Purpose: To evaluate the survival benefit of adding vaginal brachytherapy (BT) to pelvic external beam radiotherapy (EBRT) in women with stage III endometrial cancer.

Methods and Materials: The National Cancer Data Base was used to identify patients with stage III endometrial cancer from 2004 to 2013. Only women who received adjuvant EBRT+BT were analyzed. Women were grouped according to receipt of BT. Logistic regression modeling was used to identify predictors of receiving BT. Log-rank statistics were used to compare survival outcomes. Cox proportional hazards modeling was used to evaluate the effect of BT on survival. A propensity score-matched analysis was also conducted among women with cervical involvement.

Results: We evaluated 12,988 patients with Stage III endometrial carcinoma, 39% of whom received EBRT+BT. Women who received BT were more likely to have endocervical or cervical stromal involvement (OR: 2.03 and OR: 1.77; p<0.01, respectively). For patients receiving EBRT alone, the 5-year survival was 66% vs. 69% with the addition of BT at 5 years (p=0.01). Brachytherapy remained significantly predictive of decreased risk of death (HR: 0.86; p<0.01) on multivariate Cox regression. The addition of BT to EBRT did not affect survival among women without cervical involvement (p=0.84). For women with endocervical or cervical stromal invasion, the addition of BT significantly improved survival (log-rank p<0.01). Receipt of EBRT+BT was associated with improved survival in women with positive and negative surgical margins, and receiving chemotherapy did not alter the benefit of BT. Propensity score matched analysis results confirmed the benefit of BT among women with cervical involvement (HR: 0.80; p=0.01).

Conclusions: In this population of women with stage III endometrial cancer the addition of BT to EBRT was associated with an improvement in survival for women with endocervical or cervical stromal invasion.

(S008) Purpose: Stereotactic Body Radiotherapy (SBRT) Is the Standard of Care for Nonoperative Early-Stage Non-Small-Cell Lung Cancer (NSCLC) <5cm, But Use for <5cm Cases Is Considerably Less Defined, With Existing Literature Limited to Small, Single-Institution

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Purpose: Stereotactic Body Radiotherapy for Large (>=5 cm) Non-Small Cell Lung Cancer reports. This multi-institutional study reports outcomes evaluating the largest such population to date.

Methods: Clinical/treatment characteristics, outcomes, toxicities, and patterns of failure were assessed in patients with >=5 cm primary NSCLC without evidence of distant/nodal metastasis that underwent <=5-fraction SBRT. Statistics included Kaplan-Meier survival analyses and univariate/multivariate Cox proportional hazards models.

Results: Ninety-two patients treated from 2004-2016 were analyzed from 12 institutions. Median follow-up was 12 months (15 months in survivors). Median age and tumor size were 73 years (range, 50-95) and 5.4 cm (range, 5.0-7.5), respectively. Median dose/fractionation was 50 Gy/5 fractions. Actuarial local control rates at 1- and 2-years were 95.7% and 73.2%, respectively. Disease-free survival was 72.1% and 53.5% at 1- and 2-years, respectively. One- and 2-year disease-specific survival were 95.5% and 78.6%, respectively. Median, 1- and 2-year overall survival (OS) were 21.4 months, 76.2% and 46.4%, respectively. On multivariate analysis, lung cancer history and pre-SBRT PET SUVmax were associated with OS. Post-treatment failures were most commonly distant (33% of all recurrences), followed by local(26%), and elsewhere lung(23%). Three patients had isolated local failure. Grade 3-4 toxicities included one(1%) and four(4%) cases of grade 3 dermatitis and pneumonitis, respectively. Eleven percent experienced grades 2-5 pneumonitis. One patient had a 7.5cm tumor and 150-pack-year smoking history died of pneumonitis.

Conclusions: SBRT is a safe and efficacious option in this largest study of >=5 cm NSCLC to date.

(S009) In Silico Trial of MR-Guided Mid-Treatment Adaptive Planning for Hypofractionated Stereotactic Radiotherapy in Centrally Located Thoracic Tumors

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Background: Hypofractionated (>5fx) stereotactic radiotherapy (HSRT) may allow for biologically equivalent dose to tumor with a lower risk of organ at risk (OAR) toxicity in centrally located thoracic tumors (CTT). Adaptive planning may further improve OAR sparing while maintaining planning target volume (PTV) coverage. We evaluate potential dosimetric advantages of mid-treatment adaptive re-planning during HSRT for CTT using magnetic resonance image-guided radiotherapy (MR-IGRT).

Methods: Thirteen patients with CTT received HSRT using MR-IGRT. Clinically delivered regimens were 60Gy/12fractions (n=8) or 62.5Gy/10fractions (n=3), with low-field-MR (0.35T) volumetric setup imaging acquired at each fraction. Daily GTV/ OAR were retrospectively re-defined on fx1, 6, and 10 MR-image sets, and tumor volume response was recorded. Simulated initial plans (PI) were created with prescribed dose of 60Gy/12fx based on fx1 MRI. Fx6 and fx10 adaptive plans (PA) were created based on fx6 and fx10 anatomy-of-the-day. All PI/PA were created using an isotoxicity approach with goal 95% PTV coverage, subject to hard OAR constraints, to represent clinically ideal OAR sparing. PI/PA were then compared for projected OAR sparing/PTV coverage.

Results: All patients demonstrated on-treatment MRI-defined GTV reduction (median 52.1%; range 30.5-70.8%). At fx6, median reduction was 34.8%. All PI met initial hard OAR constraints. PI application to fx6 and fx10 anatomy resulted in 8 OAR violations (5/13 patients) and 12 OAR violations (6/13 patients), respectively. All violations observed in fx6 were persistent in fx10; average magnitude of OAR violation was higher in fx6 than fx10. Adaptive planning reversed 100% of OAR violations. In 55% (6/11) of fractions where OAR violation resulted from PI application to fx6/fx10 anatomy, PTV coverage was increased concomitantly with violation reversal.

Conclusions: Midpoint adaptive planning based on tumor response may be dosimetrically advantageous for sparing of surrounding critical structures in HSRT for central thorax malignancies.

(S010) Stereotactic Body Radiotherapy (SBRT) for Operable vs. Medically Inoperable Stage I Non-Small Cell Lung Cancer: Long-Term Five-Year Outcomes and an Assessment by Fractionation Regimen, Tumor Size, and Tumor Location

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Background: SBRT is standard of care for medically inoperable stage I NSCLC, but limited long-term data exist. We hypothesized long-term local control (LC) and cancer specific survival (CSS) would not differ by fractionation schedule, tumor size or location, or operability status, but that overall survival (OS) would be higher for operable patients.

Methods: All consecutive patients treated with SBRT at our institution from 6/2009-7/2013 for Stage I (cT1-2aN0M0) NSCLC were assessed. Thoracic surgeon evaluation determined operability. Central tumor location was defined per RTOG 0813. Post-SBRT imaging with CT or PET/CT was Q3mo in Yrs1-2, Q4mo in Yr3, Q6mo in Yrs4-5, then annually. Local failure, defined as growth following initial tumor shrinkage or progression on 2 consecutive scans, was dated as the earliest scan showing progression.