

The Effect of Stereotactic Body Radiotherapy (SBRT) Dose-Fraction (fx) Schema on Non-Small Cell Lung Cancer (NSCLC)

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Abstract

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Abstract

Objectives:

Stereotactic body radiotherapy (SBRT) dose-fraction (fx) schema for non-small cell lung cancer (NSCLC) varies at different centers and commonly involves 3 to 5 fx. Additionally, the frequency of treatment per week, or treatment schedules (TS), can also differ. We sought to evaluate and compare the effect of different dose-fx schemas on overall survival (OS).

Methods:

We retrieved data from the National Cancer Database. Patient eligibility included early stage NSCLC with cT1-2 N0M0 disease treated with SBRT using 3-5fx regimens. Demographics and clinical characteristics were identified. Biologically effective dose (BED) and total dose (TD) were calculated. TD included following: 45-60 Gy for 3 fx, 48-60 Gy for 4 fx, and 50-60 Gy for 5 fx. TS was classified as one of the following: daily, every other day, twice per week, or prolonged (less frequently than twice weekly). Non-prolonged TS was defined as daily, every other day, and twice per week. OS was calculated from the date of end of RT to the date of death and censored at the date of last contact. Kaplan Meier method was used to estimate OS and log-rank tests were used to compare the difference between groups. TS was compared pair wisely within each individual fx-group. Univariable Cox proportional models with robust standard errors to account for within institution correlations were used to investigate the association between BED, TD, TS, fx-group and OS. Within each fx-group, BED were also assessed and compared.

Results:

3244 patients were identified, with median age 73. 48% were males and 52% females. 601 (19%) patients received 3 fx, 884 (27%) received 4 fx, and 1759 (54%) received 5 fx treatments. For the overall cohort, median and mean BEDs were 112 and 119, respectively. TS did not show a difference in OS among each individual fx group. Overall, prolonged vs non-prolonged schedules also did not show a difference in OS ($p=0.64$). OS was superior in the 3 fx group compared to 4 and 5 fx groups, with median survival times of 61.5 vs 53.7 vs 52.6 months, respectively ($p=0.046$). Overall, an increase in BED reduced risk of death (HR=0.97 per 10-units, CI: 0.94-0.99, $p=0.04$). When stratified by fx, each 10 unit rise in BED for those treated with 5 fx reduced the risk of death by 8% (HR=0.92, CI: 0.87-0.97, $p<0.01$). However, increasing BED was not associated with change in OS for 3 fx (HR=1.00, CI: 0.93-1.08, $p=0.93$) and 4 fx (HR=1.08, $p=0.08$) regimens. Patients who received BED greater than the median (BED>112) had improved OS compared to those receiving BED≤112 (HR=0.86, $p=0.047$). When evaluating the 5 fx-group individually, BED >100 (median of 5fx group) had superior OS compared to ≤100 (HR=0.80, $p=0.02$).

Conclusion(s):

Three-fraction regimens have superior OS compared to 4 and 5 fx regimens. Higher BED improves OS in 5 fx regimens. Treatment schedule variations among individual fx-groups does not impact OS.