required margins. Lorca Marin thermoplastics masks show enough accuracy and stability during complete course of treatment with intensity modulated techniques in head and neck cancer patients.

**EP-2091**

Establishment of dose reference levels (DRLs) for CT of the head and neck in radiation therapy

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**Purpose or Objective:** Computed tomography (CT) has become an indispensable tool in oncological imaging. Ionising radiation is cumulative and carries a stochastic risk of malignancy. The implementation of dose reference levels (DRLs) for imaging procedures using ionising radiation is mandated by European Commission directive 97/43 EURATOM. There are currently no dose guidelines for radiation therapy CT of the head and neck (H&N) region. The propose of this research is to establish if variation exists in dose delivered by Irish centres; establish a national DRL for H&N CT scanning in radiation therapy and compare the national DRL with a European sample.

**Material and Methods:** All radiation therapy centres in Ireland and a selection of European centres were invited to complete a dose audit survey for 10 average-sized H&N patients undergoing a CT localisation scan. Data on CTDIvol, DLP, mAs, tube voltage, number of scan phases and scan length was collected.

**Results:** Surveys were returned by five Irish centres, representing a 42% response rate and one European centre. Significant variation was found in the mean DLP, CTDIvol and scan lengths. Based on the rounded 75th percentile of the mean DLP and CTDIvol, the proposed Irish DRL is 1025.41mGy cm and 20.97mGy, respectively. Based on the European survey the DRLs for DLP and CTDIvol were 680.12mGy cm and 21.85mGy, respectively.

**Conclusion:** Variation exists in dose used for H&N CT in radiation therapy. DRLs have been proposed with the aim of dose optimisation for this procedure.

**EP-2092**

Impact of treatment volumes in loco-regional failure of oral cancer in patients treated with IMRT

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**Purpose or Objective:** The aim of the study was to analyze the impact of radiation therapy (RT) or concomitant radiochemotherapy (RT-CT) on locoregional control (LRC) in patients affected by oral cancer.

**Material and Methods:** Materials and methods: in this study we enrolled 48 patients with oral cancer diagnoses underwent postoperative RT or exclusive RT-CT treatment. The RT was performed with intensity-modulated radiotherapy (IMRT) technique and LINAC DHX of Varian System. All patients were treated at the department of Radiotherapy, University of Pisa. In patients non treated surgically or operated with presence of minor risk factors (positive lymph nodes, lymphatic vascular invasion, perineural invasion) underwent only RT treatment. The volumes were defined as follows: PTV high risk: 66Gy (2.2Gy /fraction) or 63Gy (2.1Gy /fraction) respectively for exclusive RTCT treatment and adjuvant RTCT or RT treatment PTV intermediate risk: 60 Gy (2.0Gy /fraction) PTV low risk: 54Gy (1.8Gy /fraction)

**Results:** From January 2011 to July 2015, 48 patients (mean age 60.9 years; range 33-87) with histologically confirmed diagnosis of oral cancer were treated. At analysis 30 patients (62.5%) underwent surgical treatment and 18 (37.5 %) performed exclusive RTCT treatment. Twentyfour patients were treated with radiochemotherapy or radiotherapy plus molecular-target therapy; in 20 patients (83%) was administered CDPP; in 4 patients (17%) in combination with RT was administered Erbitux. Relapses were divided into local (on T), regional (on N) and locoregional (if the recurrences were on T and N) and classified, after the merger of radiological imaging with radiation therapy planning; in “in field” (within the PTV high risk) and “out field” (without PTV high risk) After a median follow-up of 19.8 months (range 3-62 months), six patients (12.5%) developed local recurrence “in field” and two patients (4.2%) reported locoregional relapse on field. There were not “out field” recurrences. Of six patients relapsed 2 (33.3%) underwent salvage surgery and subsequent CT; 3 (33.3%) underwent second line CT according to Extreme schedule and 1 patient (2%) didn’t any systemic treatment but only support care due to comorbidities and scarce performance status. At the date of abstract submission 3/6 patients died while the others are still alive; overall 5/48 patients (10.4 %) died and only 2 died for cancer-related causes and three for comorbidities.

**Conclusion:** The results of our study confirm the data reported in literature regarding the locoregional recurrences of oral cancer treated with radiotherapy. In field locoregional relapse seems to be the main cause of IMRT treatment failure regardless the patient underwent at surgery treatment or not.

**EP-2093**

Drinking instructions does not significantly influence interfraction bladder volume stability

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**Purpose or Objective:** Bladder preparatory protocols are used in prostate cancer (PCa) radiotherapy (RT) prior to simulation (Sim) imaging, and thereafter to each fraction of RT. Patients are asked to drink, and hold without voiding, a constant volume of water. Distension of the bladder reduces the volume of the bladder irradiated to high doses. A study of online image-guided radiotherapy (IGRT) in bladder cancer showed that inter- and intra-fraction reproducibility was mostly insensitive to degree of bladder filling. Radiographer students were asked to test the analogous hypothesis for inter-fraction reproducibility in bladder volume over 7 weeks of PCa IGRT.

**Material and Methods:** An audit of PCa IGRT found 96 cases within 1 year of study commencement. 56/96 were locally advanced PCa homogeneously treated with bladder preparation instructions, daily online cone-beam CT (CBCT) verification and 20Gy sequential boost to gland only following 50Gy to gland plus seminal vesicles by normo-fractionated IMRT. 42 were complete cases in which bladders had been consistently outlined at Sim and 7 CBCTs weekly. 30/42 men agreed to hold 300mL of water each session, but in practice only 26/42 were able to comply throughout treatment. 12/42 men declined the drinking instructions outright.
Results: Sim and weekly CBCT volumes were tested for non-normality and leverage. 4 men had Sim volumes that were well in excess of 500mL, and by mid-course, had greatly reduced. The extreme cases exerted strong leverage. In 28 men, bladder volumes were log-normally distributed. Compliant men had bladder volumes (162 mL) statistically significantly larger (p<0.01) than men refusing (83 mL). The random inter-fraction variation was the same in both groups (33%). Compliant men had a mean systematic increase in bladder volume of 12% (95% CI = 4.8-21%, p < 0.01) relative to Sim, compared to 32% (95% CI = 12-55%, p < 0.01) in the refusing group.

Conclusion: Systematic and random changes in bladder volume during Pca IGRT are relatively insensitive to bladder filling in Pca IGRT, provided the Sim volume is not excessive (> 500mL). Volumes at Sim are statistically significantly different between groups, so there may be implications for dose planning. We have proposed a follow-on project to measure the effect of changing the drinking instructions, so men are advised to drink and practice holding as much water as they can comfortably tolerate without voiding for 1 hour.

EP-2094 Can Radiation Oncologist delegate to Therapist the kv setup control in patients with pelvic cancers?

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Purpose or Objective: Check of patients’ set-up is mandatory in modern radiation therapy. The aim of this preliminary analysis is to investigate the possibility to delegate to Radiation Therapists (RT) the evaluation of two-dimensional orthogonal kv/kv imaging of pelvic cancers.

Material and Methods: Paired orthogonal kv images of patients who underwent pelvic irradiation were independently evaluated by a trained RT (on-line control) and a Radiation Oncologist (RO, off-line control). If a displacement of the isocenter larger than 5 mm was observed, the RT had to call the RO to verify and confirm such displacement. The difference of measures and the agreement between RO and RT decisions were calculated. Results are presented as mean values, and population systematic (E) and random (o) errors. SPSS software was used for the statistical analysis.

Results: From March 2015 to September 2015, 904 images’ pairs were obtained from 40 patients (10 prostate, 15 rectal, and 15 gynaecological cancers). A difference 3 mm was recorded in 766/904 (85%) paired images. A difference between 3 and 5 mm was recorded in 94/904 (10%) paired images. Forty-two/904 (4%) checks required on-line evaluation by the RO. In anteroposterior (AP), craniocaudal (CC) and mediolateral (ML) directions, systematic errors were 0.7, 0.4 and 0.8 mm, and random error were 0.2, 0.1 and 0.1 mm, respectively. Mean radial displacement was 2.6 mm (range 0-16 mm). CTV to PTV margins calculated by van Herk’s formula were 3.3, 2.3 and 3.0 mm (AP, CC and ML directions, respectively).

Conclusion: These data suggest that inter-observer variability between RT and RO is within few mm, therefore on-line kv/kv images’ evaluation could be delegated to RT after an adequate training period. Such kind of quantitative analysis can be used to define a proper action level to call for RO intervention. Similar study is currently ongoing to assess inter-observer variability for CBCT evaluation.

EP-2095 A retrospective evaluation of the feasibility of automatic prostate matching in IGRT

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Purpose or Objective: The current practice for prostate localisation in some centres is an automatic match to the bony anatomy of the pelvis. The prostate moves independently of bone and so its true motion may not be accounted with this method. An automatic match to the prostate may be more accurate. The purpose of this research it to identify if automatic prostate matching is more accurate than automatic bony matching and assess the impact on CTV-PTV planning margins.

Material and Methods: A retrospective review of CBCT data for 30 consented prostate patients was undertaken (9 CBCT each, n=270). All patients followed a bladder filling and rectal emptying protocol. Using Varian’s On-Board Imager® software, the random; systematic and population mean translational shifts was calculated based on 3 different registration techniques: automatic bone matching; automatic bone matching followed by an automatic volume of interest (VOI) matching; automatic bone matching followed by an automatic volume of interest (VOI) matching and an expert manual CTV match (gold standard). A comparison was made of the CTV-PTV margins required for the two automatic registration methods.

Results: No significant difference in the mean translational shifts was reported between the automatic bone match and gold standard match. A significant difference was seen between the population mean shift of the gold standard match and the automatic prostate match in the anteroposterior direction only (p=0.007). A larger CTV-PTV margin was required for the automatic prostate match when compared with the automatic bone match.

Conclusion: Automatic bone matching is comparable to expert manual matching in this patient group. Automatic prostate matching is not as accurate in the anteroposterior direction and does not allow for a reduction in planning margins.

EP-2096 Risk of rectal bleeding in patients with prostate cancer treated with RT on anticoagulant therapy

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Purpose or Objective: The aim of the study is to evaluate the risk of late rectal bleeding and its association with anticoagulants and/or antiaggregants use in patients receiving radiation therapy for prostate cancer.

Material and Methods: We analyzed 187 patients, age between 50-84, with prostate cancer who were managed from 2009 to 2011 at our institution. They were treated with curative intent intensity-modulated radiation therapy (IMRT 76 Gy/38 fractions) at the level of the prostate and seminal vesicles. The doses delivered to the rectum was evaluated in a manner consistent with ICRU 50-62-83. Dose constraint