

given as radical or adjuvant treatment for PC in 4 and 5 patients respectively and as neoadjuvant therapy for rectal cancer in 1 case. The median dose of prior RT was 70 Gy (range 45-76) and the median time between the first and the second RT course was 117 months (range 95-219). The total dose of retreatment was 50 Gy in 5 patients and 60 Gy in 2 (2 Gy daily fraction). Patients immobilized with Combifix device underwent planning computed tomography (CT) with 3-mm slice thickness; they were instructed to receive RT every day with an empty rectum and a full bladder. Clinical target volume (CTV) was the prostate in 5 and the PET positive nodule in 2 patients. Organs at risk (OAR) were: rectum, bladder, penile bulb and femoral heads. Planning target volume (PTV) was obtained by adding 3-5 mm to the corresponding CTV. The parameters used in HT planning system were: field width 1 or 2.5 cm, pitch 0.287 and modulation factor ranging from 2 to 3. Median duration of treatments was 180.7 seconds (range 145-347.8).

Results: Median follow up was 7 months (range 3-38). All patients completed the reirradiation course. PTV median size was 66.65 cc (range 7.91 - 114.26). The cumulative mean dose (D mean) to the rectum ranged from 37.87 to 73.83 Gy and the cumulative rectal maximum dose (D max) ranged from 112.66 to 119.85 Gy. The cumulative D mean to the bladder ranged between 19.84 and 83.79 Gy; cumulative D max ranged from 93.99 to 126.3 Gy. When total dose was 50 Gy, the OAR dose volume constraints were: V10< 40% and V25<10% for rectum; V10<20%, V25<10% and V44<2% for bladder. When total dose was 60 Gy the constraints were: V10<30% and V30<1% for rectum and V10<15%, V30<10% and V50<5% for bladder. Acute grade 2 genitourinary toxicity was observed in 3 patients and grade 2 gastrointestinal toxicity in 1 patient. Three months after retreatment all patients had early PSA decrease; only 2 patients experienced biochemical relapse due to pelvic nodal recurrence. One patient died for bladder cancer.

Conclusions: PC patients benefit from salvage reirradiation with HT. The treatment was feasible and well tolerated, with low rates of acute toxicity. Longer follow up is required to confirm retreatment safety and evaluate late toxicity.

EP-1252

From datasets to predictive models: could an ontology development improves clinical choices in prostate cancer?

A.R. Alitto¹, R. Gatta¹, A. Damiani¹, E. Meldolesi¹, N.

Dinapoli¹, G.C. Mattiucci¹, V. Valentini¹, G. Mantini¹

¹Università Cattolica S.Cuore, Radiation Oncology

Department Gemelli-ART, Rome, Italy

Purpose/Objective: Even if many advances have been done in cancer care, clinical choices are based on evidence-based guidelines, resulted from large randomized trials often, and applicable only to population subset. Need of 'tailored treatment' can require specialized Decision Support System (DSS). Therefore, creation of large, and heterogeneous databases, could implement and validate DSS based on predictive models. In order to share the same meaning between people involved in the project, an ontology need to be created and shared. Our aim is to build a prostate cancer ontology able to represent a list of the main concepts involved in this semantic domain and how those concepts are related, by a graph.

Materials and Methods: We built ontology starting from a well-defined data collection model, able to collect, standardize and organize concepts related with prostate cancer patients. These features were organized according three different levels. The first, Registry level, includes all general epidemiological information (age, gender, e.g.). The second, Procedure tier, includes information about treatment and toxicities, and outcome evaluation. The last, Research level, includes clinical, imaging and Quality of Life information for advanced research projects. Relationships between concepts have been added as last step. The so built ontology describes each of these concepts with a unique reference, preferably mapped to a published coding system (e.g. NCI Thesaurus, CTCAE).

Results: Building an ontology is a good strategy to standardize data and procedure and create a consistent dataset. We selected more than 200 variables related with prostate cancer. The three data storing tiers were used to classify all the information to easily develop queries depending on the analysis different (epidemiological, toxicity, outcomes e.g.). Many concepts can be shared with ontologies related other cancer sites (general idea of toxicities, TNM, etc.) while others are prostate specific (PSA, etc.). We decided to adopt a trade-off between the formal explication of the ontology and the effective usability of it: even if a formal ontology is a powerful tool to allow automatic inference and represent in a not-ambiguous way a semantic, it is hard to be handled and properly validated.

Conclusions: Sharing and combining multiple dataset, through structural collaboration between different groups, are the basis to generate large databases. Computer Science allows us to share concepts in a not ambiguous way in order to do that, by using ontologies and related languages. Through an ontology creation we obtained a standardized and organized dataset, easy to be shared and understood, not ambiguous, mapped on most common international standards and suitable to create predictive models which complement existing consensus or guidelines, moving from prescription by consensus to prescription by numbers.

EP-1253

Evaluation of interfractional bladder doses for two different patient positioning methods in prostate cancer

A. Altinok¹, H. Acar¹, R. Rizazade¹, N. Kucuk¹, E.

Kucukmorkoc¹, M. Doyuran¹, H. Mabhouti¹, H.B. Caglar¹

¹Istanbul Medipol University, Radiation Oncology, Istanbul, Turkey

Purpose/Objective: The aim of this study is to evaluate the changes in bladder doses during the volumetric modulated arc therapy (VMAT) treatment of prostate cancer patients using weekly cone beam computed tomography (CBCT) data.

Materials and Methods: Ten consecutive patients with prostate cancer treated by radical RT were considered. For each patient, pre-treatment CBCT performed on a weekly basis were analyzed by using two different methods of target localization (intraprostatic fiducials and bony anatomy). To evaluate the changes in bladder doses; organs of interest were contoured on each weekly treatment CBCT data set and the images, along with the contours, were registered to the original planning CT. The replanning was made on planning CT using contours transferred from CBCT for two different

positioning methods. The doses received by 20%, 40% and 50% volume of bladder were compared to those of the original treatment plans.

Results: Based on contours from CBCT images, for bony anatomy positioning method the delivered bladder doses were on average 591.7 cGy (\pm 276), 413.6 cGy (\pm 178), 367.4 cGy (\pm 93) lower than the planned dose for D_{20%}, D_{40%}, D_{50%} respectively. For fiducial positioning method, they were 141.2 cGy (\pm 84), 82.2 cGy (\pm 61), 67.3 cGy (\pm 47) lower than the planned dose respectively. The dose difference between planned and delivered dose shows that the greatest variation depending on the bladder filling among the fractions. Although, significant differences in bladder volumes and subsequent increases in dose were observed in two out of ten patients, the bladder doses are still within the acceptance criteria. Results indicate a wide range in bladder doses throughout treatment, which partly depends on the methods used for patient positioning. Of the two patient positioning methods evaluated, the least amount of bladder dose variability, is seen when target localization was made using intraprostatic fiducials.

Conclusions: Large interfraction variations in bladder filling hamper accurate radiotherapy of prostate cancer. Although the reproducibility of bladder filling during treatment is low, since the estimated mean bladder volume is generally larger when compared with the value at the planning CT scan, the bladder doses are within the tolerance limits.

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Proctoscopic evaluation of rectal toxicity after radio-hormone therapy in prostate cancer

A. Galuppi¹, F. Deodato², E. Shukull¹, E. Ippolito³, C. Digesù², L. Tagliaferri⁴, G. Macchia², S. Cammelli¹, V. Valentini⁴, A.G. Morganti¹

¹Policlinico Universitario S. Orsola-Malpighi, Radiotherapy Department, Bologna, Italy

²Fondazione 'Giovanni Paolo II' Catholic University of Sacred Heart, Radiation Oncology Unit, Campobasso, Italy

³Campus Biomedico University, Radiation Oncology Unit, Roma, Italy

⁴Catholic University of Sacred Heart, Radiation Oncology Unit, Roma, Italy

Purpose/Objective: Late rectal toxicity is one of the most important negative consequences of radiation therapy in patients with prostatic carcinoma (CAP). In a previous study we observed a significant correlation between proctoscopy outcome one year after RT and late rectal toxicity during the follow-up. Therefore we proposed early proctoscopy as a surrogate end-point for late rectal toxicity. Aim of this study was to investigate predictive factors of late rectal toxicity by proctoscopy.

Materials and Methods: The analysis included all patients who underwent proctoscopy one year after the end of radiation therapy. Proctoscopy was performed by the same operators, using Wachter score. The following parameters were analyzed as potential predictive factors: RT dose, fractionation, pelvic lymph nodes irradiation, previous prostatectomy, timing and type of hormone therapy. Statistical analysis was performed using the chi-square test (univariate analysis) and logistic model (multivariate analysis).

Results: In this analysis 157 patients with non metastatic CAP treated with curative and adjuvant RT were included. The results are shown in the table below.

		Wachter score		p: (univariate)	p: (multivariate)
		< 3 (%)	≥ 3 (%)		
dose	< 70 Gy	57.4	42.6	0.112	0.199
	≥ 70 Gy	69.8	30.2		
fractionation	≤ 2 Gy/fr	69.8	30.2	0.112	0.555
	> 2 Gy/fr	57.4	42.6		
Pelvic lymphnode RT	no	65.4	35.1	0.961	0.905
	yes	64.9	38.1		
Previous RP	no	61.8	38.1	0.156	0.112
	yes	74.4	25.6		
adjuvant	LH-RH analogue	60.3	39.7	0.178	0.061
	antiandrogen	72.5	27.5		
timing of adjuvant HT	6 months	59.4	40.6	0.238	0.495
	24 months	71.4	28.6		

RT: radiation therapy; RP: radical prostatectomy; HT: hormone therapy.

Conclusions: In a proctoscopy evaluation of radiation-induced rectal toxicity only patients who underwent adjuvant hormonal therapy based on LH-RH- analogues, showed a trend to a higher risk of toxicity. The lack of correlation with other clinical parameters can be partially explained by the use of SIB-based modulated techniques (IMR-VMAT) in patients treated with hypofractionated RT.

EP-1255

Learning curve of MRI guided high dose rate brachytherapy for prostate cancer

S. Buus¹, S. Rylander², S. Hokland², C.S. Søndergaard², E.M. Pedersen³, K. Tanderup², L. Bentzen¹

¹Aarhus University Hospital, Oncology, Aarhus C, Denmark

²Aarhus University Hospital, Medical Physics, Aarhus C, Denmark

³Aarhus University Hospital, Radiology R, Aarhus C, Denmark

Purpose/Objective: MR imaging following needle implantation in high dose rate brachytherapy (HDR BT) provide more anatomical details for improved definition of the prostate gland, organs at risk, and needles. The purpose of this study was to evaluate the introduction of MRI guided HDR BT, including time consumption, dose volume parameters, and changes over time.

Materials and Methods: A team of radiation oncologists, physicists, radiologists, and nurses was trained to perform MRI guided HDR BT. Between September 2012 and November 2014, 42 consecutive high risk prostate cancer patients received two times HDR BT of each 8.5 Gy after EBRT. Time was recorded for initiation of anaesthesia, end of ultrasound guided needle implantation, MR scan, and HDR BT delivery. We defined implantation time as duration from initiation of anaesthesia to end of needle implantation, and total procedure time as duration from initiation of anaesthesia to end of HDR BT delivery. Dose volume parameters were retrieved from the dose planning system.

Results: Implantation time was reduced from an initial level of -4.5 hours min to -2.5 hours at -800 days from introduction. Implantation time at the second HDR BT procedure was in average 12 min faster than the first. Total procedure time was reduced from an initial level of -10 hours min to -5 hours min at -800 days from introduction. Total procedure time of the second HDR BT was in average 17 min faster than the first. Estimated extra time consumption of the post implant MRI was median 66 min (range 26-195 min).