

evaluation was performed according to RTOG recommendation for IMRT. Patients were placed in two main categories: no anticoagulants and/or antiaggregants use category during RT and anticoagulants and/or antiaggregants one. Rectal toxicity was evaluated using the Common Toxicity Criteria Adverse Effect (CTCAE v. 4.03) All patients had assumed the anticoagulant and/or antiaggregant therapy before radiation therapy, during treatment as well as during the follow up.

**Results:** 20 of the 73 patients treated with anticoagulant and/or antiaggregant therapy, presented rectal bleeding; while in the group of patients not taking anticoagulants and/or antiaggregants this even occurred in 10 patients of 114 ( $p < 0.001$ ). Of the 20 patients who have received anticoagulant and/or antiaggregant agent who presented rectal bleeding, 8 developed G1 toxicity, 10 had G2 toxicity and 2 patients had G3 toxicity. Of the 10 patients who did not receive anticoagulant and antiaggregant therapy and presented rectal bleeding, 5 patients had G1 toxicity, 4 present G2 toxicity and G3 toxicity only 1 patient.

**Conclusion:** The results of our study found that patients taking anticoagulant and/or antiaggregants therapy undergoing curative radiotherapy for prostate adenocarcinoma have a higher risk of developing rectal bleeding.

#### EP-2097

Patient friendly compression-belt settings in liver stereotactic radiotherapy

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**Purpose or Objective:** Stereotactic radiotherapy of liver metastases is challenging: breathing motion, and the flexibility of the abdominal organs, in particular remaining liver, may be large. This may render a priori imaging for position verification virtually useless. Hence, "decision to treat" may be difficult and stressful.

Abdominal compression may be used to reduce movement and flexibility, but maximum compression is highly uncomfortable and probably intolerable for patients during the entire session (20-30 min). Our institution has chosen to limit compression so that patients can endure it easily during the entire session. This study investigates whether this type of abdominal compression is effective.

**Material and Methods:** In short, a diagnostic 2 phase CT scan was used to locate tumor positions. Belt pressure and marking position (Orfit Industries), were reproduced for each treatment fraction. Each fraction, cone beam CTs (CBCT) were recorded before and immediately afterwards. Scans were matched offline, using deformable image registration (Varian Smart Adapt V13), resulting in "CBCT liver contours". These were checked and adjusted, if necessary. Each CBCT liver contour was compared to original CT contour using absolute volume, center of mass shift (CMS) and dice coefficient (DC). To assess effectiveness of compression, data were averaged for each of the three computed parameters.

**Results:** Until this date, a total of 6 patients were treated using this technique. All 6 tolerated the applied abdominal compression easily during the sessions. Therapists, trained in >> 100 brain or lung stereotactic treatments, reported no exceptional difficulties in fixation, CBCT, and matching. Data from 4 patients, and a total of 24 CBCTs, were eligible for analyses. Liver CBCT volumes appeared to be very similar to CT contours: the average is only 18 cc less, with a maximum of 116 cc. The average CMS in X, Y, Z are 0.14cm (max 0.41cm), 0.05cm (max 0.33cm) and 0cm (max 0.23cm), respectively. Average DC is 0.94, with a range of [0.89 0.99].

**Conclusion:** Difference in volume, center of mass, and even shape are well within the range of standard uncertainties in

stereotactic abdominal radiotherapy. This corroborates with the reported feasibility by therapists treating these patients. In short, the patient comfortable setting of the compression-belt is reproducible and safe to correctly deliver the dose in stereotactic radiotherapy of the liver.

#### EP-2098

Use of a bladder minimum contour for prostate treatment planning to increase comfort and efficiency

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**Purpose or Objective:** Prostate cancer patients often find it difficult to maintain a full bladder throughout the course of their radiotherapy treatment. These bladder filling problems can result in patients being taken out of the treatment room in order to increase bladder filling, leading to treatment delays. The aim of this study was to provide a range of acceptable bladder sizes without compromising the bladder dose constraints.

**Material and Methods:** An audit was carried out with ten patients who attended for IMRT radiotherapy planning for prostate cancer. A minimum bladder volume (bladder min) in each patient was defined by cropping the planning CT (pCT) bladder volume to around 150cc. This new volume was then used in addition to the pCT bladder volume in the IMRT plan optimisation to fulfil the bladder dose constraints. The patients had their bladder volume assessed prior to treatment using a standard CBCT imaging protocol. Retrospective dose calculations were undertaken using the daily CBCT images, and bladder doses were plotted against bladder volume to demonstrate that dose constraints were still being met at the reduced bladder volume. The tolerance doses used are taken from the CHHiP trial protocol.

**Results:** The bladder min contour is used by the treatment radiographers as a visual guide on the CBCT scan taken before each treatment in order to assess whether the patient's bladder is an acceptable size to continue with treatment without compromising bladder tolerance doses.

The volume of the bladder min contour is adjusted to meet the constraints for each individual patient as necessary. The need for patients to be taken out of the treatment room to re-fill the bladder has been reduced and this has resulted in better workflow on the treatment floor. The use of the bladder min contour for prostate IMRT treatment planning is now standard practice in our clinic.

**Conclusion:** The use of the bladder min contour has improved patient comfort without compromising the therapeutic ratio and has aided the radiographers in online review of treatment images.

The implementation of the above has led to a reduction in treatment delays due to the bladder volume obtained at planning CT not being maintained throughout treatment. This has improved the clinic workflow. Patient discomfort is kept to a minimum and repeat CBCT scans have been reduced.

#### EP-2099

Influence of anxiety on reproducibility of cancer patients (pts) repositioning during pelvic RT

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**Purpose or Objective:** The aim of the study was an analysis of an influence of type and intensity of pts anxiety on pts repositioning during planning and delivery of RT to the pelvic area in relation to pts gender, immobilization device, and

assessments: subjective of QoL and objective -of pts repositioning during RT.

**Material and Methods:** 57 pts(28 gynecological cancer females and 29 prostatic cancer males) underwent radical RT to the pelvic area in Radiation Therapy Department of Contemporary Cancer Center in Bialystok, Poland. Pts were immobilized with an AIO SOLUTION by Orfit<sup>TM</sup> set or kneefix plus headrest. Demographic questionnaire one was filled once. Second questionnaire using VAS scale evaluated subjective sensation of anxiety via 20 questions describing events influencing areas: biological social, psychological and somatic. It was filled 3 times: before: localization CT, 1st and 11th fraction (fr) of RT. Heart rate (indicating objective pts anxiety) examination was performed before each evaluation. Reproducibility of pts positioning in relation to X, Y, Z-axes was verified under Elekta accelerator using X-ray volume imaging (XVI).

**Results:** Most of pts exhibit highly increased anxiety before CT. It was decreasing in time but still was significant at the end of RT. Contrary to men, female pts experienced higher anxiety specially in somatic, and biological areas before CT. Males developed the sensation before 1st fr. In pts positioned with hands on their chest significantly worse Y-axis position reproducibility (PR) before 1st fr and significantly higher anxiety ( $p=0,007$ ) was observed before 11th fr of RT ( $p=0,03$ ) comparing to those localized with hands along the body. Higher psychological anxiety was associated with significantly worse average PR in all axes ( $p=0.03$ ,  $R=0,3$ ). Average heartbeat was highest before the 1st while lowest - before 11th fr of RT. Intensity of anxiety was not associated with social situation, experience with cancer among relatives, and the time between diagnosis and start of RT.

**Conclusion:** Since anxiety influences pts repositioning during RT, more attention should be paid by RTT to decrease this emotional status of the pts. Educational events should be organized for RTT to help them overcome the problem of pts anxiety during RT.

#### EP-2100

Effectiveness of the manual correction during positioning patients with prostate cancer

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**Purpose or Objective:** Total shift (TS) in each of the directions along the x, y or z-axis is a sum of shifts resulting from automatic registration (AR) and manual correction (MC) and is described by formula:  $TS=AR+MC$ . Unfortunately, MC is burdened by error resulting from inter-observer variability. The aim of this study was to find the level of MC, above which the use of MC during positioning of the patients with prostate cancer on the helical tomotherapy will be reasonable.

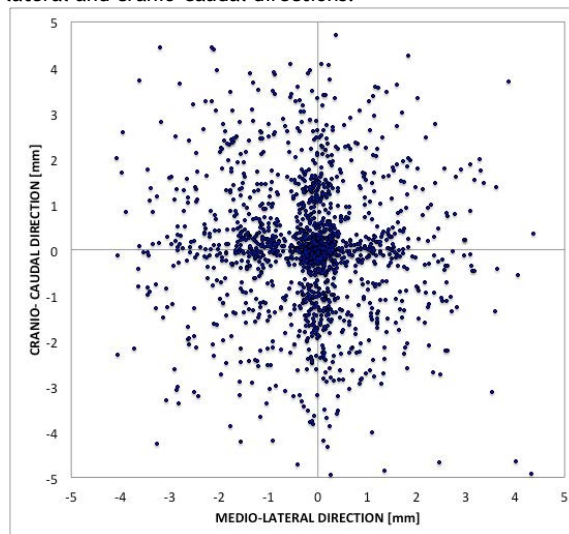
**Material and Methods:** This retrospective study based on the image guidance data gathered from 30 consecutive patients with prostate cancer treated on helical tomotherapy in 2013. The planned dose for each patient was 74 Gy delivered to the prostate or to the prostate and to the basis of the seminal vesicles. The treatment was realized in 37 fractions. Daily MVCT imaging covered whole irradiated region expanded by 10 mm in cranio-caudal direction. The data from each fraction and for every patient (daily MVCT and planned kVCT) were re-registered by five independent observers.

The MCs established by observers were averaged for each fraction and for every patient, respectively. The level of MC, above which usage of MC is reasonable, was recognized on the level of averaged MC higher than 1 mm.

**Results:** 1110 registrations were re-registered by each observer.

Using the condition of the average MC higher than 1 mm, we established that the reasonable MC that should be applied during registrations are respectively: higher than 2 mm in medio-lateral and cranio-caudal directions; and higher than 2.5 mm in antero-posterior direction.

Figure 1 shows averaged manual corrections in the medio-lateral and cranio-caudal directions.



**Conclusion:** Manual correction effectively increase the accuracy of the registrations when the value of the corrections are higher than 2 mm in medio-lateral and cranio-caudal directions and higher than 2.5 mm in antero-posterior direction. Lower values of manual corrections are burdened by error resulting from inter-observer variability and can not be applied to the total shift during registration process.

#### Electronic Poster: RTT track: Other topics for RTTs

#### EP-2101

Inverting a teaching practice

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**Purpose or Objective:** Introduction: The first year radiation therapy (RT) planning paper in the Bachelor of Radiation Therapy, University of Otago, New Zealand covers all of the basic concepts required to be able to plan radiation treatments. As the students' progress through the three years of the programme the concepts remain the same but the application of them becomes more complex. Planning concepts were taught one by one, with the students gaining knowledge and comprehension on each concept. Towards the end of the paper the aim was to be able to apply, analyse and evaluate all of these concepts together to produce a radiation therapy plan. However, students were indicating that although they understood each of the concepts individually they struggled to apply them together and felt underprepared for the clinical placement - the acquisition of knowledge had not led to critical thinking.

**Objectives:** In response to this feedback major changes were instituted to the structure of the paper delivery by essentially reversing the approach. The students' now began by creating and critiquing plans then unpacking and exploring the concepts. The authors wanted to assess the impact this new approach had on the students in their clinical placement.

**Material and Methods:** Method: To assess the preparedness of the students for clinical placement a comparison of the original method of delivery (group A) to the new approach (group B) was undertaken. Six students from group A were invited to participate in a focus group using a semi-structured