Purpose or Objective: To compare patterns of acute and late clinical/radiological lung toxicity following either 3D or image-guided VMAT stereotactic radiotherapy for stage I non-small cell lung cancer (NSCLC).

Material and Methods: In this observational study, we included 148 patients from a prospective mono-institutional SBRT series (time interval 2004-2014). All subjects had peripheral tumors and a prescription BED10Gy (at 80%) in the range 100-120 Gy. The first 95 patients (2004-2010) were planned with 3D-CRT, using multiple non-coplanar fields; a stereotactic body frame was used with CTV-PTV margins of 5 mm (antero-posterior and latero-lateral) and 10 mm (cranio-caudal). The second cohort (2010-2014) included 53 patients, planned with volumetric IMRT, using a single/multi arcs VMAT technique, on a PTV generated with 3 mm margins from a patient's specific ITV (obtained from 4D-CT), with a frameless approach through cone-beam CT guidance. Clinical acute and late toxicities were scored according to RTOG scales; radiological acute (<6 months from SBRT) and late (>6 months post SBRT) toxicity on the basis of modified Kimura and Koenig's classifications, respectively. Student’s T test was used to compare clinical characteristics, and Pearson’s chi square test to compare the incidence of any grade lung toxicity.

Results: Patients and tumors' characteristics were similar and well matched between the groups. PTV volumes were also comparable (35.1 cc for 3D-CRT vs. 40.3 cc for VMAT, p=0.16). Moreover, no significant difference was detected in Mean Lung Dose, converted in 2 Gy equivalent (11.7 vs. 10.4 Gy for 3D-CRT and VMAT, respectively, p=0.13). Frequencies of acute and late clinical toxicity (all grades) were superimposable between 3D-CRT and VMAT (acute: 10.5% vs. 22.6%, p=0.28; late: 4.2% vs. 13%, p=0.09, respectively). The crude rate of RTOG acute ≥ grade 3 radiation pneumonitis was 2.1% after 3D-CRT and 3.8% after VMAT. Acute and late radiological toxicity patterns were also similar between the two cohorts. Figures 1 and 2 depict the incidence and grade of both, according to different treatments. As expected, latent radiological toxicity occurred in approximately 60% of patients, with modified conventional (25% after 3D-CRT vs. 32.6% after VMAT) and mass-like (19.6% after 3D-CRT vs. 17.4% after VMAT) patterns as the most commonly observed findings.

Conclusion: Results of the present study indicate that the pattern of clinical and radiological toxicities following SBRT in peripheral early stage NSCLC treated with comparable BED10Gy is not influenced by the different techniques used for planning and delivery.

EP-1229
Non-small cell lung cancer: marked difference in first failure site depending on histology

L. Nygaard1, I. Vogelius1, K. Håkansson1, S. Langer2, G. Persson2, S. Bentzen3
1The Finsen Center - Rigshospitalet, Department of Oncology- Section of Radiotherapy, Copenhagen, Denmark
2The Finsen Center - Rigshospitalet, Department of Oncology, Copenhagen, Denmark
3University of Maryland Greenebaum Cancer Center, Division of Biostatistics and Bioinformatics, Baltimore, USA

Purpose or Objective: Inoperable non-small cell lung cancer (NSCLC) comprises several histological subtypes, with squamous cell carcinoma (SCC) and adenocarcinoma (AC) being most frequent. The prognosis is poor with current chemo-radiation strategies and treatment intensification is limited by patient tolerance. It is therefore relevant to target experimental therapeutic approaches to a patient’s risk of local versus distant failure. The purpose of the current study was to compare the pattern of first relapse after chemo-radiation for locally advanced pulmonary SCC and AC.

Material and Methods: We retrospectively included 193 patients with locally advanced NSCLC treated with chemoradiotherapy from 2009 to 2012. Patients with initial stage IV (n=17) disease and/or patients with histology other than AC or SCC (n=22) were excluded leaving 155 patient for the analysis. Patients were identified and grouped according to first event as either: loco-regional (LR) failure; intra-cranial distant metastases (ICDM), extra-cranial distant metastases (ECDM); dead without evidence of disease (Dead, NED), with the remaining patients being Alive, NED at latest follow-up in August 2015. The cumulative incidence of events was compared across the histology subtypes, using the competing risk method of Fine and Gray.
Results: Patients received sequential (n=49, 32%) or concomitant (n=93, 60%) chemo-radiotherapy. Eleven patients received radiotherapy alone. Competing risks analysis found a significantly higher rate of ICDM in the AC group compared to SCC (p=0.0004) but no significant difference in incidence of ECDM (p=0.08). LR failure was higher in SCC than in AC (p=0.01). There was no significant difference between the two histology groups in the proportion dying without evidence of disease (p=0.3), see Figure. Restricting the analysis to patients with distant metastases as first site of failure, there was a significantly higher rate of cerebral metastases in AC than in SCC (p=0.04), cf. Table 1.

Conclusion: The pattern of first failure in inoperable NSCLC differs among patients with AC and SCC with intra-cranial distant metastases being more common in AC than in SCC and LR relapse being much more frequent in SCC than in AC. Experimental treatment strategies should be targeting different relapse patterns in various histological subtypes. Intensification of local therapy for example may yield a worse risk/benefit ratio in AC compared to SCC.

Table 1 Pattern of distant failure in AC and SCC

<table>
<thead>
<tr>
<th></th>
<th>ICDM</th>
<th>ECDM</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC</td>
<td>18 (37.5%)</td>
<td>30 (62.5%)</td>
<td>48</td>
</tr>
<tr>
<td>SCC</td>
<td>2 (10.5%)</td>
<td>17 (89.5%)</td>
<td>19</td>
</tr>
<tr>
<td>Total of DM</td>
<td>20</td>
<td>47</td>
<td>67</td>
</tr>
</tbody>
</table>

Nomogram for PFS

Nomogram for OS

Purpose or Objective: In addition to its curative use in early stage lung cancer, stereotactic ablative radiotherapy (SABR) can also potentially be indicated for pulmonary oligometastatic disease. This study aims to retrospectively analyze treatment outcomes and develop nomograms to predict survival.

Material and Methods: From September 2012 to April 2015, treatment outcomes and toxicities for 85 cases of SABR in 72 patients retrospectively reviewed. Prognostic factors were analyzed via multivariate analyses using Cox proportional hazards regression. Using factors that demonstrated to be significant in the Cox regression model, nomograms were constructed and validated internally.

Results: After a median follow-up of 15 months, only 1 patient showed local failure within the radiation field. The local failure-free survival (LFFS) rate at 2 years was 98%. The 1-year and 2-year progression-free survival (PFS) and overall survival (OS) rates were 62% and 48%, and 90% and 72%, respectively. Multivariate analyses demonstrated that controlled primary cancer (p = 0.01), absence of extrapulmonary metastatic disease (p = 0.03), and disease-free interval (DFI) longer than 1 year (p < 0.01) favorably affects PFS. Furthermore, the absence of extrapolumary metastatic disease (p < 0.01) and lower performance status (p = 0.03) increased OS as well. In terms of internal validation, nomograms for PFS and OS revealed C-index of 0.75 and 0.81, and showed a well-fitted calibration curves, respectively. Grade 1 or 2 radiation pneumonitis was found in 37 cases, and grade 1 chest wall pain was found in 1 case. Any grade 3 or higher toxicities were not identified.

Conclusion: SABR demonstrated good local control with tolerable adverse effects for pulmonary oligometastases. Several factors were predictive for survival. Based on these factors, nomograms presented in this study can potentially be a useful tool for the prediction of progression-free and overall survival rates.

EP-1231
Proton and Carbon ion for stage I non-small cell lung cancer: a meta analysis

J. Tian1, Q. Zhang1, X. Wang1
1Gansu Cancer Hospital, Department of Radiotherapy, Lanzhou, China