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Spontaneously arising tumours, preferentially in older mice may represent an interesting model for immune therapy.

Symposium: Focus on the pelvic region

SP-0507
Bladder variability for pelvic radiotherapy: its approaches and impact

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It is clear that the bladder as an organ has marked shape and positional variability due to its function of storing urine before the call of nature. This has obvious repercussions for pelvic radiotherapy depending on the intent of treatment particularly if the bladder itself is the radiotherapeutic target. As an organ-at-risk (OAR) this variability can be important and this can also impact on adjacent organs such as the prostate, rectum and uterus if these latter organs are being treated with radiotherapy. These adjacent pelvic organs can also deform the bladder. In addition the setup position of the patient either supine or prone can also influence on the day-to-day bladder position and shape. Furthermore the kidneys filtered continuously thus there will be steady filling of the bladder with a rate dependant on the hydration status of the patient during radiotherapy delivery. Other factors may also be crucial such as bladder capacity and function as well as disease extent if there is bladder cancer. Therefore the variability of the bladder size and shape is an important consideration for any pelvic radiotherapy. Many investigators have reported on the marked difference in filling of the bladder with variation in bladder size that may range up to 20 mm on different scanning times during a course of fractionated radiotherapy. For primary bladder radiotherapy, identification of the disease extent remains important as both the target and tissue of tolerance is the bladder itself. This can also impact on the manner in which the bladder fills in 3D and be distorted by invasive bladder disease. It can be difficult to maintain daily consistency of the 3D shape and size thus there are several methods developed to deal with this including treatment with either an empty or comfortably full bladder to initiating adaptive planning and image guided delivery methods. Fiducials have been used to better target the main disease for either boosting disease or to incorporate focal therapy strategies. These methods can also permit organ avoidance if the bladder is an OAR and it is critical to minimise dose to it due to poor bladder function and other clinical factors. If the bladder is not the target then it can perform a useful function with intended filling prior to radiotherapy in order to displace other pelvic organs such as the bowel from irradiation such as with treatment of the pelvic nodes. Thus patient and disease related factors will need to be carefully assessed for each case. All these methods including their rationale and effectiveness will be discussed for both situations of the bladder as a target and as an OAR.

SP-0508
An evaluation of GoldAnchor intraprostatic fiducial marker stability during radiotherapy

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Background: Implantation of fiducial markers for IGRT (Image Guided Radiation Therapy) of prostate cancer patients increases the treatment accuracy by prostate localization using two orthogonal X-rays images. However the precision of the treatment depends on the stability of the fiducial marker. The aim of this study was to evaluate the migration of fiducial markers during the whole radiotherapy of prostate cancer patients.

Material and methods: An analysis of the intraprostatic fiducials migration during the treatment planning was done on a group of 45 patients on the basis on fusion of kV CBCT (performed during the first week of the treatment) and planning CT. The value of migration during the course of radiotherapy was done on a group of 20 patients treated within IGRT protocol on the basis on the fusion of kV CBCTs, performed weekly. The migration was defined as a shift between central points of markers, measured in three axis.

Results: The average values of the GoldAnchor™ migration during the treatment planning were: 1.1 mm (SD=0.9 mm) in the superior-inferior (SI) direction, 0.5 mm (SD=0.6 mm) in the left-right (LR) direction and 1.1 mm (SD=1.2 mm) in the anterior-posterior (AP) direction. The mean value of the vector of shifts was 1.9 mm (SD=1.3 mm). The average values of the GoldAnchor™ migration during the course of radiotherapy were: 0.1 mm (SD=0.2 mm) in the superior-inferior (SI) direction, 0.1 mm (SD=0.3 mm) in the left-right (LR) direction and 0.2 mm (SD=0.4 mm) in the anterior-posterior (AP) direction. The mean value of the vector of shifts during the treatment was 0.3 mm (SD=0.5 mm).

Conclusions: The analysis of the collected data showed that the marker shifts during the treatment planning seems to have no clinical significance and probably are related to the inaccuracy of the fusion of kV CBCT and planning CT. Position of the marker is stable during the whole course of radiotherapy. Therefore, IGRT based on GoldAnchor™ markers is safe and effective method of prostate cancer patient positioning.

SP-0509
Validation of a prostate cancer decision aid tool for shared decision making

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Purpose: To comply a decision aid tool with the criteria of the International Patient Decision Aid Standards (IPDAS), it is mandatory to follow a systematic and iterative approach to; (a) understand patient's and clinicians decisional needs, (b) create prototypical tools, (c) evaluate these prototypes with patients and clinicians and (d) use these results to improve the tool. We developed and validated a web-based decision aid (DA) for shared decision making in prostate cancer patients using this approach.
Methods: A prototype of the tool was designed based on the input of an interdisciplinary group. Its clarity and acceptability was tested using a mixed method (interview and technology acceptance questionnaire; 5-Likert scale). The evaluation was performed with physicians (N=19) and patients (N= 16). Professionals from 5 academic and private hospitals (urologists, radiotherapists, specialized nurses and family doctors) gave their perspective about the patients' decisional needs and validated the information about the treatment options, complications and outcomes. The included patients were treated with either external beam radiotherapy, brachytherapy or prostatectomy. Patients who choose not to be treated (active surveillance) were also included. The decisional needs were evaluated during an interview. Afterwards the patients' were guided through the DA and asked to fill in a questionnaire to check the comprehensibility of the tool. A second group of patients (N=8) was included to assess the e-learning effect of the DA and to check if patients were able to use the DA alone (without coaching).

Results: The results were considered to create a new version of the DA. Physicians mentioned the need of information about basic anatomy, contraindications, hospital specific figures, and psychological support. Patients reported that the

prototype of the DA provides clear information about the treatment options and their side-effects. Issues about the usability of the DA were reported and enabled us to improve and simplify the DA. The next step is to perform a study to establish the impact of the DA on the decisional conflict and the shared decision making process.

Conclusion: The systematic and iterative approach used to develop and validate the DA, allows to follow a thoroughly development process, and to gain knowledge about decisional needs.

Poster Viewing: 11: Clinical: Breast, head and neck

PV-0510

Evaluation of a breast cancer nomogram to predict local relapse after breast conserving therapy

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Purpose or Objective: Van Werkhoven et al. developed a nomogram to predict the 10-years ipsilateral breast relapse (IBR) after breast conserving therapy (BCT) for breast cancer (BC) based on the European Organisation for Research and Treatment of Cancer (EORTC) 'boost no boost'-trial with a concordance probability estimate (CPE) of 0.68 (van Werkhoven E, et al. 2011, Radiother Oncol). The nomogram includes histologic grade, ductal carcinoma in situ (DCIS), tumour diameter, age, tamoxifen, chemotherapy and boost. The aim of this study was to evaluate the performance of that algorithm in an independent cohort.

Material and Methods: We retrospectively identified 1866 BC patients who underwent BCT with radiotherapy from 2000 to 2007.

Two definitions of IBR were considered where simultaneous regional or distant recurrence were either censored (conform EORTC analysis) or included as event.

Patient, tumour and treatment characteristics were evaluated in uni- and multivariable analysis.

Firstly we assessed discrimination, i.e. the extent to which patients predicted to be at higher risk exhibit higher event rates than those deemed at lower risk, by the CPE. The CPE was determined based on a Cox model with time to IBR as outcome and the EORTC nomogram 10-years IBR-free probability as the only covariate. Secondly a calibration plot was drawn, showing the predicted 10-years IBR-free probabilities against observed Kaplan–Meier estimates, to reflect prediction accuracy, i.e. the absence of over- or underestimation.

Results: Median follow-up time was 10.75 years.

Patients were on average older (58 vs 54 years), had a larger average tumour diameter (18 mm vs 15 mm) and were more likely to have received chemotherapy (29.7 % vs 15.7 %), to have a high grade disease (37.0 % vs 23.5 %) and to have a DCIS (69.8 % vs 57.8 %). Twenty-three percent of the patients received tamoxifen in the EORTC group, whereas 81.6 % received hormonal therapy in the validation group. Almost all patients (99.7 %) in the validation group received a boost versus 50.4 % in the EORTC cohort. Noteworthy on the variables not included in the nomogram, patients in the validation cohort had a higher percentage of oestrogen and progesterone receptor positivity (86.4 % vs 71.7 % and 75.9 % vs 64.3 %, respectively) and 10.2 % had HER2 overexpression.

The 10-years IBR-rate was 1.4 %. On multivariable analysis, only the omission of the boost dose was a significant prognosticator of IBR ($p < 0.01$) with a trend for age ($p = 0.06$).

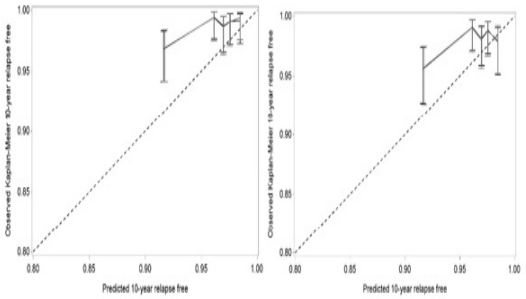
The nomogram demonstrated suboptimal discrimination, with a CPE of 0.54, and suboptimal calibration with an overestimation of the IBR-risk in general (Table 1 – Figure 1).

Table 1: CPE for the two definitions of local relapse.

IBR	Dataset	N cases	N events	CPE * (95 % CI)
First definition	All data	1787	34	0,54 (0,52;0,57)
	Restricted data *	1672	31	0,54 (0,51;0,57)
Second definition	All data	1787	45	0,54 (0,51;0,56)
	Restricted data *	1672	42	0,54 (0,51;0,56)

* Restricted data: excluding values beyond the ranges applied in the EORTC nomogram (age range 27-76 years and tumour size 0-50 mm).

Figure 1: model calibration plot for the two definitions of local relapse.



Note: For 5 subgroups of equal size, the model-predicted average relapse-free rate was plotted against the Kaplan-Meier estimated observed rates with 95 % confidence intervals. Black represents 'All data', grey represents 'Restricted data'. The dashed line corresponds to ideal calibration.

Conclusion: The EORTC predictive model for IBR in BC patients lacks accuracy in this more recent study population. Therefore the model should be tested and verified in additional, large patient populations and incorporating molecular subtyping might be needed.

PV-0511

Hypofractionated VMAT for early stage breast cancer: acute toxicity and cosmesis in 840 patients

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Purpose or Objective: To evaluate acute toxicity and early clinical outcomes of hypofractionated simultaneous integrated boost (SIB) approach with Volumetric Modulated Arc Therapy (VMAT) as adjuvant treatment after breast-conserving surgery.

Material and Methods: Patients presenting early-stage breast cancer were enrolled in a phase II trial. Eligibility criteria were as follow: age >18 years, invasive cancer or DCIS, Stage I to II (T <3 cm and ≤N3), breast -conserving surgery, any systemic therapy was allowed in neoadjuvant or adjuvant setting. All patients underwent VMAT-SIB technique to irradiate the whole breast with concomitant boost irradiation of the tumor bed. Doses to whole breast and surgical bed were 40.5 Gy and 48 Gy respectively, delivered in 15 fractions over 3 weeks Acute skin toxicities were recorded according to RTOG scoring criteria, and late skin toxicities according to CTCAE v4.0. Cosmetic outcomes were assessed as excellent/good or fair/poor according to the Harvard scale.

Results: Between August 2010 and January 2015, 840 consecutive patients were treated. Median age was 60 year (range 19-89 years). The median follow up was 16 months (range 6-55). At the end of RT treatment skin toxicity profile was G1 in 49% of the patients, G2 in 13%, and one patients presented G3 toxicity (0.1%). At six months of follow up skin toxicity was G1 in 27% of patients, G2 in 1%, no G3 cases;