problem of cancer treatment is side-effect as a result of high dose of radiation. All of the modern apparatus for cancer therapy are not enough efficient when low-doses applying. It related with the biological sensitivity and reaction of tumor cells on radiation. Biological effects could be increased by using pulse-modulated radiation. It could allowed to significantly decrease radiation dose with saving antitumor efficacy. The source of low-dose repetitively pulsed X-ray radiation was first developed and created at the Institute of high-current electronics (Russia).
Materials and Methods: 'Sinus-150' as a generator of pulse periodic X-ray was applied. A high-voltage pulse had a half-height duration of 4 ns and amplitude of 260 kV. The calculated photon energy spectrum had a maximum at 90 keV, and most of the quantum flux was the 60-200 keV range. Dose per pulse was 0.3 mR, absorbed dose were 0.12; 0.2 and 0.5 Gy for 2-time irradiation (day 6 and 9). Solid-type of Lewis lung carcinoma was prepared by intramuscularly transplantation of 3×10^6 cells into the hind limb of C57BL/6 female mice. Tumor volumes were measured with calipers and a volume calculated (L+W+W/2). The metastases of the lung were counted using a stereoscopic microscope.
Results: Low-dose pulsed X-ray inhibits growth of Lewis lung carcinoma cells at all experimental groups. Irradiation with absorbed dose 0.12 Gy affects 69 % of tumor inhibition, 0.2 Gy – 56 % and 0.5 Gy up to 46 % compare to control group. Inhibition of metastasis growth (by square of colonies) was highest in group 0.5 Gy (72 %) and lowest at 0.2 Gy absorbed dose (58 %). Applying 0.12 Gy produced 68 % decreasing of metastatic colonies square. Same time, index inhibition of metastasis (by number of colonies) was highest both in groups irradiated with 0.12 and 0.5 Gy (84-85 %) and only 67 % observed in group with absorbed dose 0.2 Gy.
Conclusions: Pulse regime increase antitumor efficacy of low dose X-ray up to 50 - 70 % and antimetastatic action up to 60 – 80 %. Similar effects of non-pulsed X-ray achieved when the absorbed dose exceed 10 – 20 Gy.

POSTER: PREVENT TRACK: OTHER

PO-0920
Does personalized health care improve management of cancer?
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Purpose/Objective: To Assess the impact of Personalized Care on Treatment Compliance in Cancer Patients

Materials and Methods: During Jan. 2010 to Jan.2011, 161 patients with histologically proven cancer were randomized in two arms: study- where patients were provided with personalized care approach, patient centred care with requisite related information, whereas control arm patients were managed in conventional manner as prevalent within the department. All patients were treated as per merit of the case and according to departmental policy. Patients were evaluated for treatment compliance to the scheduled plan in terms of treatment completions and treatment interruptions, dropout rates and follow-up rates at the end of 3 months.
Results: N=161,study- 78, Control- 81; Age: 47.5years (mean), Range-10-70 yrs; Sex: M:F-1:1.4; Marital status:Married-99%; Rural/Urban:Rural-75%; Religion:Hindu-92%; Literacy-39%; Occupations: housewives-47%, manual workers-45% (including farmers and carpenters), professionals-8%; types of family: joint families-60%;Referral pattern: within hospital-58%; Sites: Cervix-37%, Head and Neck-32%, Breast-8%, GI-7%, brain-4% and others-12%;stage: I=7%, II-30%, III-21%, IV-31%, stage unknown-11%; Intent of treatment: Radical-69%,Postoperative-24%, Palliative -7%. Seventy percent of the patients completed the prescribed treatment (112/161). The rate of completion of treatment in study arm was better than control arm (78% vs. 61%) (P=0.02). Of the remaining 49 patients, 16/161 (10%) patients were dropped out and 33/161 (20%) patients were not came for scheduled treatment. The drop-out rate was similar in both control and study arm (10%) while the percent of patients not came for treatment was much lower in study arm (12% vs. 29%) (P= 0.011). The percentage of patients experiencing treatment interruption in those who completed treatment was lower in study arm (12% vs. 15%). Study armhad higher number of patients under follow up after 3 months: 54 (69%) vs.44(53 %).
Conclusions: The use of personalized care, providing requisite related information, communication provision, and supportive care may improve treatment compliance in terms of better treatment completions, lesser dropouts, low treatment interruptions and better follow up.

PO-0921
Fentanyl pectin nasal citrate to control breakthrough pain provoked by radiotherapy procedures in cancer patients.
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Purpose/Objective: To evaluate and control breakthrough pain (BP) episodes in advanced cancer patients (ACP) undergoing radiotherapy during proceedings and maneuvers necessary to receive treatment, and assess the ability of Fentanyl pectin nasal citrate (FPNC) to control these episodes.
Materials and Methods: Twelve patients with severe BP associated to routine radiotherapy procedures and maneuvers were selected to receive FPNC for pain relief. Most patients (10/12) suffered from bone metastases and showed a low Karnovsky performance status (30-70%). BP intensity was evaluated by Visual Analog Scale before and after the procedures that triggered it. All patients were already receiving an opioid basal treatment at total dose equivalent to 40-80 mg morphine. BP was treated before the procedure with a dose of 100-400 µg of FPNC. Data related to tolerance, pain relief, onset of the relief and efficient dose to allow the procedure were collected.
Results: In all patients, BP score was reduced at least to 50% after 13 min (5-30 min) of fentanyl administration. Pain relief started after 7 min (5-15 min) and the duration of the effect permitted the normal procedure development. All patients reported pain control with a dose of 200 µg of FPNC except one patient who required progressive doses till 600 µg. Five patients reported minor undesirable effects related to the FPNC administration.
Conclusions: Procedures and maneuvers necessary to apply radiotherapy treatment in ACP may provoke in some of them severe BP episodes, so a simple, rapid and strong analgesic is needed. FPNC offers a rapid absorption and pain relief, being particularly efficient and well accepted in these patients. This relief allows the completion of necessary procedures to administrate treatment without adding unnecessary suffering to patients.