Purpose/Objective: To evaluate patterns-of-care and patterns-of-outcome after stereotactic body radiotherapy (SBRT) for stage I non-small cell lung cancer (NSCLC).

Materials and Methods: The working group Extracranial Stereotactic Radiotherapy of the German Society of Radiation Oncology (DEGRO) performed a multi-center analysis of practice and outcome after SBRT for stage I NSCLC: 16 German and Austrian centers with experience in pulmonary SBRT were asked for participation.

Results: Data of 582 patients treated in 13 institutions between 1998-2011 were collected; all but one institution were academic hospitals. In 2010, the last full year covered in this analysis, 95 patients in total were treated with SBRT. The median number of patients per institution was 39 (range 8-110) and the median number of patients per institution and year was 5 (range 1-29). Median patient age was 72 years (range 31-92) and median pre-treatment FEV1 was 58% (range 16-129%). Median maximum tumor diameter was 2.5cm. NSCLC was biopsy confirmed in 84.5% of the patients. A time trend to more advanced radiotherapy technologies (nodal staging using FDG-PET, advanced type B dose calculation algorithm, in-room image guidance) was observed. The PTV encompassing dose was increased continuously and reached a plateau of 94Gy±26Gy BED (Q=10Gy) on average in 2006-2011. Patient characteristics (age, performance status, pulmonary function) remained stable over time. Inter-institutional variability was substantial in all treatment characteristics. In contrast, there was no inter-institutional variability in pre-treatment patient age and pulmonary function. After average follow-up of 21 months, three-years freedom from distant recurrence (FFDR), regional recurrence (FFRR) and local progression (FFLP) were 63.4%, 75.4% and 79.6% for all 582 patients, respectively. Three-years overall survival (OS) bi-logistic and 47.1%. The biological effective dose (BED) was the most significant factor influencing all patterns of failure and OS in univariate and multivariate analysis. After ≥106Gy BED as planning target volume encompassing dose (n=164), three-years FFDR, FFRC, and FFLP were 74.8%, 90.4% and 92.5%, respectively; three-years OS was 62.2%. The figure below shows OS depending on stage and irradiation dose.

No evidence for a learning curve of improved results with larger SBRT experience or practice was observed. Radiation induced pneumonitis grade ≥2 was observed in 7.4% of the patients and grade 5 pneumonitis was documented in only two patients. Thirty day mortality after SBRT was 0.5% (n=3).

Conclusions: After irradiation doses ≥106Gy BED, favorable and consistent outcome after SBRT for stage I NSCLC was observed in this multi-institutional analysis despite substantial time-trends and inter-institutional variability in the methodology of SBRT.

OC-0140
A prospective study to compare doctor versus model predictions for outcome in lung cancer patients: pick the winner!

C. Oberije1, G. Nalbantov2, A. Dekker3, B. Reymen4, A. Baardwijk van5, R. Wanders1, D. De Ruyschser1, E.W. Steyerberg1, P. Lambin1
1Maastricht University Medical Centre+, Radiation Oncology (MAASTRO) GROW – School for Oncology and Developmental Biology, Maastricht, The Netherlands
2University Hospital Leuven/ KU Leuven, Department of Radiation Oncology, Leuven, Belgium
3Erasmus Medical Center, Department of Public Health, Rotterdam, The Netherlands

Purpose/Objective: Despite the increasing number of decision making tools, many are not used in daily clinical practice. Implementation might be stimulated if it is obvious that models can offer valuable extra information. We previously reported that prediction models outperformed physicians’ predictions based on chart review. However, physically seeing a patient provides the doctor with extra information. The purpose of this prospective study was to compare predictions based on statistical models to predictions made by the physicians after they had seen the patient.

Materials and Methods: Based on the performance of already published and validated prediction models for lung cancer, we hypothesized that these models would outperform the doctors prediction by at least 0.1 in Area Under the Curve (AUC) of the Receiver Operating Characteristic (ROC). The required sample size for the primary outcome, 2-yr survival, was 128 patients. Model predictions were obtained by experienced radiation oncologists as asked to predict 2 yr survival, dyspnea (≥grade III) and dysphagia (≥grade III) at two time points: 1) after they had seen the patient for the first visit, and 2) after the treatment plan was made. For survival prediction NSCLC patients ≤stage I-IIIB, were included; for dyspnea and dysphagia both NSCLC and SCLC were included. All patients were treated with radiotherapy with or without chemotherapy, did not have surgery, no other tumor≤5 years ago, and no distant metastasis. We compared the performance of the models to the doctors in terms of AUC. To gain more insight in the benefit of using predictions in clinical practice we analysed the positive (PPV) and negative predictive value (NPV) for all possible cut-off values of the probabilities. In addition, Kaplan Meier curves based on TNM stage were made.

Results: At time point 1 the doctors predicted outcome for 121, 139 and 146 patients (2-yr survival, dyspnea and dysphagia respectively). The AUCs of the doctors were 0.56, 0.59 and 0.52, while the models yielded AUCs of 0.71, 0.76 and 0.72, with p-values for difference in AUC of 0.02, 0.06 and 0.03 respectively. The Kaplan Meier curves based on TNM stage could not identify survival risk groups (p=0.33). Predictions at time point 2 were only available for 35, 39 and 41 patients (survival, dyspnea and dysphagia). Results were in line with those at time point 1. The PPVs of the models were generally higher, while the NPVs of doctors and models were comparable, indicating that the models could better identify high risk patients.

Conclusions: Prediction models for lung cancer patients substantially outperformed the physicians’ prediction for all outcomes. The difference between doctors and models did not decrease after the doctors had seen the treatment planning. The models were especially superior in identifying high risk patients and should therefore be implemented in clinical practice to guide decisions.

OC-0141
Reduction of the dose to the elective CTV in HNSCC using IMRT. Dosimetrical analysis and effect on acute toxicity.

S. Nuyts1, M. Lambrecht2, F. Duprez2, J.F. Daisne2, D. Van den Weyengaert3, N. Platteeuw1, Y. Geussens1, M. Voordeekers1, J. Madani2
1University Hospital Gasthuisberg - Radiation Oncology, Radiation Oncology, Leuven, Belgium
2University Hospital Gent, Radiation-Oncology, Gent, Belgium
3Clinique Ste-Elisabeth, Radiation-Oncology, Namur, Belgium
4University Hospital Antwerp, Radiation-Oncology, Antwerpen, Belgium
5University Hospital Brussels, Radiation-Oncology, Brussels, Belgium

Purpose/Objective: Radiation induced toxicity is an important issue in head and neck cancer patients. With the introduction of IMRT into daily practice we are able to minimize doses to organs-at-risk while maintaining adequate tumor coverage. However, the commonly used elective nodal site doses might result in neck fibrosis and dysphagia. The goal of this randomized, multicenter trial was to investigate whether a reduction of the dose to the elective nodal sites and target regions of the swallowing apparatus delivered by IMRT would result in a reduction of both acute and late side effects without compromising tumor control.

Materials and Methods: Two-hundred patients with histologically proven head and neck squamous cell carcinoma were randomly assigned to the standard and experimental arm. In the standard arm the elective nodal volumes (PTVelective) were irradiated up to an equivalent dose of 50Gy in 2 Gy fractions. In the experimental arm an equivalent dose of 40Gy in 2 Gy fractions was delivered to the nodal volumes and the dose to the swallowing apparatus was kept as low as reasonably possible without compromising coverage of the therapeutic PTV (PTVtherapeutic). Toxicity was recorded using CTCAE v3.0 weekly during
Conclusions: Concurrent CTRT is associated with significant better OS and DFS as compared to RT alone (Conventional or Accelerated) without significant increase in late toxicities.

OC-0143
Managing mucositis with humidification during radiotherapy for head and neck cancer: TROG 07.03 RadioHUM results
A. Macar1, S. Porceddu2, C. Milross3, M. Penniment4, T. Fu5, C. Fraser-Brownie6, H. Holy7, M. Bell8, M. King8
1Auckland City Hospital, Radiation Oncology, Auckland, New Zealand
2Princess Alexandra Hospital, Radiation Oncology, Brisbane, Australia
3Royal Prince Alfred Hospital, Radiation Oncology, Sydney, Australia
4Royal Adelaide Hospital, Radiation Oncology, Adelaide, Australia
5Peter MacCallum Hospital, Radiation Oncology, Melbourne, Australia
6Auckland City Hospital, Oncology Research, Auckland, New Zealand
7Auckland City Hospital, Head and Neck Service, Auckland, New Zealand
8Biometrics Matters Ltd, Biometrics, Hamilton, New Zealand
9University of Sydney, PoCOG, Sydney, Australia

Purpose/Objective: To assess the role of domiciliary based humidification (HUM) on the natural history of mucositis during radiotherapy (RT) for head and neck cancer. To evaluate the impact of HUM on patient reported outcomes (PRO).

Materials and Methods: In this phase III multi-site trial, patients with SCC of the oral cavity, oropharynx, larynx, hypopharynx, nasopharynx receiving definitive or adjuvant RT chemotherapy were randomised to either institutional standard of care (control) or HUM using the Fisher and Paykel Healthcare MR880 humidifier. HUM commenced day 1 of RT and continued until CTCAE version 3.0 mucositis clinical exam score (CMuc) was <1. Compliance was recorded electronically. HUM Compliance ratio (HCR) was calculated using the formula: total days of HUM / total days of treatment.

Results: Of 193 patients who could be reached (experimental arm: n=96, standard arm: n=97), 72 patients in each arm were evaluable for HCR and median HCR was 1. HCR of >0.33 was set as the cutoff compromising PTV coverage. This resulted in a significant reduction of median D95 of the PTV elect was significantly lower in the experimental arm than in the standard arm (39.5 Gy vs 49.8 Gy; p<0.0001). Using this strategy we were able to significantly reduce the dose to swallowing structures (Table 1). There was no significant difference in acute mucositis, skin toxicity and weight loss between both groups. During treatment no difference was seen in severe dysphagia. Three months after radiotherapy however there was significantly less grade 3+ dysphagia in the experimental arm compared to the standard arm (2% vs 11%; p=0.03) (Figure 1). At 6 months, no significant difference was seen in locoregional control between both arms (88% vs 92%; p=0.6).

Conclusions: Using IMRT we were able to significantly reduce the dose to the elective nodal volumes and several organs at risk without compromising PTV coverage. This resulted in a significant reduction of severe dysphagia 3 months after radiotherapy, without compromising locoregional control. Further follow-up is necessary to investigate whether these observations translate into a benefit on late treatment related dysphagia without affecting treatment outcome.

OC-0144
Conventional radiotherapy vs. chemoradiotherapy vs. accelerated radiotherapy in advanced head neck cancer
1Tata Memorial Hospital, Radiation Oncology, Thane, India
2Tata Memorial Hospital, Radiation Oncology, Mumbai, India
3Tata Memorial Hospital, Medical Oncology, Mumbai, India
4Tata Memorial Hospital, Surgical Oncology, Mumbai, India

Purpose/Objective: To compare conventional fractionation radiotherapy (RT, Arm A), conventional fractionation RT with concurrent chemotherapy (CTRT, Arm B) and accelerated radiotherapy (ART, Arm C), in terms of survival and toxicity for loco-regionally advanced, non-squamouspan, Squamous Cell Carcinoma Head and Neck (HNSCC).

Materials and Methods: Between April 2000 and October 2007, 179 previously untreated, non-metastatic, Stage III and IV HNSCC were randomised. There were 53, 64 and 62 patients in Arm A, B and C respectively. All patients in Arm A and B, all patients in Arm C received conventional fractionation RT to a total dose of 66-70Gy in 6-7 weeks, five fractions per week. In Arm B, concurrent CT regime consisted of Cisplatin 30 mg/m2/week. In Arm C, the total dose of radiotherapy was same, 6 fractions were administered per week, with concomitant boost being given on Saturday. Analysis was on an intention-to-treat basis.

Results: The median age of cohort was 49 years. The age, sex, primary sites, stage of disease were equally distributed in all three arms. Oropharynx was the most common primary site in all the three arms. The median treatment duration was 49, 51 and 40 days in 3 arms respectively. In arm B, the median number of chemotherapy cycles was 6. The mean and median follow up was 37.7 and 23 months respectively (inter-quartile range 10-59 months). There was a significant difference in the Disease-Free Survival (DFS) and Overall survival (OS) for CT-RT arm compared with the others. The Median DFS in Arm A was 16 months compared to 34 months in Arm B and 10 months in Arm C (p=0.02). Median OS in Arm A was 32 months compared to 76 months in Arm B and 32 months in Arm C (p=0.03). In terms of acute toxicities patients of Arm A experienced fewer Grade 3 or more oral mucositis compared to Arms B & C (11 versus 22 versus 19 respectively). No incidence of G3 or more haematological toxicity was seen during the treatment in either of the arms. There was no difference in grade 3 skin toxicity between the arms (14 versus 15 versus 10 respectively). In terms of late toxicities (RTOG Scale) G2-G3 xerostomia was similar in all the three arms (10 versus 14 versus 11 respectively). Similarly the late toxicity in terms of CMuc was not significantly different in the 3 arms. Salvage surgery was done in 19 patients (4 versus 6 versus 9 respectively in Arms A, B & C). Thirteen patients developed second primary cancer (3 versus 5 versus 5 respectively in Arms A, B & C).

Conclusions: There was no difference in the primary endpoint of AUC CMuc with HUM. There is a trend in the HNRQ PPA suggestive of efficacy with HUM which is reflected in the AUC FSMuc PPA as well but the major difficulties in achieving consistent patient compliance suggests this is not an effective therapy for mucositis in its current format.

SYMPOSIUM: MANAGEMENT OF BRAIN OLIGO-METASTATIC DISEASE

SP-0144
Management of Brain Oligo-Metastatic Disease: The Dose Issue
S.E. Combs
1Univ. Klinikum Heidelberg, Radiation Oncology, Heidelberg, Germany
2Medical University of South Carolina, Medical Oncology, Charleston, USA

Treatment of patients with oligo-metastatic disease has moved into focus since it has been shown that limited disease volume and sites contribute favorably to outcome. This is also relevant in metastatic lesions to the brain. However, due to the dose-response relationship