

**Material and Methods:** We prospectively identified all patients due to receive adjuvant RT to left breast after surgery for early breast cancer, and offered participation. After RT planning scan patients were kept in treatment position and asked to hold their breath for 20 seconds twice, with one minute between attempts. Demographics and patient factors were recorded. Treatment was subsequently delivered as normal with no breath-holding used.

**Results:** Fifty-eight patients were included, median age 60.0 years (range 35.1-85.2), median body mass index 26.8 (18.1-39.3). WHO Performance status was 0-1 in 56, and 2 in 2 patients; 3 patients had mobility issues, 2 were unable to climb on the scanner couch unaided. Seven patients had a diagnosis of chronic respiratory disease, 7 using inhalers regularly. Twenty patients were ex-smokers, 7 current smokers, 31 never smoked. At diagnosis, 6 patients (10%) had ductal carcinoma in-situ, 36 (62%) T1, 15 (26%) T2, and 1 (2%) T3 disease; 9 (16%) had nodal disease; 7 (12%) had full axillary node clearance and 16 (28%) had chemotherapy prior to RT. Fifty three (91%) were successful in breath-holding for both 20 second periods, 2 (3%) were unsuccessful on both attempts. Two (3%) were unsuccessful first, but successful a minute later; 1 (2%) was successful for the first period but not the second.

**Conclusion:** The vast majority of patients from an unselected cohort of patients due to undergo adjuvant RT to the breast or chest wall were able to maintain breath-hold successfully for two 20-second periods one minute apart in a simulated treatment position. No consistent patient factors were identified that would reliably predict success or failure to breath-hold. We anticipate most patients will tolerate breath-holding techniques during breast RT should they be employed more in the future. In the era of stereotactic ablative RT, breath-holding may also become important in other patient cohorts.

#### EP-1179

Preoperative parallel PET/MR predicts the disease free survival in patients with breast cancer

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**Purpose or Objective:** The aim of this study was to determine whether PET/MR could predict disease-free survival (DFS) in patients with operable breast cancer.

**Material and Methods:** Seventy-eight patients with breast cancer were enrolled. All patients underwent preoperative parallel PET/MR: whole body PET/CT at 1 h after 18F-FDG injection, breast dynamic contrast enhanced MR, and breast PET/CT at 2h after 18F-FDG injection sequentially in prone position. All patients were analyzed by diverse parameters (maximum SUV at 1 h [SUV1], maximum SUV at 2 h [SUV2], retention index of SUVmax [RI], metabolic tumor volume [MTV], total lesion glycolysis [TLG], initial slope of the enhancement curve [IS], transfer constant [Ktrans], reflux constant [Kep], extravascular extracellular space volume fraction [Ve], and initial area under the curve [iAUC]). A relationship between covariates and DFS after operation was analyzed using Kaplan-Meier method and multivariate Cox proportional-hazard regression method.

**Results:** The median follow-up of 78 patients was 55 months (31-67 months), and 9 (11.5 %) patients developed recurrence or metastasis. Among parameters, higher RI ( $p = 0.0010$ ), lower Ktrans ( $p = 0.0046$ ), and lower Ve ( $p = 0.0035$ ) were significantly associated with poorer DFS. In contrast, SUV1,

SUV2, MTV, TLG, IS, Kep, and iAUC were not. On multivariate analysis, RI ( $p = 0.016$ ; HR = 5.20; CI 1.4-19.7), and Ktrans ( $p = 0.035$ ; HR = 0.22; CI 0.054-0.89) were found as independent predictors of DFS. Patients with higher RI and lower Ktrans revealed a significantly higher recurrence rate (66.7 %) than the rest of patients (6.9 %,  $P < 0.0001$ ).

**Conclusion:** RI and Ktrans measured by preoperative parallel PET/MR can predict DFS in patients with operable breast cancer. The combination of these parameters could make improvement of patients care because tailored surveillance would be applied for high risk group.

#### EP-1180

Postoperative IMRT with helical tomotherapy for breast cancer: outcome and toxicity analysis

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**Purpose or Objective:** Radiation therapy (RT) plays a key role in the management of breast cancer. Intensity-modulated radiotherapy (IMRT) has been shown to provide a more homogeneous dose distribution and to decrease skin toxicity. It covers a wide spectrum of techniques, ranging from static IMRT to helical tomotherapy (HT). HT could be relevant for complex volumes and/or difficult anatomies, but it needs to be evaluated since clinical data are still limited. The objective of this retrospective study is to investigate the short-term outcome and toxicity in a series of patients treated with adjuvant breast HT.

**Material and Methods:** Patients with an indicated breast adjuvant radiotherapy using an IMRT technique were included after a staff discussion. The treatment was performed with HT with concomitant boost if needed: 50 Gy (2 Gy/fraction) over the breast or the chest wall and lymph nodes, 60 Gy (2.4 Gy/fraction) on the tumor bed, 58 Gy (2.33 Gy/fraction) on the mastectomy scar if indicated. Toxicities were evaluated according to the NCI-CTCAE v4.0. A search for factors related to toxicity was conducted using univariate and multivariate analysis.

**Results:** 98 patients were treated between January 2013 and September 2014. The following target volumes were irradiated: breast (53.4%) or chest wall (46.6%), locoregional lymph nodes i.e. internal mammary chain, infra and supraclavicular levels (79.6%). 54.4% of them were treated for left side breast cancer. The acute toxicities were mainly skin toxicity (grade (gr) 1: 63.1%; gr 2: 28.2%; gr 3: 3.9%) and esophagitis (gr 1: 42.9%; gr 2: 15.3%). Other acute toxicities were gr 1 laryngitis (2.0%); gr 2 pneumonitis (1.0%); gr 1 (3.1%) and gr 2 (1.0%) cough. With a median follow-up of 8.4 months (1.1-20.7), there were skin toxicity (gr 1: 41.2%, gr 2: 2.1%) and dysphagia (gr 1: 1.0%). No local recurrence occurred, two metastatic relapse occurred and one patient died (death related to cancer). Factors significantly ( $p < 0.05$ ) correlated with toxicity in multivariate analysis were: breast size and average skin dose for acute skin toxicity; chemotherapy, esophageal D2%, average esophageal dose, esophageal V30Gy and V45Gy for esophagitis. For the short-term skin toxicity, PTV volume, PTV D2% and average PTV dose were associated with toxicity.

**Conclusion:** In this retrospective study with a short follow-up, postoperative breast HT is a well-tolerated treatment for patients in need of a complex irradiation. Several clinical and dosimetrical parameters related to toxicity have been identified.