

CLINICAL OUTCOMES FOLLOWING PROTON BEAM THERAPY FOR LOCALLY ADVANCED NON-SMALL CELL LUNG CANCER: ANALYSIS OF A MULTI-INSTITUTIONAL PROSPECTIVE REGISTRY

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Background: For most disease sites, level 1 evidence is lacking for proton beam therapy (PBT). By identifying target populations that would benefit most from PBT, prospective registries could overcome the challenges in clinical trials enrollment. Herein, we report clinical outcomes of patients treated with PBT for locally advanced non-small cell lung cancer (LA-NSCLC).

Method & Materials: Data were obtained from the multi-institutional prospective database of the Proton Collaborative Group (PCG). Inclusion criteria of our study were stage III LA-NSCLC, use of PBT, and availability of follow-up data. Survival time was calculated from the start of treatment until death or last follow-up. Kaplan-Meier curves were generated for groups of interest and compared with log-rank tests. Cox regression modeling was used to evaluate the relationship between selected covariates and overall survival (OS).

Results: A total of 195 patients were included in the analysis. PBT alone was given to 93% of patients with a median equivalent dose in 2 Gy fractions (EQD2) of 63.8 Gy(RBE). Pencil beam scanning (PBS) was used in 20% of treatments. Treatment-related grade 3 adverse events (AEs) were rare: one pneumonitis, two dermatitis, and three esophagitis. No grade 4 events were reported. Two grade 5 events occurred, both cardiological, probably unrelated to PBT. The median follow-up time for living patients was 13.6 months and the median OS was 19.0 months. On multivariate analysis, good performance status (HR=0.26, 95% CI 0.15–0.47, $p<0.0001$), PBS use (HR=0.45, 95% CI 0.20–0.99, $p=0.046$), and increased EQD2 (HR=0.97, 95% CI 0.96–0.98, $p<0.0001$) were associated with decreased mortality.

Conclusion: PBT appears to yield low rates of AEs with encouraging OS for the treatment of LA-NSCLC. PBS use and increased EQD2 can potentially increase OS. Prospective databases such as the PCG registry could play a key role in the future but need meticulous updates to reflect the clinical reality.