

AbstractID: 4889 Title: RELATING CHANGES IN PULMONARY FUNCTION TESTS (PFTs) TO CHANGES IN RADIATION-INDUCED REGIONAL LUNG PERFUSION

Purpose: To further assess if RT-induced changes in pulmonary function tests (PFTs) can be prospectively predicted based on the sum of predicted RT-induced changes in regional lung perfusion.

Method and Materials: Between 1991 and 2005, 123 evaluable patients with lung cancer underwent pre- and post-RT PFTs (forced volume capacity [FVC], forced expiratory volume in one second [FEV1] and diffusion capacity for carbon monoxide [DLCO]) as part of a prospective trial. Patients with recurrence or death within 6-month post-RT were excluded. The maximal declines in PFTs were noted. The anticipated decline in PFTs was computed by summing the predicted reductions in regional perfusion, throughout the lung, based on a previously-defined population dose-response model [DRC] and the patient's pre-RT SPECT (single photon emission

computed tomography) lung perfusion scan. This "integrated response" is also termed the overall response parameter (ORP):

$$ORP = \sum_{d=0}^{d_{max}} (Vd \cdot Rd) \cdot 100\%$$

where Vd is the percentage volume of lung irradiated to dose d , and Rd is the predicted reduction in regional perfusion at dose d based on a population DRC. Correlations between predicted and measured changes in PFTs were evaluated using 2-tailed Pearson test.

Results: There was a statistically-significant association between the reduction in PFTs (i.e. FVC and DLCO) and ORP, $p < 0.01$; however, correlation coefficients were low (range: 0.24-0.35). Correlations were better in the subgroup of patients without large central tumors (i.e. those often with associated hypoperfusion of adjacent lung on the pre-RT SPECT) and with more than 2 follow-up PFTs post-RT (range: 0.41- 0.62).

Conclusion: The sum of predicted RT-induced changes in regional perfusion is related to RT-induced changes in PFTs, however, correlations are relatively weak. These findings are consistent with our prior analysis involving fewer patients and continue to illustrate that predicting changes in PFTs is extremely challenging.

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