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Title: Stereotactic body radiation does not impair respiratory health in patients with stage I non-small cell lung cancer

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Body: Rationale: Stereotactic body radiation therapy (SBRT) has been used in early stage non-small lung cancer (NSCLC) as an alternative to surgery in patients with poor lung function. With recent technological advances the target volume can be estimated based on the tumor distance from the spine without invasive and potentially risky placement of fiducials. While SBRT provides high cure rate for NSCLC, irradiation raises concerns about lung health and long-term outcomes. We evaluated the effect of SBRT with lung optimization treatment (LOT) on lung function and quality of life. Patients and methods: Between 2011 and 2013, we enrolled 13 patients (74.5±8.7 years, female 46%) with Stage I NSCLC who were not surgical candidates and were offered SBRT due to impaired lung function (predicted postoperative FEV1<40%, DLCO<40%).We followed them for 1 year and recorded pulmonary function, blood gases, 6-minutes walk test and imaging findings. We compared results prior to and 3, 6 and 12 months post SBRT. Karnofsky Performance Status Scale and the Saint George's Respiratory Questionnaire for COPD were used to evaluate life quality. Estimating equation and T-test were performed for statistical analysis. Results: We have found significant reduction in tumor size (p=0.04) following SBRT without significant changes in FEV1 (1.25±0.5L vs.1.67±0.58L, p=0.27), FVC (2.33±0.47L vs. 2.97L±0.48, p=0.3) and DLCO (51.33%±24.1 vs. 51.66%±7.99, p=0.98) at 12 months. Patients tolerated the treatment well with no changes in quality of life. Conclusion: We found that SBRT with LOT provides a safe, effective and non-invasive means to treat patients with early stage NSCLC and advanced lung disease.