Conclusion: This retrospective study shows that the SUVmax50 pre-therapeutic signal correlates with the post-therapeutic recurrences in the majority of patients. Pre-therapeutic PET/CT or planning PET/CT is a useful tool to guide the future dose escalation studies.

**EP-1224**

An Australian radiotherapy decision support system with contextual justification

**Purpose or Objective:** There is great potential to utilise a large range of retrospective clinical data as an evidence base in decision support systems (DSS) for cancer prognosis and subsequent personalised treatment decisions. Recently, there were several DSSs built for this purpose using machine learning tools, mainly regression models, Bayesian Networks (BN) and Support Vector Machines (SVM). These machine learning tools provide only a prediction of a class (decision), based on input attributes that were used to build the model, without providing additional information to clinicians about how and why this prediction was made.

**Objective:** To investigate the performance of an alternative machine learning tool in building a lung cancer radiotherapy DSS that provides clinicians with an estimated prediction together with the influencing attributes and their values (evidence) in supporting the decision reached. This will provide contextual justification to clinicians regarding the decisions, which will further help them in deciding whether to adopt the machine prediction or not.

**Material and Methods:** A Non-Small Cell Lung Cancer 2 year survival prediction model was built, using data at Liverpool Cancer Therapy Centre in NSW, Australia. The attributes used to predict the survival were age, gender, ECOG, GTV and FEV1. The machine learning tool used is a Decision Tree which automatically extracts rules from the training data and formulates these as if-then-else patterns. A report of the used rules during the prediction process indicates the effective attributes used to reach the decision. SVM, Regression models and BN were built and tested using the same data set; however, BN possess less, and SVM/Regression models possess none, of this reporting capability as they are learned by analysing probabilities and numerical distances among data points associated with prediction class.

**Results:** The DSS was learnt within the Liverpool Clinic with an unfiltered cohort of 4650 4686 patients. After filtering out patient records with missing values for the used attributes the cohort was reduced to 97 patients treated radically. The area under curve of the Decision Tree, SVM, Regression Model and BN when tested using a rigorous 10 fold cross-validation method respectively was 0.62, 0.62, 0.63 and 0.6. There is no significant difference in the performance between the four tools examined, however, the decision tree also generates an understandable context with every prediction made as a list of supporting attributes like the example in Figure 1.
Results: All patients demonstrated on-treatment reduction in MRI-defined GTV (Figure 1). Average reduction in tumor size from treatment initiation to completion of therapy was 51.0% (median 52.1%) and ranged from 30.5-70.8%. At a time point of fraction six, average reduction in GTV size was 38.2% (median 34.8%). Linear correlation across median values at each time point suggested a consistent decline over time of approximately 4% per day, with the most pronounced changes occurring between the 5th and 6th fractions.

Conclusion: Tumor volume decreased considerably during treatment for most patients undergoing lung SBRT. The dosimetric impact of this degree of MRI-defined tumor volume change during the course of therapy has yet to be assessed. However, adaptive planning during the course of SBRT may be dosimetrically advantageous for sparing of surrounding critical structures, particularly for disease involving the central thorax.

EP-1226
Quality of life in locally-advanced non-small cell lung cancer patients: a systematic review
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Purpose or Objective: Non-small cell lung cancer has a substantial impact on health-related quality of life (HRQoL) of affected patients. Measuring HRQoL in lung cancer patients is an important approach to forecast and assess the relative risks and benefits of a treatment as experienced by patients. A systematic literature review was performed to provide an overview of prospective studies measuring HRQoL in patients with locally-advanced non-small lung cancer (LA-NSCLC) receiving treatment with curative intent, published over the last 10 years.

Material and Methods: The literature search was performed in four electronic databases: PubMed, ScienceDirect, MEDLINE and Embase. The inclusion criteria for the studies were: English language, clinical trial, study population with LA-NSCLC, treatment with curative intent, HRQoL assessment, full text availability and published over the last 10 years.

Results: Only 5 studies out of the 225 potentially eligible studies matched our inclusion criteria. Four of these were randomized controlled trials; one was a prospective cohort study. All studies included radiotherapy at least in one of the evaluated treatment arms. Details of the studies and the analyzed parameters are shown in the table. HRQoL was a secondary endpoint in four studies and a co-primary endpoint in one. No significant treatment-related improvement or deterioration in HRQoL has been reported in the included studies. Variability has been observed in terms of use of HRQoL instruments and statistical analysis.

Conclusion: Evaluation of HRQoL in patients with LA-NSCLC receiving curative intent treatment remains scarce. Reporting and statistical analysis of HRQoL data lacks standardization. More research is needed to address these issues in both clinical trials and daily care of patients receiving radiotherapy as part of their primary treatment for LA-NSCLC. Based on these considerations, a prospective cohort study has been launched in our institute, which aims to evaluate HRQoL, treatment-induced toxicity and neurocognitive functioning in patients with unresectable LA-NSCLC receiving radiotherapy, all or not in combination with concurrent or sequential chemotherapy.

EP-1227
Salvage radiotherapy for regional lymph node recurrence after surgery of non-small cell lung cancer
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Purpose or Objective: To evaluate clinical outcomes of salvage radiotherapy for regional lymph node (LN) recurrence developing after radical surgery of non-small cell lung cancer (NSCLC).

Material and Methods: Between 2008 and 2013, out of patients with NSCLC who achieved complete response (CR) after definitive treatment (surgery with or without chemotherapy), 31 patients developed regional LN (mediastinum, hilum, and supravacuicular area) recurrence (median age, 66 years; stage I, n = 17; stage II, n = 7; stage IIIA, n = 7). The median time from definitive surgery to recurrence was 12 months (range, 3-80). Fifteen patients (48.4%) had single LN recurrence and others had multiple LN recurrence. All patients were irradiated to the recurrent LN area with daily fractions of 2.0 Gy (n = 27), 2.5 Gy (n = 2), or 3.0 Gy (n = 2) by 3D-conformal radiotherapy. The median total dose for recurrent LN was 66 Gy (BED 79.2 Gy10); range, 65.1-79.2 Gy10). Sixteen patients received chemotherapy either.

Results: The median follow-up was 14 months (range, 3-76). After salvage radiotherapy, 16 patients (51.6%) achieved CR, 9 patients (29.0%) partial response, and 6 patients (19.4%) stable disease. After salvage radiotherapy, one- and two-year in-field local control rate was 88.4% and 75.8%, respectively. Only two patients experienced an out-of-field mediastinal recurrence. One- and two-year progression-free survival rate from initial salvage radiotherapy was 73.1% and 50.9%, respectively. Progression site was predominantly distant. Overall, ten of 31 patients (32.3%) were successfully salvaged as CR state. Recurred LN size (<3 vs. ≥3 cm) was a significant prognostic factor for progression-free survival (p = 0.03). Pneumonitis requiring conservative treatment (grade 2 or more) occurred in 5 patients (16.1%). There was no radiation-related mortality.

Conclusion: Salvage radiotherapy for regional LN recurrence after radical surgery was suggested to be an effective treatment option with an acceptable level of toxicity. The recurred node size (3 cm cutoff value) was a strong predictor of progression-free survival. Aggressive salvage radiotherapy should be considered as a front-line treatment in regional LN recurrence of NSCLC.

EP-1228
Pulmonary toxicity after 3D-CRT or VMAT-based stereotactic radiotherapy for early stage lung cancer
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