genitourinary (GU) and/or gastrointestinal (GI) late toxicity with p = 0.0043 after Bonferroni correction in a recessive SNP model. This SNP belongs to BBC3/PUMA that plays a critical role in DNA damage-induced apoptosis. EPIC-validated quality-of-life questionnaires were surveyed for these patients with a maximum follow-up of 5 years. In this study, we further tested the relationship between rs2032809 and EPIC scores (sexual function [SF], sexual bother [SB], and sexual domain summary [SS]).
Results: At baseline, the mean SF, SB, and SS scores were 44.63 (95% confidence level [CI]: 39.53 – 49.45), 63.52 (95% CI: 58.20 – 69.13), and 50.40 (95% CI: 45.43 – 55.03), respectively. At 5-year follow-up, the mean SF, SB, and SS scores decreased by 41%, 30%, and 40%, respectively. A Mann-Whitney U test was used to investigate relationship between rs2032809 and EPIC scores. Significant associations were found with third-year SB (p = 0.039) and SS (p = 0.037) scores (Figure 1). In the third year, the mean SB scores for those who have and do not have the minor allele were 71.53 and 44.49, and 50.33 and 31.47 for the mean SS score, respectively, suggesting a considerable protective effect of this SNP. An additional test between the SNP and a fifth-year SF score yielded a borderline significant estimate (p = 0.090) and the mean SF scores were 45.76 and 23.85, respectively, for those who have and do not have the minor allele.

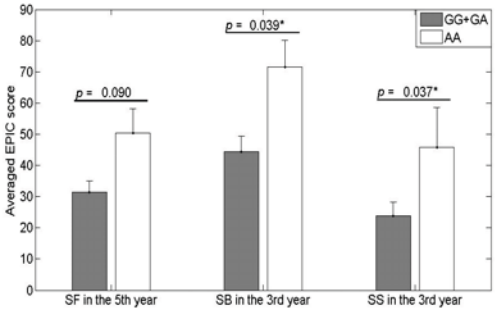


Figure 1. Comparison of mean EPIC scores (+standard error of the mean) for patients who have GG+GA and AA genotypes in rs2032809 using Mann-Whitney U test. SF: sexual function; SB: sexual bother; SS: sexual domain summary.
Conclusions: We further examined a single BBC3/PUMA gene SNP (rs2032809) that was identified as a candidate biomarker of GI/GU toxicity in prostate cancer patients with a hypothesis as to whether this SNP is also correlated with sexual dysfunction. We observed a statistically significant association between the SNP and the third or fifth-year ED of patients. This further strengthens the evidence that this apoptosis gene is an important determinant of late toxicity and is affected by rs2032809.

POSTER: PREVENT TRACK: EFFECTS OF BIOLOGICAL MODIFIERS ON NORMAL TISSUE TOLERANCE (AMELIORATION / EXACERBATION)

PO-0909
Comparison of protective effect of melatonin and amifostine on acute renal damage caused by ionizing radiation
A. Özen[1], E. Tastekin[2], S. Parlar[1], S. Cakina[3], N. Kurkcu[1], C. Uzal[1]
[1]*Trakya University Medical Faculty, Depatment of Radiation Oncology, Edirne, Turkey*
[2]*Trakya University Medical Faculty, Depatment of Pathology, Edirne, Turkey*
[3]*Trakya University Medical Faculty, Depatment of Biophysics, Edirne, Turkey*

Purpose/Objective: The aim of this study is to compare the protective effect of melatonin and amifostine on radiation induced acute renal damage.
Materials and Methods: Fifty female albino rats were divided into five groups (with ten rats each): control (Cont), radiotherapy alone (RT), radiotherapy + amifostine (RT+AMI), radiotherapy + melatonin (RT+MEL), radiotherapy + amifostine + melatonin (RT+AMI+MEL). All experiments were conducted adhering to the guidelines of the institutional animal ethics committee. RT group were treated with only 0.9% saline solution 30 min before irradiation. Intraperitoneal amifostine (200 mg/kg) was administered to the rats in the RT+AMI and RT+AMI+MEL groups 30min before irradiation. Intraperitoneal melatonin (100 mg/kg) was administered to the rats in the RT+MEL and RT+AMI+MEL groups 30 min before irradiation. RT, RT+AMI, RT+MEL and RT+AMI+MEL groups were irradiated individually with a single dose of 8 Gy on whole body, using a Co-60 treatment unit (Cirus,cis-BioInt., Gif-sur-Yvette,France). Dose rate was 1.15 Gy/min. At the end of the follow-up period (72 hours) sacrification was done in all groups. Paraffin embedded kidney tissue samples were analyzed and percentage of damaged glomeruli was determined by counting damaged glomeruli of kidney cortex as segmental or total necrosis for each animal.
Results: The percentage of damaged glomeruli is presented in Table 1. The protective effectof amifostine, melatonin, and amifostin plus melatonin on radiation induced renal toxicity is statistically meaningful (p 0.000, 0.003, 0.000, respectively). There is an advantage in favor of melatonin when compared with amifostine (p 0.005). Although there is not an advantage of adding amifostine to melatonin when compared with melatonin alone (p 0.243), there is statistically significant better protective effect in amifostine plus melatonin group when compared with amifostine alone group (p 0.003). As there was no significant damage following 8 Gy whole body irradiation on the kidney tubule, the protective effect of any agent could not be assessed.

Table 1. The percentage of damaged glomeruli

	Groups			
	Cont	RT	RT+AMI	RT+MEL	RT+AMI+MEL
Glomeruli damage (%)	0	40	30	20	20
	0	40	40	20	30
	0	50	40	30	30
	0	40	30	25	30
	0	50	20	20	20
	0	40	30	20	15
	0	40	30	25	20
	0	50	40	30	15
	0	40	40	20	15
	0	40	30	30	20

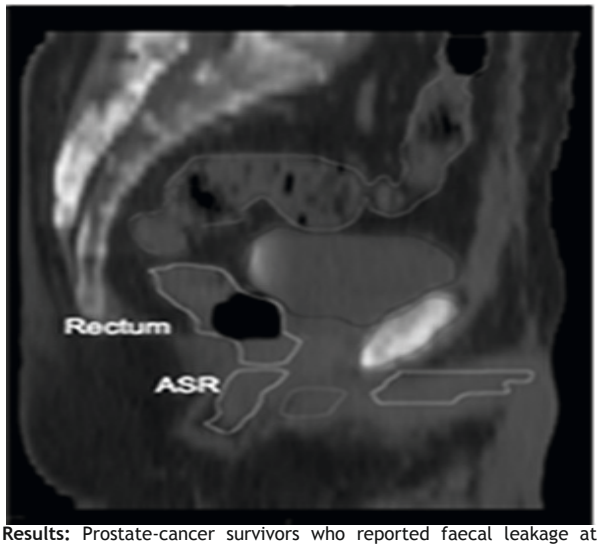
Conclusions: In this study, it has shown that the protective effect of melatonin on radiation induced acute renal toxicity is better than amifostine. These results are encouraging for the clinical use of melatonin.

POSTER: PREVENT TRACK: RADIATION EFFECTS ON SPECIFIC ORGANS / TISSUE

PO-0910
Dose to the anal-sphincter region and the rectum and faecal leakage after radiation therapy for prostate cancer.
D. Alsadius[1], C. Olsson[1], N. Pettersson[2], S.L. Tucker[3], U. Wilderäng[1], G. Steineck[1]
[1]*Institute of Clinical sciences, The Sahlgrenska Academy University of Gothenburg, Department of Oncology, Sweden*
[2]*Institute of Clinical sciences, The Sahlgrenska Academy University of Gothenburg, Department of Radiation Physics, Sweden*
[3]*The University of Texas MD Anderson Cancer Center, Department of Bioinformatics and Computational Biology, Houston, USA*

Purpose/Objective: To investigate possible synergetic effects between dose to the anal-sphincter region and dose to the rectum for the occurrence of long-term fecal leakage after radiation therapy for prostate cancer.
Materials and Methods: For the current analyses we included 414 prostate-cancer survivors who had received external beam radiation therapy (EBRT) to a total dose of 70 Gy in 2 Gy daily fractions between 1993 and 2006. We also included 332 population-based controls matched for age and residency. EBRT was delivered using one anterior-posterior and two lateral wedged field. The planning target volume comprised the prostate or post-operative prostatic region with 20 mm margin except for the rectal margin, which was 15 mm or maximum half the rectal cross-sectional area. We restored original

treatment plans on which we delineated the anal-sphincter region (ASR) and the rectum following the outer border (Figure). We delineated the anal-sphincter region extending from the end of the rectal ampulla to the anus. The rectum was delineated from the recto-sigmoid junction to the end of the rectal ampulla. Fecal leakage was assessed in the questionnaire by the question 'Have you had fecal leakage while awake, the previous six months?'. The responses were dichotomized at a level of symptom occurrence at least once a month.



Results: Prostate-cancer survivors who reported faecal leakage at least once a month had received an average mean dose to the rectum of 47.8 Gy compared to 44.0 Gy for those who reported faecal leakage less than once a month (two-sided t test p=0.009). When stratifying the mean absorbed dose to the rectum in 5 Gy-bins we found a statistically significantly higher occurrence of faecal leakage compared to population-based controls from 35 Gy and above. Men who had received a mean absorbed dose of ≥40 Gy to the anal-sphincter region *(IJROBP 2012;84:e131)* and ≥35 Gy to the rectum had the highest prevalence ratio 4.6 (95% CI 2.2-9.5) of faecal leakage compared to controls (Table).

Fecal leakage and mean absorbed dose to the anal-sphincter region and the rectum among prostate-cancer survivors compared to population-based controls.

	Population-based controls	Anal-sphincter region <40 Gy, Rectum <35 Gy	Anal-sphincter region ≥40 Gy, Rectum <35 Gy	Anal-sphincter region <40 Gy, Rectum ≥35 Gy	Anal-sphincter region ≥40 Gy, Rectum ≥35 Gy
Fecal leakage, *at least once per month*	8/ 239 (3)	16/ 346 (5)	7/ 77 (9)	22/ 281 (8)	48/ 312 (16)
Prevalence ratio	1.0 (Reference)	1.4 (0.6–3.2)	2.7 (1.0–7.2)	**2.3 (1.1–5.2)**	**4.6 (2.2-9.5)**

Conclusions: Our results suggest that the combination of dose to the anal-sphincter region and dose to the rectum contributes to the excess risk of long-term faecal leakage after radiation therapy for prostate cancer. These findings indicate that future prediction models for this symptom may need to consider both these organs-at-risk.

PO-0911

Acute toxicity and cosmetic outcome in 294 breast cancer patients treated with hypofractionated radiotherapy

J. Pardo[1], A.M. Mena[1], I. Prieto[2], A.O. Noe[1], A. Alvarado[3], J. Luna[2], J. Vara[2], A.M. Pérez[2]
[1]*Hospital Universitari Son Espases, Radiation Oncology, Palma de Mallorca, Spain*
[2]*Capio-Fundación Jiménez Díaz, Radiation Oncology, Madrid, Spain*
[3]*Capio Sanidad, Radiation Oncology Research Group, Barcelona, Spain*

Purpose/Objective: Since the objective of conservative treatment, in addition to local control and survival, is the aesthetic result, the acute toxicity and cosmetic outcome evaluation is essential. Here we present the results of the first 256 breast cancer pts treated with HPRT scheme.
Materials and Methods: Clinical records of 294 breast cancer pts receiving postoperative HPRT after conservative surgery pts had been evaluated. Age: Mean 57.26 years (range 30-80). Tumor location: 54.08% (158) of the pts on the right breast and 45.92% (136) on the left. Surgical treatment: Lumpectomy+sentinel node technique (181 pts, 61.56%), quandrantectomy+axillary dissection (60 pts, 20.40%), and lumpectomy+axillary dissection (53 pts, 18.04%). Histology: CDI (94.89%). Tumor size: 1.39 cm. (range 0.4-5.8). Histological grade: GI 29.25%, G2 40.81% and G3 29.94%. Resection margins: 18 pts (6.12%) with positive margins. Hormone receptors: (-) in 6.46%. HER-2: (-) in 11.22%. Sentinel lymph node: (+) in 1.70%. Isolated axillary nodes: Mean 12.5 (range 1-24). Positive 1.02 (range 0-2). Stage: I 70.06%, II 27.55%, and III 2.39%. RTP schedule: Breast: 40.5 Gy in 15 fractions of 2.7 Gy. Boost: 103 pts (35.03%) received no boost, 176 (59.86%) received 10 Gy/5fr and 15 (5.11%) received 14 Gy/7fr. Adjuvant chemotherapy: 52.38%. Hormone therapy: 58.87%. Follow-up schedule: Weekly based during RTP, 1 month after the end of RTP and, later, every three months.
Results: 77 pts (26.19%) developed radiodermatitis. Of these, 88.31% Grade I and 11.69% Grade II. The mean dose at which radiodermatitis appeared was 34.92 Gy (range 13.5-46.5). After 12 months of follow-up, only 17 pts (5.78%) had a slight residual hyperpigmentation in the treated area.
Conclusions: With careful planning, acute toxicity and cosmetic outcome of HPRT are perfectly comparable to that obtained with conventional fractionation. Thus, in addition, this treatment scheme reduces total time of treatment and, therefore, a decrease in the waiting list is achieved.

PO-0912

Radiation-induced cancer risk in breast cancer patients (pts). Boost by photons or electrons? Preliminary results

I. Alastuey[1], J. Pardo[1], A. Ariño[2], J. Font[2], I. Prieto[3], A. Mena[1], A.O. Noe[1]
[1]*Hospital Universitari Son Espases, Radiation Oncology, Palma de Mallorca, Spain*
[2]*Hospital Universitari Son Espases, Medical Phisics, Palma de Mallorca, Spain*
[3]*Capio-Fundación Jiménez Díaz, Radiation Oncology, Madrid, Spain*

Purpose/Objective: In breast cancer pts it's crucial, because of its high survival, to study the possibilities of developing a radiation-induced cancer. In its development are implicated low range radiation doses (up to 20 to 30 Gy, depending on the tumor type) received by the healthy tissue, except for second sarcoma, induced at higher doses. The dose over the entire breast is 50 Gy, and therefore this dose is outside the above range. The purpose of this study is to analyze the effects of boost performed, whose value is between 10 and 16 Gy [included within the dosage range previously mentioned as potential inducer of second cancers in areas as homolateral (HL) and contralateral lung (CL) and breast (CB)] and find out if there is any difference if its delivered by PH or E and, therefore, one technique is more cancer inductive than the other. We present the results of the first five pts.
Materials and Methods: 5 consecutive breast cancer pts, treated with conservative intend, undergoing radiotherapy, were enrolled. The Eclipse (Varian) version 10.0 planning system was used for treatment planning and dose-volume histograms (DVH) analysis. Statistical analysis of data was performed by MATLAB software. For each pt, two different boost planning options were calculated; one by PH and another by E. DVH of each were analyzed and determined: a) Volume (cm^3) of HL and CL receiving a dose between 5 and 20 Gy (V5-20 Gy). b) Volume (cm^3) of CB receiving a dose between 5 and 10 Gy (V5-10 Gy). c) Volume (cm^3) of esophagus receiving a dose between 10 and 20 Gy (V10-20 Gy). These cancer induction dose ranges had been reported by Schneider et al in 2011. Also, the mean integral dose in the treated breast (MIDB) and the mean integral dose received in the whole simulation volume (MIDWSV) were determined for each patient. A Wilcoxon-Mann Whitney test was performed for each organ.
Results: The Wilcoxon-Mann Whitney test was performed for HL, MIDB and MIDWSV because, in the other organs we observed that the volumes receiving doses considered limiting were null. The test showed that the null hypothesis was true (median equal for both data samples, with a significance level of 5%) for HL, but false for MIDB and MIDWSV. Therefore, in the group of patients, no significant differences were found in HL between both boost treatment modalities (PH or E), but they were found for MIDB (increased for E) and for MIDWSV (increased for PH).
Conclusions: There is a significant difference between E or PH boost regarding low doses in distant organs. Not differences were found regarding lung doses for both techniques. E boost possibly is more related to higher probability of homolateral induced sarcoma. Integral dose is also higher in PH boost. Integral dose has been linked to general cancer induction. This low dose distribution might be used as