feasibility and tolerability in a cohort of volunteers. HFPP was applied in patients eligible for breast 3DRT, lung stereotactic RT, locally-advanced lung RT. Durations of breath hold obtained under HFPP for each clinical situation were reported. Dosimetric parameters in free breathing (FB), MI gating, or HFPP conditions were compared. The HFPP was also adapted and tested for thoracic M& PET.

Results: For volunteers, HFPP offered a mean duration time for apnea like breath hold of 10.6 minutes. Transferred in patients, this percussion assisted radiotherapy (PART) was applied with good tolerance in the first 3 patients without patients, this percussion assisted radiotherapy (PART) was applied with good tolerance in the first 3 patients without treatment breaks during the overall fractionated RT. All together, 50 RT fractions have been delivered under PART, and the mean duration of apnea-like breath hold necessary for “beam on” was 7.61 minutes (SD 2.3). HFPP offered a favorable dosimetric profile when compared to MI or FB for these 3 clinical RT situations (table). In addition, the HFPP markedly improved both PET and M& image quality in detecting small pulmonary lesions (figure).

Conclusion: The HFPP allowed prolonged apnea-like breath hold that could be used both for fractionated RT and chest imaging. These preliminary results were very promising and prompt to develop larger studies to evaluate its reproducibility and potential clinical benefits both for radiotherapy and for lung PET/MRI imaging.

OC-0139
Expert knowledge vs. data-driven algorithms: Bayesian prediction models for post-radiotherapy dyspnea
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Purpose or Objective: Moving away from guideline-based treatment to a more personalized approach requires accurate outcome prediction. Yet, physicians’ predictions of survival and toxicity after lung radiotherapy are as good as flipping a coin (Oberije et al., Radiother. Oncol. 2014). We hypothesize that the physicians’ knowledge of complex interactions between clinical variables and treatment outcomes is a valuable resource for prediction modelling. Therefore, we created and compared expert-based and data-driven prediction models. The predicted endpoints are severe dyspnea (CTCAE dyspnea score 2) and increases in the CTCAE dyspnea score after radiotherapy (RT). Severe dyspnea occurs in approximately 15% of all patients treated with lung radiotherapy and has a possibly severe impact on patients’ quality of life.

Material and Methods: Data from 1152 lung cancer patients treated in clinical routine (2006-2015, partially incomplete data) were used. Seven experts selected causal links between 19 variables (patient, disease, treatment, and dose-related variables) and post-RT dyspnea to construct Bayesian Networks (BNs). Their individual choices, the consensus choices, and a data-driven algorithm were used to build BNs for both endpoints. 80% of the data were used for model building. Validation was performed for all models in terms of discrimination (Area under the Curve) in the remaining 20% of the data, isolated before modelling.

Results: Expert-based networks were more complex than algorithmically-constructed networks (range: 7-30 vs. 3-6 arcs) but their predictions for severe dyspnea in non-dyspneic patients were not significantly better (see 95% confidence intervals in table). Furthermore, all models besides expert model 6 were not different from chance as AUC confidence intervals include 0.5. Models predicting increases in CTCAE dyspnea scores performed better (all models’ AUCs > 0.6) and different from 0.5 with 97.5% confidence. Among those, the data-driven approach performed significantly better than 3 of the 7 expert models. Consensus networks between experts did not improve the predictive performance.

Conclusion: The results suggest that reliable predictions of post-RT dyspnea scores 2 in non-dyspneic patients are not achievable with any of the presented models. Clinical routine appears to still miss appropriate biomarkers. In contrast, prediction modelling for post-RT increases in dyspnea is feasible with expert knowledge as well as data-driven algorithms. The comparison between expert- and data-driven modelling indicates that data-driven modelling can yield simpler models with similar performance as expert-driven modelling.

OC-0140
Management of patients with extensive-stage small-cell lung cancer: A European survey of practice
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Purpose or Objective: The role of thoracic radiotherapy (TRT) in extensive stage small-cell lung cancer (ES-SCLC) has been evaluated in a recent phase 3 randomised control trial. The results of the Chest Radiotherapy Extensive stage Small cell lung cancer Trial (CREST) were published in the Lancet (2015,385,36-42). This study showed that TRT did not significantly improve 1-year overall survival, which was the primary endpoint. However there was a significant
improvement in 2-year overall survival, suggesting TRT should be considered for all patients with ES-SCLC who respond to chemotherapy. An additional analysis showed that in patients with a response but residual disease after chemotherapy, the difference in 1-year survival was significantly better after TRT (Lancet 2015, 385, 1292-3). We carried out a European survey to determine the impact of the publication on clinical practice.

Material and Methods: In May 2015 an electronic questionnaire of 34 items was composed using Select Survey software designed for running online surveys. Questions covered the use of TRT before and after the CREST study, evaluated the current practice of prophylactic cranial irradiation (PCI), including dose and fractionation, and asked whether practice was restricted based on performance status (PS) and age. The survey was distributed by email to one thoracic clinical/radiation oncologist per centre in 7 European countries. A reminder was sent to non-responders.

Results: This European-wide survey received 95 complete responses (UK n=42, Belgium n=23, Netherlands n=14, France n=8, Switzerland n=5, Germany n=2, Poland n=1). A response rate of 74% was achieved within the UK. Before the publication of the CREST study only 25% of centres were giving TRT routinely to patients who had responded to chemotherapy, compared to the current practice of 81%. Currently the preferred dose and fractionation of TRT is 30 Gy in 10 fractions in 70% of centres, however a wide variety of fractionations were used before the CREST publication. An upper age limit was applied in 88% of all centres, the most common age limit being 75 (60%). An upper limit of PS ECOG 2 is commonly applied to TRT (83%). In the 18 centres (19%) not implementing TRT there were a wide variety of explanations with no single reason standing out. Regarding the practice of PCI in ES-SLC, 96% of centres give PCI routinely if patients have responded to chemotherapy. Of these, 52% deliver 25Gy in 10 fractions and 44% deliver 20Gy in 5 fractions. An upper age limit was applied in 76% of all centres, the most common age limit being 75 (60%). An upper limit for PS was applied in 88% of all centres, most commonly ECOG 2.

Conclusion: Following the publication of the CREST study there has been a dramatic increase in the use of TRT in patients with ES-SLC who have responded to chemotherapy. The dose and fractionation schedule used in the study has widely been adopted as standard practice across Europe. There is also evidence of high consistency in European practice in the use of PCI in patients with ES-SLC.

Proffered Papers: Clinical 4: Late breaking abstracts

OC-0141 Does an integrated boost increase acute toxicity in prone hypofractionated breast irradiation?
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Purpose or Objective: To compare acute skin toxicity between prone whole-breast irradiation (WBI) with a sequential boost (SeqB) and a simultaneous integrated boost (SIB).

Materials and Methods: 167 patients were randomized between WBI with a SeqB or a SIB. 150 patients were treated at Ghent University Hospital (UZ Gent) and 17 at Liège University Hospital. All patients were treated in prone position to 40.05 Gy in 15 fractions to the whole breast. In the SeqB arm a median dose of 10 Gy in 4 fractions was prescribed to the PTV Boost (CTV to PTV margin of 5 mm). In the SIB arm a median dose of 46.8 or 49.95 Gy (negative and positive surgical margins, respectively) was prescribed to the CTV Boost with dose decay to 40.05 Gy in the first 2 cm around the CTV Boost. In the SeqB arm dose parameters were calculated on the summed plan (WBI + boost). For comparison, a PTV optim was created including the PTV for WBI more than 2 cm away from the CTV Boost as illustrated in Figure 1.

Results: The analysis of dose parameters was done on 146 patients treated at UZ Gent. Reasons for excluding patients were electron boost (2), 3 different plans on 3 different CTs (1) and changed treatment arm due to machine breakdown (1). This latter patient was excluded from the toxicity analysis as well. Patient age was the only significantly different parameter between treatment arms (mean age 59.6 ± 11.0 vs 55.7 ± 10.4 years, p=0.0210). Dose coverage of the CTV Boost was slightly better in the control arm (95% ± 1% vs 97% ± 2%, p<0.01). The volume of the PTV optim and the skin receiving more than 105% of the prescription dose were significantly higher in the SeqB arm than in the SIB arm (27 ± 20% vs 9 ± 6% for the PTV optim and 394 ± 216cc vs 201 ± 125cc for the skin, both p<0.01). In both arms, 6/83 patients developed moist desquamation (primary endpoint). Grade 2/3 dermatitis was significantly more frequent in the SeqB arm (38/83 vs 24/83 patients, p=0.037). In the SIB and SeqB arm, respectively, 36 and 51 patients developed pruritus (p<0.015). The incidence of edema was lower in the SIB arm (59 vs 68 patients), but not statistically significant (p=0.071).

Conclusion: Acute toxicity is not increased using a SIB in prone hypofractionated WBI. In contrast, grade 2/3 dermatitis and pruritus are significantly less frequent. With our SIB-technique, high dose regions outside the boost region are smaller than with a SeqB.

OC-0142 Hypo- vs normofractionated radiation of early breast cancer in the randomised DBCG HYPO trial
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Purpose or Objective: To compare acute skin toxicity between hypo- and normofractionated radiation of early breast cancer in the randomised DBCG HYPO trial.

Materials and Methods: 167 patients were randomized between WBI with a SeqB or a SIB. 150 patients were treated at Ghent University Hospital (UZ Gent) and 17 at Liège University Hospital. All patients were treated in prone position to 40.05 Gy in 15 fractions to the whole breast. In the SeqB arm a median dose of 10 Gy in 4 fractions (negative surgical margins) or 14.88 Gy in 6 fractions (transsection) was prescribed to the PTV Boost (CTV to PTV margin of 5 mm). In the SIB arm a median dose of 46.8 or 49.95 Gy (negative and positive surgical margins, respectively) was prescribed to the CTV Boost with dose decay to 40.05 Gy in the first 2 cm around the CTV Boost. In the SeqB arm dose parameters were calculated on the summed plan (WBI + boost). For comparison, a PTV optim was created including the PTV for WBI more than 2 cm away from the CTV Boost as illustrated in Figure 1.

Results: The analysis of dose parameters was done on 146 patients treated at UZ Gent. Reasons for excluding patients were electron boost (2), 3 different plans on 3 different CTs (1) and changed treatment arm due to machine breakdown (1). This latter patient was excluded from the toxicity analysis as well. Patient age was the only significantly different parameter between treatment arms (mean age 59.6 ± 11.0 vs 55.7 ± 10.4 years, p=0.0210). Dose coverage of the CTV Boost was slightly better in the control arm (95% ± 1% vs 97% ± 2%, p<0.01). The volume of the PTV optim and the skin receiving more than 105% of the prescription dose were significantly higher in the SeqB arm than in the SIB arm (27 ± 20% vs 9 ± 6% for the PTV optim and 394 ± 216cc vs 201 ± 125cc for the skin, both p<0.01). In both arms, 6/83 patients developed moist desquamation (primary endpoint). Grade 2/3 dermatitis was significantly more frequent in the SeqB arm (38/83 vs 24/83 patients, p=0.037). In the SIB and SeqB arm, respectively, 36 and 51 patients developed pruritus (p<0.015). The incidence of edema was lower in the SIB arm (59 vs 68 patients), but not statistically significant (p=0.071).

Conclusion: Acute toxicity is not increased using a SIB in prone hypofractionated WBI. In contrast, grade 2/3 dermatitis and pruritus are significantly less frequent. With our SIB-technique, high dose regions outside the boost region are smaller than with a SeqB.