the median JI for BS had increased to 0.67 (range 0.65 –0.70) and the median JI for CTV1 had increased to 0.70 (range 0.66 – 0.75).

Conclusions: Target volume delineation varies significantly in head and neck radiotherapy trials. However, it appears that detailed RTQA feedback does improve clinician conformity within the pre-accrual period.

PO-0938
Use of deformation metric for head and neck atlas selection
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Purpose/Objective: Metrics relating to the deformation field between the patient and an atlas have been frequently used in the literature as a method of atlas selection. Two popular metrics in neurology have been the mean and maximum of the deformation after rigid alignment, used as a method to assess similarity between patient and atlas. The aim of this study was to investigate whether this approach is suitable for head and neck atlas selection.

Materials and Methods: 33 structures were contoured to atlas standard according to RTOG guidelines for 10 Head and Neck subjects. A leave-one-out approach was used to auto-contour each case using an atlas-based contouring system (RTx, Mirada Medical, Oxford, UK). Thus, 90 cases with manual ground truth results were available for assessment. The Dice similarity between the patient and selected atlas was calculated on the case as a whole. The mean and maximum absolute deformation distance after rigid registration were measured. The correlation between the deformation metrics and the Dice similarity were calculated using Spearman rank correlation coefficient.

Results: The average Dice similarity for the case as a whole was 0.79.The average and maximum absolute deformations were 16.90mm and 59.31mm respectively. The Spearman rank correlation coefficent was -0.11 for Dice versus mean and 0.02 for Dice versus max.

Conclusions: Poor correlation was found between the deformation metrics and the Dice similarity, suggesting that these metrics are not suitable for atlas selection on a whole case basis for head and neck cancer. These deformation metrics may reflect change in patient position, and it may be more appropriate to measure deformation for individual structures as a method of assessing similarity.

PO-0939
Factors of importance for the need for adaptive re-planning in head and neck IMRT
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Purpose/Objective: Adaptive re-planning is of interest in head and neck IMRT due to anatomical changes with potential dosimetric consequences. It is not clear how and when such re-planning should be performed. Weight loss and tumor shrinkage occur in some but not all patients. The daily volumetric kV-Cone Beam CT (CBCT) taken for positioning may be used to select patients for re-planning. The purpose of this study was to identify factors of importance for the need for adaptive re-planning during the treatment course.

Materials and Methods: Since 2009, we have used daily CBCT for all head and neck cancer IMRT. The daily CBCT acquired at the treatment couch is compared by the Radiation Therapists (RTT) with the planning CT by the using automatic rigid 3D match on the bony anatomy followed by couch shift and treatment delivery. If consecutive daily match results show deviations in the patient anatomy of more than 5mm, re-planning is considered to maintain sufficient target coverage and sparing of organs at risk (OAR). Re-planning is performed on either pre-scheduled mid-course CT or extra CT acquired at the time of observed deviations. A systematic review through the patient records of 378 head and neck cancer patients treated in 2010 and 2011 (30-34 fractions) identified 36 patients (10%) with at least one re-plan during the treatment course. Tumor site, TNM stage, age, body weight twice weekly, HPV status and medication during treatment were collected from patient records and CBCT scans were reviewed off-line. From the daily CBCTs in the online matched position changes in the body outline from planning at the level of cervical vertebra C2 were measured to assess shrinkage of soft tissue near the parotid glands.

Results: A total 36 (10%) of curative head and neck patients were re-planned over a 2 year period. Average time for re-plan was after 14 fractions. Eight patients needed more than one re-plan. Cause of re-planning was improper immobilization in 23 patients, of whom 14 needed a new mask. Six patients had significant weight loss, 4 from tumor shrinkage, 3 from tumor growth and 3 from swelling. Despite interventions with dietary supplements a significant weight loss (3.5%

mean) was observed, most pronounced in the group of patients treated with chemoradiotherapy, who lost 13% weight. Data from more than 1000 CBCT have been collected and investigations of the association between patient weight curve and change in body-outline are ongoing.

Conclusions: The data suggest that adaptive replanning during head and neck cancer IMRT is necessary in about 10% of cases, most commonly due to weight loss and tumor shrinkage, leading to unstable immobilization. The potential role of using anatomical information from the daily CBCT in a prognostic model for the need for replanning is currently being investigated.

PO-0940
The influence of bladder and rectum movement on geographic miss during post-prostatectomy IMRT
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Purpose/Objective: There is little guidance for Radiation Oncologists on appropriate margin for post-prostatectomy IMRT (PP-IMRT) and what importance to place on reproducible bladder and rectal filling. The aims of this study were to quantify prostate bed movement and to determine what amount of bladder or rectum size variation creates the potential for geographic miss.

Materials and Methods: Cone Beam CT images (n=377) of forty patients who received PP-IMRT, were reviewed. Prostate bed motion was measured in the upper and lower segments using the position of surgical clips relative to bony anatomy. The movement was then related to variation of bladder and rectal filling. The frequency of potential geographic misses was calculated assuming a 1cm CTV to PTV margin except 0.5cm posteriorly.

Results: The mean movement of the prostate bed in the anterior/posterior (A/P), superior/inferior (S/I) and left/right (L/R) directions was: upper portion: 0.50cm, 0.28cm, and 0.10cm respectively, and lower portion: 0.18cm, 0.18cm, and 0.08cm. Most geographic misses occurred in the upper prostate bed in the A/P direction. Geographic miss occurred in the A/P, S/I, L/R directions in the upper prostate bed in 18.0%, 1.1%, and 0% of images respectively, and in the lower prostate bed in 1.9%, 0%, and 0% of images respectively. In the upper prostate bed, variations in bladder filling of >2cm larger, ±1cm, or >2cm smaller occurred in 3.5%, 55.7%, and 15.4% of images respectively. These variations in bladder filling resulted in potential geographic misses in 61.5%, 9.5% and 27.6% of these images respectively. In the upper prostate bed, variations in rectal filling of >1.5cm larger, 1.1cm larger to 1cm smaller, and >1cm smaller occurred in 17.8%, 75.1%, and 7.1% of images respectively. These variations in rectal filling resulted in geographic misses in 28.4%, 12.4%, and 63.0% of these images respectively. Bladder and rectum size variation had minimal impact in the lower prostate bed, with less than 2% of all images demonstrating a potential geographic miss

Conclusions: Greatest movement occurred in the upper prostate bed especially in the A/P direction. Potential geographic miss occurred in 20.2% of all images with a 0.5cm posterior margin. Bladder and rectum size changes had greatest potential for geographic miss seen when the bladder increases or the rectum decreases. Therefore ensuring a full bladder and empty rectum at simulation could significantly decrease the frequency of potential geographic miss.

PO-0941
A prospective analysis of inter and intrafractional errors to calculate CTV to PTV margin in HN cancer patients
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Purpose/Objective: To analyse the appropriate CTV-PTV margin in head and neck (HN) carcinomas for our institution.

Materials and Methods: Twenty-three consecutive patients with HN tumors were analysed. Patients were immobilized with a thermoplastic mask fixed to an indexed carbon fiberbase plate fixed to the table coach of the linac. Two orthogonal (anterior-posterior, and lateral) set-up fields were used for the isocenter'sverification. Digitally reconstructed radiographs of those fields were imported into the electronic portal imaging device software for verification purposes. Manually bony anatomy template matching was undertaken in an off-line environment to compare reference images to those acquired daily during treatment in order to extract the displacement errors. Displacements in antero-posterior and in craneocaudal were measured on the lateral portal image. Displacements in cranio-caudal