fractions. Treatments were planned on Eclipse software (Varian Medical Systems, Inc) using 7-9 static fields or two volumetric modulated arcs for delivery on Varian linacs. Kilovoltage free breathing CBCTs were taken both for initial patient positioning and also immediately after treatment. The pre- and post-treatment CBCTs were compared to confirm that the lung tumour remained inside the PTV and to assess the stability and the suitability of the PTV margin used. Comparisons were performed using a visual match by at least two experienced professionals in Varian’s Offline Review software. The time interval between both CBCTs was examined trying to have a measure of the treatment time.

**Results:** There were 44 cases/treatments with pre- and post-treatment CBCTs reviewed. The mean time between the CBCTs (treatment time) was 16.5 ± 6 minutes (range: 10 to 34 minutes). In all cases the tumour was appropriately kept inside the PTV in the post-treatment CBCT. The mean corrections between pre and post-treatment CBCTs were -0.7 ± 1.6 mm (range -5.0 to 3.0 mm) vertically, -0.3 ± 1.7 mm (range -4.8 to 3.0 mm) longitudinally, and -0.4 ± 1.5 mm (range -4.0 to 2.0 mm) laterally.

**Conclusions:** There was no tumour displaced outside the PTV even during relatively slow SBRT delivery in all our lung cancer patients treated with SBRT without any customized immobilization. For our cohort of patients, the PTV margin (5 mm) used was consistent with the measured residual intrafraction motion, also reported in other studies. This experience goes along with the growing trend in frameless, free-breathing SBRT for lung tumours.

154 THE SUITABILITY OF CYTOLOGY AND SMALL BIOPSY SPECIMENS FOR EGFR MUTATION TESTING IN METASTATIC LUNG CANCER
Fred Hsu1, Alex De Caluwe2
1British Columbia Cancer Agency, Abbotsford, BC
2Jules Bordet Institute, Brussels, Belgium

**Purpose:** Obtaining a proper specimen for diagnostic pathology and genetic analysis can be challenging in some patients. The purpose of this study was to examine the diagnostic yield for different specimen types submitted for epidermal growth factor receptor (EGFR) mutation testing in patients with metastatic non-small cell lung cancer (NSCLC).

**Methods and Materials:** A multicentre retrospective study was conducted of patients with a pathologic diagnosis of metastatic non-squamous, NSCLC for the period 2010 to 2012. Patients were identified using a provincial cancer registry. Data was collected on patient characteristics, biopsy characteristics, and diagnostic outcome. All EGFR testing was done at a central lab for frameless, free-breathing SBRT for lung tumours.

155 MILIARY METASTASES ARE ASSOCIATED WITH EGFR MUTATIONS IN ADVANCED NON-SMALL CELL LUNG CANCER
Fred Hsu1, Ted Toriumi1, Alex De Caluwe2
1British Columbia Cancer Agency, Abbotsford, BC
2Jules Bordet Institute, Brussels, Belgium

**Purpose:** Milary metastases arise from widespread hematogenous disease dissemination and are characterized by metastatic nodules that are diffuse, innumerable and small. The purpose of this study was to examine the incidence, prognostic significance, and impact of epidermal growth factor receptor (EGFR) mutations for milary metastases from non-small cell lung cancer (NSCLC).

**Methods and Materials:** Patients were identified from a Provincial cancer registry (British Columbia, Canada) for the period 2010-2012. Inclusion criteria were Stage IV NSCLC at initial presentation and conclusive EGFR mutation testing (for exons 19 and 21). Milary metastases for each organ site were objectively defined as > 15 metastatic nodules of < 1 cm diameter size involving more than one organ lobe and bilaterally distributed. The primary endpoint was the association between EGFR mutations and milary lung, brain, and liver metastases. The significance of EGFR mutation status and milary metastases on survival were assessed using the Cox proportional hazards model.

**Results:** For 543 patients, 422 (77.7%) were EGFR wild type (WT) and 121 (22.3%) EGFR mutation positive (EGFR+). Six (1.1%) patients had miliary brain metastases: two (0.5%) EGFR WT and four (3.5%) EGFR+ (exon 19 = 4; exon 21 = 0). Patients with an exon 19 mutation had a significantly higher incidence of milary brain metastases compared to EGFR WT (p = 0.005). Twenty-nine (5.3%) patients had miliary lung metastases: 15 (3.6%) EGFR WT and 14 (11.6%) EGFR+ (exon 19 = 8; exon 21 = 6). Patients with EGFR+ status had a significantly higher incidence of milary lung metastases compared to EGFR WT (p = 0.002). There was no difference in miliary lung metastases between exon subtypes (p = 0.78). Two (0.4%) patients had miliary liver metastases: two (0.5%) EGFR WT and none EGFR+. In multivariate analysis (MVA), lung (p = 0.47) and lung (p = 0.64) metastases were not significant factors for survival. EGFR+ status was significant for longer survival (p = 0.001) in MVA.

**Conclusions:** Mutations in EGFR predispose to milary brain and lung metastases. The survival outcome of patients with milary brain and lung metastases is not adverse compared to non-miliary metastases.

156 CARO ELEKT QUALITY OF LIFE FOLLOWING STEREOTACTIC ABLATIVE RADIOTHERAPY FOR EARLY STAGE LUNG CANCER: RESULTS FROM THE ROSEL RANDOMIZED CONTROLLED TRIAL AND A SYSTEMATIC REVIEW
Alexander Louie1, Hanbo Chen1, Erik van Werkhoven 2, Egbert Smitt2, Marinus Paul3, Andrew Warner4, Joachim Widder5, David Palma1, Harry Groen6, Ben van den Born6, Katrien De Jaeger3, George Rodrigues1, Ben Slotman3, Suresh Senan3
1University of Western Ontario, London, ON
2Netherlands Cancer Institute, Amsterdam, The Netherlands
3VU University Medical Center, Amsterdam, The Netherlands
4University of Groningen, Groningen, The Netherlands
5Catharina Hospital, Eindhoven, The Netherlands

**Purpose:** One of the purported advantages of SABR as an alternative treatment option to surgery for early-stage non-small cell lung cancer (ES-NSCLC) is health-related quality of life (HRQOL). The purpose of this study is to 1) perform a systematic review of HRQOL following SABR for ES-NSCLC and 2) to describe HRQOL and indirect costing outcomes from the ROSEL randomized trial comparing surgery and SABR for ES-NSCLC.

**Methods and Materials:** In ROSEL, 22 patients with ES-NSCLC were randomized to SABR or surgery before the trial closed due to poor accrual. HRQOL was evaluated at baseline, and then three, six, 12, 18, and 24 months post-treatment using the 30