

## Does dose volume histogram (DVH) predict survival following re-irradiation with stereotactic body radiation therapy (SBRT) for primary lung cancers and lung metastases?

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## Abstract

**Objectives:** The purpose of this study is to analyze composite DVH data for patients treated with at least two courses of radiation to the lung utilizing MIM software correlating lung volumes (V5, V10, V20) to survival.

**Methods:** All patients treated with SBRT to the lung with at least one prior course of external radiation or SBRT to the lung were reviewed. Patients must have recent follow up with known date of death and all dose files available for MIM evaluation. The charts were abstracted for primary site, previous radiation type, age, sex, history of lung surgery and type of surgery/lobe resected, lobe of lung receiving radiation, respiratory status including need for oxygen at last follow up and composite dosimetry including lung V5, V10 and V20 for each patient.

**Results:** Forty nine patients treated with two to four courses of radiation met selection criteria. Seventy eight percent of these patients had primary lung cancer with stages I (n=19), II (n=9), III (n=6), IV (n=3) and unknown (n=1). Twenty two percent of patients had lung metastases from renal (n=2), colorectal (n=5), breast (n=2), liver (n=1), and prostate (n=1) cancer. The initial course of radiation was either conventionally fractionated external beam (n=11) or SBRT (n=38). The median dose of the initial course of radiation was 60Gy for external beam and 53.25Gy for SBRT. The first course of re-irradiation was usually given with SBRT with a median dose of 50 Gy (n=47). Of the 49 patients, 31 had two courses of radiation, 13 had three courses, and 5 had four courses. Median composite V5 from all treatment courses was 39.0% (range= 14.8%-96.0%). Median composite V10 was 20.1% (range= 6.5%-81.2%). Median composite V20 was 7.5% (range= 1.3%-55.3%). Median survival from completion of first course of radiation is 21.5 months and second course of radiation is 10.5 months. Eight patients died with a median interval between first treatment and death of 31 months (range= 11-70 months). Six of these patients died of metastatic disease (with no pulmonary symptoms) while one died of post-operative sepsis (V5=25.7%, V10=13.9%, V20=5.8%) and another of acute respiratory failure/interstitial pneumonitis (V5=74.8%, V10=33.5, V20=19.6%). The median V5 is (51.9/38.7), V10 (23.8/19.7) and V20 (12.3/6.9) between those patients who died vs those alive NED or AWD respectively. Of the eight patients that died, 37.5% had prior lobectomy or greater

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#### Abstract

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compared with 12.2% of the 41 patients alive.

Conclusions: Cumulative dose delivered to the lung in multiple courses delivered over time appear to be more forgiving with regard to survival than would be expected by composite DVH analysis. Further follow up of this group is necessary to ensure stability of these results.