Purpose or Objective: Online CBCT pre-treatment registration (Elekta, XVI) for locally advanced cervix carcinoma (LACC) is performed by RTT’s, using a cubic Clipbox-based Volume of Interest (C-VOI) algorithm. Consecutive manual adaptation in order to fulfill the predefined criteria for LACC-registration, implies large shifts. This is suboptimal regarding setup reproducibility, challenges PTV margins and strongly depends on RTT’s experience. The objective is to determine whether the use of a Mask-based VOI (M-VOI) reduces the magnitude of manual shifts and thus is a better starting point.

Material and Methods: Seventeen consecutive image sets (1 representative patient) and 14 sets among them were registered by 2 RTT’s and 1 experienced radiotherapist respectively, both using C-VOI and M-VOI methods (identical Gray Value T algorithm). The M-VOI was generated from the primary CTV which includes the uterus and cervix. Within predefined matching criteria, lymph node regions were not taken into account. Four 3D translations were recorded: after C-VOI and M-VOI autoregistration (AR) and after consecutive C-VOI and M-VOI manual registration (MR). Data was analyzed using SPSS software.

Results: M-VOI and C-VOI AR resulted in statistically significant different translations in all 3 directions (paired T-test \( p < 0.01 \)). The manual shifts afterwards cancelled out the significance in all directions (ANOVA, pairwise comparison, Bonferroni corrected \( p > 0.05 \)). All 3 readers converged towards each other. Nevertheless, values of maximal relative shifts between the readers stayed: x: 0.47 cm, y: 1.06 cm, z: 1.33 cm and x: 0.76 cm, y: 0.68 cm, z: 1.28 cm after C-VOI and M-VOI MR respectively. Plotting the data stresses the importance of the level of experience in LACC-CBCT registration. Comparison of the vector endpoints of C-VOI and M-VOI MR, shows that the experienced reader is able to move the CBCT towards one and the same endpoint, whereas the less experienced readers produce more fanned out point-by-point clouds and tend to vary around the given solution (which stresses the importance of a good starting point). Analysis of the manual shifts (\( \Delta \)) reveals a better performance of M-VOI AR, i.e. smaller shifts are applied. This means that criteria for a ‘good’ match are here inherently taken into account in a better way. Paired T-tests for the shifts either after C-VOI and M-VOI AR should be avoided. Therefore Dual Registration (XVI, Elekta) combined with a written procedure will be the next step in the study.

Conclusion: M-VOI AR is a better starting point than C-VOI AR for pre-treatment CBCT registration of the tumor in LACC. In order to minimize the maximal relative shifts, registration experience should be high. To minimize inter- and intrarreader variability, manual shifts after AR should be avoided. Therefore Dual Registration (XVI, Elekta) combined with a written procedure will be the next step in the study.

OC-0469 Genitalia contouring in anal cancer IMRT; comparisons of volumes with and without a genitalia atlas C. Brooks¹, V. Hansen¹, D. Tait²
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Purpose or Objective: Genitalia as an organ-at-risk in radiotherapy has received little attention in literature. Contours vary widely and IMRT dose constraints in anal cancer (AC) often not met without compromising PTV. Despite IMRT technological advances genitalia toxicity still exists. Study aim: apply a proposed genitalia atlas to a retrospective series of AC patients and quantify the genitalia dosimetric differences between the original genitalia contour as defined by the clinician and the new genitalia contour defined with the aid of the genitalia atlas.

Material and Methods: Sixty AC patients (females \( n = 40 \), males \( n = 20 \)) previously treated with IMRT were retrospectively identified. Four sub-groups were defined: female node negative (FNN) (\( n = 24 \)), female node positive (FNP) (\( n = 16 \)), male node negative (MNN) (\( n = 10 \)) and male node positive (MNP) (\( n = 10 \)). ‘Node negative’ and ‘node positive’ groups are defined as MRI tumour staged with involved nodes. Original genitalia contours for the retrospective treated plan were defined by the clinical oncologist and their interpretation of the departmental protocol. Genitalia were re-contoured following proposed genitalia contouring guidelines, DVH data and genitalia volume of original and new genitalia contours were compared. Statistical significance level of \( P < 0.05 \) is reported.

Results: Table 1 shows the volume and dosimetric differences between original and new genitalia contours. New contours were significantly larger than original. F genitalia received more radiation than M genitalia. Patients with involved nodal disease received more genitalia irradiation than patients without nodal disease. The majority of genitalia contours failed to meet current genitalia dose constraints hence new achievable dose constraints are recommended (figure 1). Dose constraints are rounded to the
The median DVH value of new genitalia contours denotes the optimal constraint and the 75th centile denotes the mandatory constraint. It can be observed that new recommended dose constraints contrast the current dose constraints highlighting the need for gender and tumour stage specific genitalia dose constraints.

**Conclusion:**
Dosimetric differences exist between genders and between patients with and without involved nodes when defining genitalia contours with aid of an atlas. Current generic set of genitalia dose constraints are inappropriate and gender/tumour stage specific constraints have been recommended.

**Purpose or Objective:**
The clinical target volume (CTV) in rectal cancer is subject to large deformations. These deformations result in large margins when a planning target volume (PTV) is constructed with a population based method. A preferred approach uses a library of plans (LoP) and is expected to result in smaller PTV margins. A LoP requires a selection of the best fitting plan based on a Cone Beam CT (CBCT) scan. This triggers the questions: 'Is the visibility of the target volume sufficient for plan selection?' and 'Do the plan selection choices of Radiation Therapists (RTT) coincide?' The purpose of this study is to determine feasibility in plan selection for a LoP in radiotherapy of rectal cancer.

**Material and Methods:** Thirty rectal cancer patients were included in this retrospective study. All patients received a radiation dose of 25 Gy in 5 fractions of 5 Gy, with on-line position verification. Instructions for the patient on the planning-CT were: full bladder and empty rectum. The CTV was defined on the planning-CT (pCT) and contained the mesorectum, presacral area, pelvic lymph node areas and gross tumor volume (GTV). From the this single CTV a library of CTVs was constructed with in-house built software using population statistics on daily rectal deformations. The library consisted of five plans: two larger, two smaller and the original plan, see figure. We performed a baseline measurement with 4 observers (all RTTs). The observers separately selected plans on 150 CBCT scans based on a priori set of instructions (Observer study I). The study was followed by multiple consensus meetings with an experienced radiation oncologist to discuss deviating choices and refine the instructions. A golden standard was determined for each scan. After 5 months the observers were asked to reevaluate the same set of scans based on the refined guidelines (Observer study II).

**Results:**
Observer study I: The scan quality was determined to be sufficient for plan selection. In 69 % of the cases the observers were in accordance with the gold standard. 29 % of all selections deviated by 1 plan and 2% deviated by 2 plans. The consensus meeting revealed that inconsistency in choices arose from inadequate instructions. For instance, should an air pocket rather far from the GTV also be covered within the CTV? Instructions were clarified and more specified. Observer study II: In 87% of the cases the observers were in accordance with the gold standard and 13% of all selections deviated by 1 plan.

**Conclusion:**
The observer study showed a good consistency in selecting the plan that would fit best on the anatomy of that day, even given the suboptimal CBCT image quality. Clinically, the occasional selection of a plan that deviates by one from the gold standard is deemed acceptable by the radiation oncologist. Therefore, plan selection based on daily CBCT by RTT for rectum patients is feasible, albeit room for improvement remains.

**Purpose or Objective:**
In our department, bladder cancer patients with solitairy muscle-invasive bladder tumor are in accordance with the gold standard. 29% of all selections deviated by 1 plan and 2% deviated by 2 plans. The consensus meeting revealed that inconsistency in choices result from inadequate instructions. For instance, should an air pocket rather far from the GTV also be covered within the CTV? Instructions were clarified and more specified. Observer study II: In 87% of the cases the observers were in accordance with the gold standard and 13% of all selections deviated by 1 plan.

**Conclusion:**
The observer study showed a good consistency in selecting the plan that would fit best on the anatomy of that day, even given the suboptimal CBCT image quality. Clinically, the occasional selection of a plan that deviates by one from the gold standard is deemed acceptable by the radiation oncologist. Therefore, plan selection based on daily CBCT by RTT for rectum patients is feasible, albeit room for improvement remains.

**Purpose or Objective:**
In our department, bladder cancer patients with solitairy muscle-invasive bladder tumor are standardly treated with adaptive radiotherapy treatment