



P2660: Longitudinal Decline in Pulmonary Function Following Multiple Courses of Thoracic Radiotherapy

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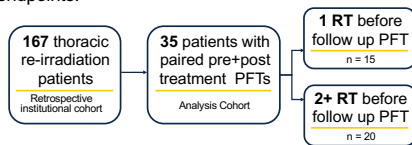
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INTRODUCTION

Pulmonary function decline following thoracic radiotherapy (RT), particularly DLCO, is well documented after single courses of RT in lung and esophageal cancer cohorts. However, in current practice patients increasingly undergo multiple distinct thoracic RT courses for recurrent, progressive, or new thoracic malignancies. Re-irradiation analyses to date focus on feasibility, toxicity, and dosimetry rather than functional longitudinal PFT endpoints linked to prior RT exposure at the time of testing. Comparatively little is known about how pulmonary function changes after repeated thoracic RT exposure. We investigated DLCO changes following multiple courses of thoracic RT and evaluated whether greater prior RT exposure was associated with increased decline in DLCO and other pulmonary function measures.

METHODS

We performed a retrospective chart review of patients at our institution who received ≥ 2 distinct courses of thoracic RT, and we abstracted baseline and follow-up PFTs. Among 167 patients who underwent thoracic re-irradiation, 35 patients had paired pre- and post-treatment PFT data and formed our sample population (25 with 2 thoracic RT courses; 10 with 3 thoracic RT courses). Thoracic RT courses in this cohort were delivered between 2007 and 2024. Because follow-up PFT timing varied relative to successive RT courses, patients were grouped according to the number of thoracic RT courses completed before the follow-up PFT. Individual patient changes were assessed using paired tests (paired t-test or Wilcoxon signed-rank, as appropriate). We evaluated predictors of DLCO change using multivariable linear regression while adjusting for baseline DLCO %pred, age at baseline PFT, and sex. We also evaluated clinically meaningful DLCO decline, defined as DLCO ≥ 10 %-pred point decline or $\geq 15\%$ relative decline, using binary endpoints.



DISCUSSION

Patients demonstrated longitudinal declines in DLCO, FEV1, and FVC following thoracic radiotherapy. DLCO decline was greater among patients whose follow-up PFT occurred after 2+ thoracic RT courses compared with 1 course. Adjusting for baseline DLCO, age, and sex, there was a similar direction of effect for DLCO decline. Clinically meaningful DLCO decline was also more frequent after 2+ RT courses, supporting the potential clinical relevance of repeated thoracic radiation exposure.

These findings add to prior thoracic re-irradiation literature by incorporating patient-level longitudinal pulmonary function rather than focusing primarily on toxicity and dosimetry. The results suggest that serial PFT assessment may help identify patients experiencing meaningful pulmonary functional decline during repeated thoracic RT.

Our interpretation is limited by the retrospective single-institution design, small sample size particularly for patients with 3 RT courses, and variable PFT follow-up timing. Larger prospective studies are needed to define the relationship between cumulative thoracic RT exposure, dosimetry, and long-term pulmonary function.

CONCLUSION

Greater longitudinal DLCO decline was observed among patients with multiple prior thoracic RT courses. This study adds novel patient-level longitudinal pulmonary function data to the thoracic re-irradiation literature. These findings support the importance of pulmonary function surveillance and may help inform risk stratification and PFT-based thresholds when considering repeat thoracic RT.

REFERENCES & ACKNOWLEDGEMENTS

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- Note, AI was used for language editing, poster organization, and figure formatting.



RESULTS

Characteristic	Overall (N=35)	1 RT (n=15)	2+ RT (n=20)	Characteristic	Overall (N=35)	1 RT (n=15)	2+ RT (n=20)
DEMOGRAPHICS				BASILINE PULMONARY FUNCTION			
Age at baseline PFT, years	66.1 $\pm$ 10.2	65.6 $\pm$ 8.5	66.5 $\pm$ 11.5	DLCO, % predicted	67.9 $\pm$ 25.2	68.8 $\pm$ 28.2	67.2 $\pm$ 23.6
Female sex, n (%)	18 (51.4%)	7 (46.7%)	11 (55.0%)	FEV1, % predicted	75.7 $\pm$ 25.9	73.1 $\pm$ 23.1	77.7 $\pm$ 28.3
PULMONARY HISTORY				FEV1, L	1.9 $\pm$ 0.9	1.9 $\pm$ 0.6	1.9 $\pm$ 1.0
Smoking status, n (%)				FVC, % predicted	81.4 $\pm$ 19.9	78.1 $\pm$ 21.0	84.0 $\pm$ 19.1
Never	6 (17.1%)	2 (13.3%)	4 (20.0%)	FVC, L	2.9 $\pm$ 1.1	2.9 $\pm$ 1.0	2.9 $\pm$ 1.2
Former	27 (77.1%)	11 (73.3%)	16 (80.0%)	RADIO THERAPY / FOLLOW-UP			
Current	2 (5.7%)	2 (13.3%)	0 (0.0%)	Total thoracic RT courses, n (%)			
Smoking exposure, pack-years	36 [17-60]	37 [26-58]	32 [15-63]	2 total courses	25 (71.4%)	12 (80.0%)	13 (65.0%)
Baseline lung history, n (%)				3 total courses	10 (28.6%)	3 (20.0%)	7 (35.0%)
None	7 (20.0%)	4 (26.7%)	3 (15.0%)	Baseline PFT $\rightarrow$ RT1 completion, days	91 [35-168]	111 [26-290]	75 [43-114]
COPD/emphysema	26 (74.3%)	9 (60.0%)	17 (85.0%)	Most recent RT $\rightarrow$ follow-up PFT, days	620 [272-1238]	477 [247-1392]	668 [310-1025]
IPF/ILD	0 (0.0%)	0 (0.0%)	0 (0.0%)	Baseline $\rightarrow$ follow-up PFT, days	1422 [734-1826]	826 [464-1545]	1676 [1271-2062]
Other	2 (5.7%)	2 (13.3%)	0 (0.0%)				
Treatment for lung condition, n (%)							
Lung treatment type, n (%)							
Inhalers	24 (68.6%)	9 (60.0%)	15 (75.0%)				
Medications	9 (25.7%)	1 (6.7%)	2 (10.0%)				

Table 1. Patient Characteristics and Baseline Pulmonary Function by Thoracic RT Exposure

