between the two groups of treatment. The boost administration (p< 0.01), the breast volume (p 0.04), dose inhomogeneities (p<0.01) and boost volume (0.04) were found to be statistically significant as concerns the occurrence of acute skin reaction at the univariate analysis; the boost administration (p < 0.01), and hormone therapy (p 0.01) at multivariate analysis. Other clinical factors such as diabetes or hypertension were not correlated with the development of acute skin reaction. G1 and G2/G3 late fibrosis were 15.3% and 8.1% in patients received chemotherapy and 12.3% and 3.1% in patients who did not receive it, with a significant difference (p=0.045) between the two groups. Diabetes (p 0.04) and boost administration (p < 0.01) were also found to be statistically significant on the occurrence of late fibrosis, but a multivariate analysis adjusted also for clinical tumour characteristics did not show any factors correlated to late fibrosis.

Conclusion: The results of our study, according to the large randomized trials, confirmed that hypofractionated whole breast irradiation is safe, even in patients treated with chemotherapy. Chemotherapy didn’t impact on acute toxicity but only on late toxicity; however the percentage of G2-G3 fibrosis is low (8.1 vs 3.1%). Our study confirmed an increase of acute and late toxicity in patients who received additional boost.

**PV-0514**
Chest wall radiotherapy and complications after flap reconstruction
Y. Yao1, A. Mull1, A. Qureshi2, T. Myckatyn3, J. Zober1
1Washington University in St. Louis, Radiation Oncology, Saint Louis, USA
2Washington University in St. Louis, Plastic Surgery, Saint Louis, USA

**Purpose or Objective:** The effect of radiotherapy (RT) on the outcome of autologous reconstruction after mastectomy for breast cancer is unclear. Advances in technique such as the deep inferior epigastric artery perforator (DIEP) flap and IMRT may affect the complication rate. We seek to retrospectively evaluate the outcomes after flap reconstruction at our institution with a focus on radiotherapy variables.

**Material and Methods:** Patients receiving flap reconstruction after mastectomy at our institution from 2003 -2014 were identified in a chart review. Analysis was limited to patients with a coded cancer status and who returned for at least one follow up visit. The outcome variables analyzed were flap loss or any complication (loss, ischemia, hematoma, infection). Descriptive data analyzed included age, tumor stage, flap type, chemotherapy, and radiation. RT specific variables included radiation at an academic medical center vs independent radiotherapy facility, 3D-CRT vs IMRT, and whether radiation was directed to the internal mammary (IM) region. Analyses was on a per-flap basis rather than per patient. Statistics were done in SPSS using logistic regression. Two prognostic models were generated. The first included all patients and analyzed age, stage, flap type, chemotherapy, and radiation therapy. The second model included only those receiving radiation therapy and included significant factors from the first model and the RT variables discussed above.

**Results:** 291 patients receiving 402 flap procedures met inclusion criteria. Mean age was 47.2 years with median follow up of 339 days. 93 (21.2%) had transverse rectus abdominis (TRAM) flaps, 178 (40.6%) had muscle sparing TRAM flaps, and 121 (27.6%) had DIEP flaps. 128 (29.2%) flaps abdominis (TRAM) flaps, 178 (40.6%) had muscle sparing

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**Conclusion:** Cancer stage and age are important predictors for flap failure and complications. Use of chest wall radiation therapy was not a significant predictor of flap failure.

**PV-0515**
GTV delineation of laryngopharyngeal carcinoma on PET is more accurate than on CT and MRI
1UMC Utrecht, Department of Radiotherapy, Utrecht, The Netherlands
2UMC Utrecht, Department of Radiology, Utrecht, The Netherlands
3UMC Utrecht, Department of Pathology, Utrecht, The Netherlands
4UMC Utrecht, Department of Otorhinolaryngology, Utrecht, The Netherlands

**Purpose or Objective:** Correct GTV delineation is the basis for accurate radiotherapy treatment. It is important to determine which imaging modality (CT, MRI or FDG-PET) results in most accurate GTV delineation. For clinical assessment, both GTV delineations and target volumes adjusted for delineation inaccuracies were compared with histopathology.

**Material and Methods:** Twenty-seven patients with a laryngeal or hypopharyngeal tumor (T3/T4) were imaged with CT, MRI and FDG-PET followed by laryngectomy. Imaging was performed in radiotherapy positioning mask. GTV was delineated in consensus by three observers on CT and MRI, while a semi-automatic delineation was performed on FDG-PET using an intensity based threshold method. The true tumor volume was delineated by one pathologist on whole-mount histopathological sections. These slides were digitized and the specimen was reconstructed in 3-dimensions. The tumor contours were non-rigidly transferred to the imaging acquired before tumor resection. To cover 95% of the outer contour of all tumors, modality dependent target margins were derived and added to the GTV (Fig. 1a). GTVs and target volumes were compared between the modalities.

**Results:** The median tumor volume delineated on pathology was 10.5 ml (range: 3.4 ml - 68.6 ml). Median GTVs delineated on CT, MRI and PET were 17.5 ml, 15.2 ml and 14.8 ml, respectively. None of the GTVs fully covered the pathological tumor volume with a median tumor coverage of 93%, 90% and 87%. In several cases, the position of cartilage invasion was not recognized, which contributed to missing tumor volume.

**Figure 1:** a) A schematic representation of the target margin (blue dotted line) added to the delineated GTV (blue) to cover 95% of the outer surface of the tumor (red). b) Bi-plots of target volumes of all patients are shown for the three modalities.

**Results:** The median tumor volume delineated on pathology was 10.5 ml (range: 3.4 ml - 68.6 ml). Median GTVs delineated on CT, MRI and PET were 17.5 ml, 15.2 ml and 14.8 ml, respectively. None of the GTVs fully covered the pathological tumor volume with a median tumor coverage of 93%, 90% and 87%. In several cases, the position of cartilage invasion was not recognized, which contributed to missing tumor volume.
The modality dependent target margins to cover 95% of the tumor outer contour were 5.6 mm, 8.7 mm and 6.2 mm and resulted in median target volumes of 56 ml, 72 ml and 53 ml for CT, MRI and PET, respectively (Fig. 1b).

Conclusion: In all modalities, delineated GTVs overestimated tumor volume. Nevertheless, some tumor volume was missed in all cases. Automated delineation on PET resulted in the smallest target volume compared to manual delineation on CT and MRI, while covering an equivalent amount of tumor. This study suggests that delineation or segmentation inaccuracies can be corrected using a margin between 5.6 and 8.7 mm.

PV-0516
Guideline development for tumor delineation on MRI images for laryngeal and hypopharyngeal cancer
E. Jager1, N. Raaijmakers1, H. Litgenberg2, J. Caldas-Magalhaes3, T. Schakel1, F. Pameijer3, N. Willems1, C. Terhaard3, M. Philippens1
1UMC Utrecht, Department of Radiation Oncology, Utrecht, The Netherlands
2UMC Utrecht, Department of Radiology, Utrecht, The Netherlands
3UMC Utrecht, Department of Pathology, Utrecht, The Netherlands

Purpose or Objective: Development of guidelines for the delineation of the gross tumor volume (GTV) on MRI is of utmost importance to benefit from the increased visibility of anatomical details and to achieve a more accurate and precise GTV delineation. In the ideal situation, the GTV corresponds to the histopathologically determined “true tumor volume”. In this work we developed and validated guidelines for GTV delineation on MRI by comparison with the tumor outline on histopathology as gold standard.

Material and Methods: Twenty-seven patients with T3 or T4 laryngeal or hypopharyngeal cancer underwent a MRI scan before total laryngectomy. After surgery, whole-mount hematoxylin-eosin stained (H&E) sections were obtained from the surgical specimen. One pathologist delineated all tumor tissue on the H&E sections (tumorH&E). The GTV was delineated on the MR images (T1 w, Gd-T1 w, T2 w) by three independent observers in two sessions. The first session (delineation 1) was performed according to clinical practice. In the second session (delineation 2) the observers used delineation guidelines derived from guidelines for detection of cartilage invasion on MRI: Volumes with increased signal intensity on T2w images and higher signal intensity on Gd-T1w images than that of the tumor bulk were not included in the GTV. The reconstructed specimen was registered to the MR images in order to compare the GTV to the tumorH&E in 3D. Volumes and overlap parameters were analyzed. Distances between the GTV and the tumorH&E were calculated at locations where the tumorH&E was outside the GTV. Subsequently, a margin that accounted for the underestimation of the tumor was determined. Finally, target volumes were created by applying this margin to the GTV.

Results: The median GTVs of delineation 1 (19.4 cm3) and of delineation 2 (15.8 cm3) were larger than the volume of the tumorH&E (10.5 cm3). However, target margins of 10.2 mm and 8.3 mm were needed for delineation 1 and 2, respectively, to compensate for the underestimation of the tumor at specific locations. By adding this margin to the GTVs, the target volumes for delineation 1 (median: 117.6 cm3, mean: 125.9 cm3, SD: 53.2 cm3) were significantly larger than those for delineation 2 (median 76.2 cm3, mean 85.7 cm3, SD: 43.3 cm3).

Conclusion: GTV delineation guidelines on MRI decreased the overestimation of the tumour, resulted in a smaller margin around the delineated GTV needed to include all tumor tissue and consequently resulted in smaller target volumes with the same tumor coverage.

PV-0517
Upfront vs. no upfront neck dissection in primary head and neck cancer radio(chemo)therapy
D. Nevens1, F. Duprez2, K. Bonte3, P. Deron1, W. Huvenne3, A. Laenen4, W. De Neve5, S. Nuys1
1KU Leuven-University of Leuven- University Hospitals Leuven, Radiation Oncology Department, Leuven, Belgium
2Ghent University Hospital, Radiation Oncology Department, Ghent, Belgium
3Ghent University Hospital, Department of Head- Neck & Maxillofacial Surgery, Ghent, Belgium
4KU Leuven-University of Leuven, Leuven Biostatistics and Statistical Bioinformatics Centre, Leuven, Belgium

Purpose or Objective: The benefit of upfront neck dissection (ND) in locally advanced head and neck cancer (HNC) treated with primary (chemo-) radiotherapy (CRT) is debated. Therefore, we retrospectively compared outcome and toxicity between patients with and without upfront ND followed by CRT.

Material and Methods: Two-hundred sixty-four consecutive patients with HNC without metastases at diagnosis and with lymph node stage N2-N3 were included in 2 centers. Patients were all treated between January 2002 and December 2012, and received definitive CRT in center 1 and upfront ND followed by CRT in center 2. Clinical data and outcome were assessed retrospectively. Toxicity was scored using the LENT-SOMA scale at 6, 12, 18 and 24 months after the end of treatment. Both patient groups were compared using a Chi-square test for categorical variables or a Mann-Whitney U test for continuous variables. Descriptive statistics on overall survival (OS) is based on Kaplan Meier estimates. For all other time-to-event outcomes, cumulative incidence function (CIF) estimates were calculated. The difference between both groups on the different outcomes was analyzed using multivariable models, including group and prognostic patient- or tumor characteristics on which the 2 groups were different. All tests were two-sided, and a p-value of less than 0.05 was considered statistically significant.

Results: We included 150 patients in the group without ND (center 1) and 114 patients in the group with upfront ND (center 2). The group comparison is given in Table 1.