injection was monitored on real-time ultrasound using the probe on the endoscope. Patients were monitored for two hours before discharge.

Daily cone beam CT (CBCT) images and 2D kV fluoroscopy (FS) images at fractions 2, 16 and 30 were acquired for setup and evaluation of marker visibility.

Safety visits were planned twice during the RT course.

**Results:** 15 patients were included. A total of 35 markers were injected, 1-3 markers per patient, 0.10-0.30 mL per injection. The marker injections were performed 9-27 days before start of RT.

No pneumothorax, haemorrhage or other serious complications to the marker injection were observed during or after the procedure.

29 of 35 placed markers were available for evaluation; 2 markers disappeared and one dispersed into a tumour cavity. Another three markers were injected in two patients who subsequently did not receive RT; one patient died (not related to the marker) and one patient developed metastatic disease prior to start of RT.

All 29 examined markers remained stable in position relative to original injection site (based on visual assessment) and were visible on planning CT, CBCT and FS images throughout the treatment course (fig.1).

27 of 29 markers were usable for image registration between planning CT and CBCT.

No marker related adverse events were seen during the RT period.

**Conclusion:** The liquid fiducial marker is a safe and clinically useful alternative to solid metal fiducial markers for IGRT of patients with NSCLC and may also be a good alternative for use in IGRT of other solid tumours.

PO-0693

Primary tumor response of locally advanced NSCLC in PET/CTs during radiochemotherapy

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**Purpose or Objective:** Standard of care for patients with inoperable, locally advanced non-small-cell lung cancer (NSCLC) consists in combined radiochemotherapy (RCT) with curative intent. Ideally, radiotherapy planning will be performed based on F18-FDG-PET/CT. Additionally, there is great interest in using the biological signal from PET/CT for assessment of treatment response and outcome prediction. Hypothetically, PET/CT may serve as basis for treatment modification such as dose escalation of radiotherapy for poor responders to RCT. The objective of the presented work was the evaluation of the early primary tumor (PT) response during RCT by means of response (R)-PET/CTs during and shortly after radiotherapy and its correlation with survival.

**Material and Methods:** Between 2011 - 2015, 39 patients with locally advanced NSCLC undergoing conventionally fractionated (2 Gy/day) RCT were prospectively scheduled for three whole-body PET/CT-scans (a radiotherapy planning (RP) PET/CT, a first response PET/CT (1R-PET/CT) 2 weeks after start of RCT and a second response PET/CT (2R-PET/CT) within one week after end of RCT. FDG-uptake of the PT was measured semiquantitatively by means of the maximum standardized uptake value (SUVmax). SUVmax measurements were compared using PERCIST 1.0 criteria.* Here, a response to treatment is defined by a decline of SUVmax of at least 30% (partial metabolic response, PMR).


**Results:** 39 patients (33% female, 67% male) with a NSCLC (59% SCC, 31% adenocarcinoma and 10% other NSCLC) in UICC-stage IIa (5%), IIb (51%) und IIIb (44%) received an average total dose of median 68 (58-76) Gy during a median duration of 49 (39-66) irradiation days. Median GTV size was 58 (15-923) mL. SUVmax was median 14 (5.5-28.3) in the RP-PET/CT median 15 (2-37) days before start of irradiation. 33 patients had a 1R-PET/CT median 15 (13-29) days after start of irradiation and at median 22 (16-40) Gy, with a SUVmax of median 10.5 (3.4-23.7). 36 patients had a 2R-PET/CT median 4.5 (4 days before, 15) days after end of irradiation, with a SUVmax of median 5.45 (1.4-14.3). A PMR was seen in 14/33 (42%) patients in the 1R-PET/CT (PMR1) (compared to the RP-PET/CT), and in 22/30 (73%) patients in the 2R-PET/CT (PMR2) (compared to the 1R-PET/CT). 9/29 (31%) patients reached both a PMR1 and a PMR2 (double PMR), none of these patients experienced a PT-progression during a median follow up of 18 (1.4-53) months after end of irradiation. The 2-year overall survival rate was 75% as opposed to 54% without a double PMR.

**Conclusion:** These preliminary data imply that a double PMR measured in response PET/CTs scheduled during and at the end of RCT for NSCLC is associated with a prolonged overall survival rate.

**PO-0694**

Lung toxicity modelling in thoracic post-operative RT for NSCLC and pleural mesothelioma

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**Purpose or Objective:** Our hypothesis is that NSCLC patients and malignant pleural mesothelioma (MPM) patients treated with thoracic post-operative RT (PORT) are more prone to develop lung toxicity compared to non-surgical NSCLC RT patients. Main objectives are: 1) To quantify the differences in terms of CT lung density changes after PORT for NSCLC and MPM vs. non-surgical RT patients; and 2) To evaluate the correlation between CT lung density changes, dosimetric factors and clinical symptoms (dyspnea).

**Material and Methods:** Two groups of patients were analyzed: a) SURGICAL GROUP (n=27): stage I-II resectable MPM treated with extrapleural pneumonectomy (EPP) and PORT (n=22) and stage I-II NSCLC treated with pneumonectomy and PORT (n=5); b) NON-SURGICAL GROUP (n=35): stage I-IV NSCLC treated with chemo-radiotherapy.
Patients were treated consecutively in the University Hospitals of Leuven between 2005 and 2014 and their data were retrospectively retrieved. PORT MPM patients were treated with RT doses up to 64 Gy in 2-Gy fractions. PORT NSCLC were treated with RT doses up to 60 Gy in 2-Gy fractions. Non-surgical patients were treated with RT doses up to 66 Gy in 2.75 Gy sequentially with chemotherapy or up to 70 Gy in 2 Gy fractions concurrently with chemotherapy. Dyspnea scores (CTCAE 4.03) before and after RT were retrieved and delta dyspnea was calculated as the difference between the dyspnea after RT (worse at any time point) and before RT. For every patient, 2 CT scans were retrieved: 1) CT0: a free breathing planning CT scan; 2) CT3M: deep inspiration breath-hold diagnostic follow up CT scan 3-6 months after the end of RT. CT0 and CT3M were non-rigidly co-registered in MIM. Differences in Hounsfield Unit (delta HU=HU3M-HU0) were represented as the slope of the dose-dependent delta HU between 0 and 20 Gy (expressed in delta HU/Gy). Primary endpoint was delta dyspnea >= 2. Univariate and multivariate logistic regression analysis were performed in order to identify significant predictors of delta dyspnea >= 2. A p-value of < 0.05 was considered statistically significant.

Results: Delta dyspnea >= 2 was observed in 10/27 patients (37%) in the surgical group and in 7/35 patients (20%) in the non-surgical group (chi-square test 3.38, p<0.06). Mean delta HU/Gy was higher in the surgical group (1.67 vs. 0.67, t-test: p=0.04) (see Figure 1). Outcomes of univariate and multivariate analysis are showed in Table 1. The model with MLD, mean delta HU/Gy and mean heart dose appears to better predict a delta dyspnea >= 2 both in the surgical and non-surgical group (although not significant).

Conclusion: Surgical patients after PORT are at higher risk of developing clinically relevant dyspnea (with a delta >= 2) and have a higher increase in lung density (a surrogate of lung damage) compared with non-surgical patients. To strengthen this hypothesis, we will investigate radiation toxicity after more limited surgery (lobectomy) in NSCLC patients. Results will be available by the time of the congress.

PO-0695
Lobectomy vs Stereotactic Ablative Radiotherapy in NSCLC: a multicentric series in four centers
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Purpose or Objective: Purpose Data from prospective randomized clinical trials are lacking in the comparison between lobectomy (LOB) and stereotactic ablative Radiotherapy (SABR) in operable patients (pts) and on-going trials have troubles in recruiting. In inoperable pts SABR achieves a local control of 64-95% in retrospective and 92-98% in prospective trials particularly when over 100 Gy Biological Equivalent Dose (BED) is delivered.

Material and Methods: From 2010 to 2014, 187 pts with stage I-II NSCLC were treated: 133 were male, 54 female. Mean age was 72 years. Cyto-histological prove of NSCLC was available in 167/187 (89.3%): 111 pts had adenocarcinoma, 51 squamous cell carcinoma and 3 other histologies. 133 pts (71.1%) had stage T1 NSCLC, and 54 (29.9%) stage II NSCLC. Ninety-three (49.8%) pts underwent SABR, while ninety-four (50.2%) were submitted to LOB. Pts who underwent SABR received 9-20 Gy/die for 3-7 fractions; BED was superior than 100 Gy for all treatments. Response to SABR was evaluated according to RECIST criteria and toxicity according to CTCAE 4.0 scale. To compare LOB vs SABR, we analyzed outcomes in terms of Local Control (LC), Tumor-Specific Survival (TSS), Metastasis Free Survival (MFS) and Overall Survival (OS) using Kaplan-Meier method and log rank tests to evaluate differences in time-to-event outcomes between LOB and SABR.

Results: At a mean follow up of 23 months (range 6-67), LOB showed a better OS (p<0.014) with a 2- and 5-year OS of 67.6±5.9% and 34.6±15.7% for SABR and 84.1±4.8% and 73.4±6.6% for LOB. SABR achieved the same results in terms of LC with a 2- and 5 years LC of 92.3±2.7% and 80.6±7.9% respectively with a p<0.07. Neither significant difference in frequency of distant metastasis nor in TSS was observed between the two treatment groups (respectively p<0.41 and p<0.50). In SABR group only 3 G3 lung toxicities were found. No other G3 or G4 acute/late toxicity was found. Toxicity was minor in SABR group (1 fatigue G1,1 dyspnoea G1,1 hemoptysis G1); in surgery group we have recorded 7 atrial fibrillation, 2 bleeding, 1 death, 6 prolonged air leak.

Conclusion: SABR using high doses (BED>100) shows similar LC than LOB. Very encouraging results in terms of MFS and TSS with very few toxicity and no excess of tumor-related deaths are obtained with SABR compared with LOB. OS is better in LOB group, apparently being strongly influenced by the selection of pts addressed to surgery.

Poster: Clinical track: Upper Gl (oesophagus, stomach, pancreas, liver)

PO-0696
Prognostic impact of celiac/supraclavicular node metastasis in locally advanced oesophageal cancer
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Purpose or Objective: Most of trials which established the standard treatment of locally advanced oesophageal cancer included M0 stage according to the 6th edition of the AJCC staging system. Now in the 7th edition of AJCC staging system, supraclavicular and celiac lymph node (LN) metastasis are no more classified into M1, but considered as M2 disease. The aim of the current study was to evaluate the treatment outcomes of NACRT followed by surgery in thoracic