other than those reported in literature about SBRT and SBRS on abdominal area.

EP-1207
Can DIBH technique be used for SABR of large and mobile tumors of lung and liver? A clinical study
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Purpose or Objective: To assess clinical feasibility, local control and toxicity of deep inspiratory breath hold (DIBH) technique for delivery of SABR for large and mobile tumors of lung and liver.

Material and Methods: All patients suitable to undergo SABR, underwent respiratory training consisting of DIBH on demand for 15-25 seconds at a time. Patients underwent 2 sets of immobilization and imaging, one in DIBH phase and other in free breathing (FB) phase. Respiratory monitoring was performed using Varian RPM system and a 4mm gating threshold window was allowed. Set-up verification was performed using KV imaging and gated cone beam CT both taken in DIBH. All patients were planned with 2-4 arc VMAT using 6MV flattening filter free (FFF) photon beams to a dose of 60Gy in 5 fractions.

Results: 12 patients of lung tumors and 9 patients of liver tumors were treated with DIBH based SABR. In patients with lung tumors, DIBH resulted in 1.53 times higher mean lung volumes (3937 cc vs. 2576 cc, p=0.003). Compared to ITV, 14 times smaller for lung and 1.38 times smaller for liver tumors in DIBH CT compared to FB CT (36.15 cc vs. 53.83 cc, p=0.002, 57.76cc vs. 79.78, p=0.03). All the plans accepted for delivery met the standard criteria (ROSEL for lung and RTOG 1112 for liver) for both target and OAR constraints. On an average, V20 was reduced by 30%(18-38) in DIBH plans compared to FB plans. Time taken to deliver each session in DIBH phase with FFF beams was longer by an average of 2 minutes due to interruptions (maximum 4 interruptions/arc each lasting <10 seconds). Mean setup errors in cm quantified on CBCT were 0.1, 0.2 and 0.1 in vertical, longitudinal and lateral dimensions respectively and a uniform margin (based on Van Herk's formula) of 4mm appears to be safe. Except for 1 patient with symptomatic grade 2 pneumonitis and 1 patient with grade 2 chest wall pain, none had any major toxicities. With a median follow-up of 16 months, 18 month local control was 95%.

Conclusion: DIBH based SABR is clinically feasible and effective and should be considered standard for treating mobile and especially large tumors of lung and liver provided patient is suitable for treatment with DIBH technique. DIBH-CBCT based verification appears to be reproducible and effective to reduce setup errors. A margin of 4 mm appears to be safe in DIBH setting with 4 mm gating threshold window. Despite minimal increase in treatment time, DIBH is an effective way to deliver high throughput high quality SABR.

EP-1208
Radiation-induced pulmonary function change after postoperative radiotherapy in NSCLC
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Purpose or Objective: We aimed to establish the model predicting radiation-induced pulmonary function change after postoperative radiotherapy (PORT) in non-small cell lung cancer (NSCLC).

Material and Methods: From March 2003 to December 2011, 37 patients with NSCLC who underwent PORT were analyzed. All patients took the forced expiratory volume in 1 second (FEV1) at the beginning of PORT and follow-up FEV1 within 6-36 months after the completion of PORT. We calculated mean lung dose (MLD) as a dosimetric parameter of the lung. Simple linear correlation and regression model were implemented to establish the prediction model between MLD and radiation-induced pulmonary function change.

Results: The median absolute value of FEV1 at the beginning of PORT, and follow-up FEV1 were 1.76 L (range, 0.90-3.05), and 1.66 L (range, 0.93-3.08), respectively. Radiation-induced pulmonary function change (follow-up FEV1 minus FEV1 at beginning of PORT) ranged from -0.71 to 0.40 L (median, 0.06). The median MLD of PORT was 12.3 Gy (range, 0.5-20.4). Radiation-induced FEV1 change and MLD showed statistically significant correlation (correlation coefficient = -0.357, p = 0.030). PORT-induced FEV1 change could be predicted by simple linear regression model [FEV1 change (L) = 0.295 - 0.026 MLD (Gy)].

Conclusion: Radiation-induced FEV1 change was significantly correlated with MLD in patients with NSCLC who underwent surgery followed by PORT. Follow-up FEV1 after the completion of PORT can be predicted by simple linear regression model using this correlation.

EP-1209
WBRT plus SRT versus WBRT alone or SRT alone for brain metastases from non-small cell lung cancer
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Purpose or Objective: The benefits of addition of whole brain radiotherapy (WBRT) to stereotactic radiotherapy (SRT) with respect to overall survival of patients with brain metastases from non-small cell lung cancer (NSCLC) are unclear. Most of the published studies addressing this issue recruited the patients with diverse histology and primary sites, with only few focusing on NSCLC. We addressed this issue by evaluating institutional experience in efficacy of SRT plus WBRT vs. SRT alone or WBRT alone in patients with NSCLC.

Material and Methods: The analysis encompassed 143 patients with brain metastases from NSCLC, including 65 with squamous-cell cancer (45.5%), 53 adenocarcinoma (37.1%), 25 NOS (17.4%), SRT alone was used in 52 patients (36.4%), WBRT alone in 33 patients (23.1%) and WBRT plus SRT in 58 patients (40.5%). Two chief subgroups were considered: those with 1-3 brain metastases (121 patients, 84.6%) and those with >3 metastases (22 patients, 15.4%). WBRT doses ranged from 20-30 Gy in 3.0-4.0 Gy per fraction, SBRT was given in 1-6 fractions (median 1 fraction) of 6-22 Gy (median 15 Gy).

Results: 1-year actuarial overall survival was 8%, 6% and 27% for SRT, WBRT and SRT+WBRT, respectively. The difference in overall survival among 143 patients treated with SRS+WBRT vs. SRS or WBRT was highly significant (p<0.0001). The difference in overall survival between SRS+WBRT vs. SRS or WBRT was also apparent in a subgroup of patients with 1-3 metastases (1-year OS of 9%, 0% and 26%, respectively). By contrast, the differences in OS according to treatment were not significant among the patients with >3 metastases. A multivariate analysis showed that out of several variables considered only WBRT alone or SRT alone (HR=1.85, p=0.001) and age over 70 years (HR=2.08, p=0.005) were associated with unfavorable survival.

Conclusion: Although conclusions from this study are limited by non randomized selection of the treatment schedule and some heterogeneity in prescription practice the data presented suggest that combination of WBRT and SRT vs. WBRT alone or SRT alone result in considerably improved
survival among the patients with 1-3 brain metastases from non-small cell lung cancer.

EP-1210
Definitive Radiotherapy with or without chemotherapy for T4N0-1 Non-small Cell Lung Cancer
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Purpose or Objective: To know the failure patterns and survival of T4N0-1 non-small cell lung cancer (NSCLC) treated with definitive radiotherapy.

Material and Methods: Ninety five patients with T4N0-1 NSCLC who received definitive radiotherapy with or without chemotherapy from May 2003 to Oct 2014 were retrospectively reviewed. Standard radiotherapy scheme was 66 Gy in 30 fractions. Main concurrent chemotherapy regimen was weekly Paclitaxel 50 mg/m2 combined with Cisplatin 20 mg/m2 or Carboplatin AUC 2. Primary outcome was overall survival (OS). Secondary outcomes were failure patterns and toxicities.

Results: The median age was 64 (range, 34-90). Eighty eight percent (n=84) of patients had ECOG performance status 0-1 and 42% (n=40) experienced pretreatment weight loss. Sixty percent (n=57) of patients had no metastatic regional lymph nodes. The median radiation dose was EQD2 67.1 Gy (range, 56.9-83.3). Seventy one patients (75%) were treated with concurrent chemotherapy. Among them, 13 patients were also administered neoadjuvant chemotherapy. At the median follow-up of 21 months (range, 1-102), 3-year OS was 44%. Three-year cumulative incidence of local recurrence and distant recurrence were 48.8% and 36.3%. Pretreatment weight loss and combination of chemotherapy were significant factors in OS. Acute esophagitis over grade 3 was occurred in 3 patients and only one grade 3 chronic esophagitis was reported. There was no grade 3-4 radiation pneumonitis.

Conclusion: Definitive radiotherapy for T4N0-1 NSCLC resulted in favorable survival with acceptable toxicity rates and local recurrence was a major pattern of recurrence. For improving local tumor control, the application of intensity modulated radiotherapy and radio-sensitizing agents would be needed.

EP-1211
Prognostic factors in patients with Stage I NSCLC treated with 3-D noncoplanar conformal RT
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Purpose or Objective: To clarify the prognostic factors of this treatment method, we carried out this investigation.

Material and Methods: Eligibility criteria were as follows: maximum tumor diameter not greater than 5cm, PS between 0 and 2, and no limitation regarding age and pulmonary function. Radiotherapy was given with 6MV photon beam by fixed 10 non-coplanar conformal beams to a total dose of 75Gy in 25 fractions in 5 weeks. Irradiation was aiming at the ITV with proper margins. No ENi was given. Between Jan. 2002 and Jan. 2011, 109 eligible cases were treated. Age ranged from 53 to 93 (median 78). The male/female ratio was 79/30. There were 100 PS 1 and 9 PS 2 cases. There were 22 low risk operable cases, 31 high risk operable cases (surgery recommended RT), and 56 inoperable cases. There were 63 T1 tumors and 46 T2. Forty-six cases were central tumors and the other 63 were peripheral tumors. Seventy tumors were adenocarcinoma, 23 tumors were squamous cell carcinoma, and 16 others. Regarding tumor markers, pretreatment CEA was elevated (>5ng/ml) in 26 cases. Using these 8 parameters, multivariate analysis (MVA) for overall survival (OS) and local control (LC) was performed by Cox’s Proportional Hazard Model. Median follow-up period was 67 months.

Results: Five-year LC and OS rates were 84% and 50%, respectively. As for LC, MVA revealed that histology (p=0.0279) was prognostic and PS (p=0.0541) and pretreatment CEA (p=0.0560) had a tendency. As for OS, MVA revealed that gender (p=0.0081) and pretreatment CEA (p=0.0189) were prognostic and operability (p=0.0520) and histology (p=0.0913) had a tendency. On the other hand, age, T-stage or tumor location was not prognostic regarding neither LC nor OS.

Conclusion: Our overall results of this method were promising considering the status of the patients. Regarding LC, adenocarcinomas were better controlled compared with other histologies, and patients with good PS and tumors with normal pretreatment CEA tended to be better controlled. Regarding OS, female patients, patients with normal pretreatment CEA survived better than their counterpart, and operable cases and adenocarcinoma cases tended to survive better than their counterpart, respectively. Unlike other reported series, T2 stage and central tumors did not carry worse prognoses with this treatment method.

EP-1212
Are the encouraging SABR results for NSCLC reproducible outside of pioneering academic institutions?
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Purpose or Objective: Stereotactic ablative radiotherapy (SABR) is an internationally accepted standard of care for the management of early stage medically inoperable NSCLC [1]. However, the issue of whether the excellent results of SABR for lung cancer can also be achieved when patients are treated outside pioneering academic institutions remains a pertinent one [2].

South Tees NHS Trust is a large general hospital with a non-academic cancer centre, serving a population of 1.1 million in the North-East of England. In 2009, we became the first non-academic cancer centre in the UK to establish a SABR programme. To date, over 200 patients have been treated with SABR. We present outcome data of 167 patients with Stage IA-IIb lung cancer, all of whom have at least 6 months of follow up and CT assessment of response.

Material and Methods: Data was collected prospectively between Sept 2009 - Sept 2015. Only patients with stage IA-IIb histologically proven NSCLC or PET +ve growing lesions, and at least 6 months of follow up, were included in the analysis. All patients were treated according to local protocols based on the national guidelines of the UK SABR Consortium. The following risk adapted treatment schedules were used depending on size and location of the tumour: 54Gy in 3 fractions (40patients), 55Gy in 5 fractions (105pts), 60Gy in 8 fractions (15pts), or 50Gy in 10 fractions (7pts)